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# MINING AND SCIENTIFIC PRESS

ESTABLISHED 1860. 45th YEAR.

Whole No. 2293.—VOLUME LXXXIX.  
Number 1.

SAN FRANCISCO, CAL., SATURDAY, JULY 2, 1904.

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Single Copies, Ten Cents.

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Office, Stuart and Folsom Streets, SAN FRANCISCO, CAL.  
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**MINING MACHINERY.**  
**GOLD DREDGING,**  
Milling, Concentrating, Pumping, Air Compressing, Water  
Wheels, Hydraulic Elevators.  
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**THE ROESSLER & HASSLACHER CHEMICAL CO.,**  
100 WILLIAM ST., NEW YORK, N. Y.  
**CYANIDE,** AND OTHER CHEMICALS FOR MINING  
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**SULLIVAN MACHINERY CO.**  
(SEE PAGE 8.)

**WE ARE MANUFACTURERS OF  
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WRITE US YOUR REQUIREMENTS.

WE ARE HERE TO ANSWER.

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24-26 FIRST STREET, SAN FRANCISCO.



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**HENDRIE & BOLTHOFF MFG. AND SUPPLY CO.**  
DENVER, COLO.  
STEAM ELECTRICAL AND HYDRAULIC ENGINEERING — MINE AND SMELTER SUPPLIES.

SEE  
ADV.  
PAGE  
19.

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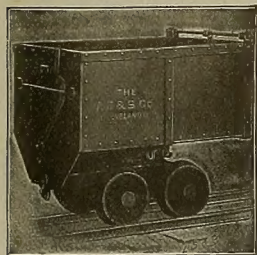
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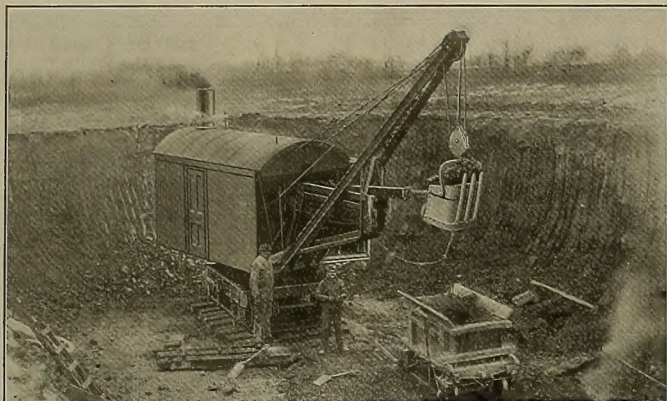
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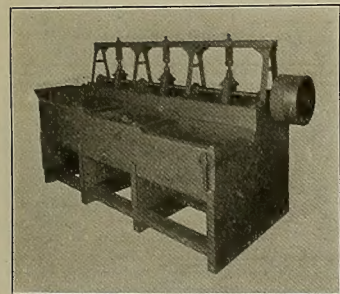
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See our machines at St. Louis Exposition.

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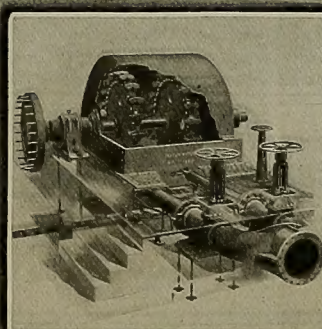
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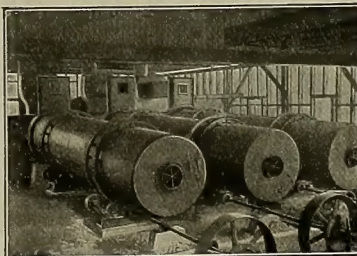
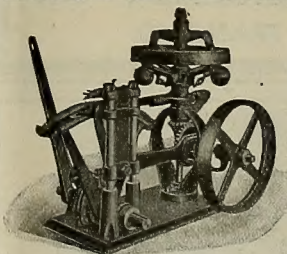
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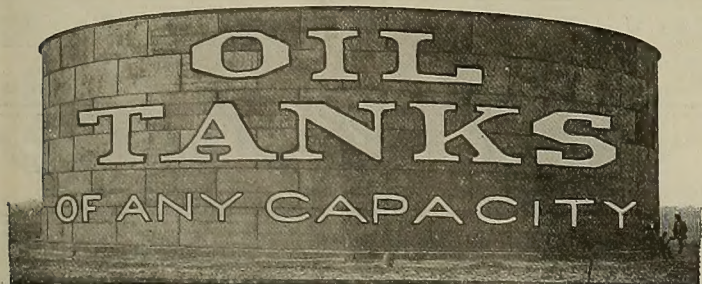
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The power is to be transmitted  
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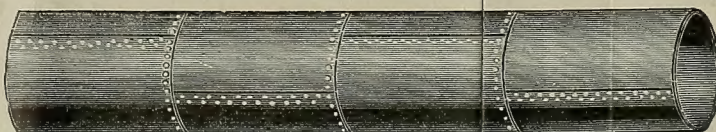
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**STEEL PLATE WORK** OF ANY  
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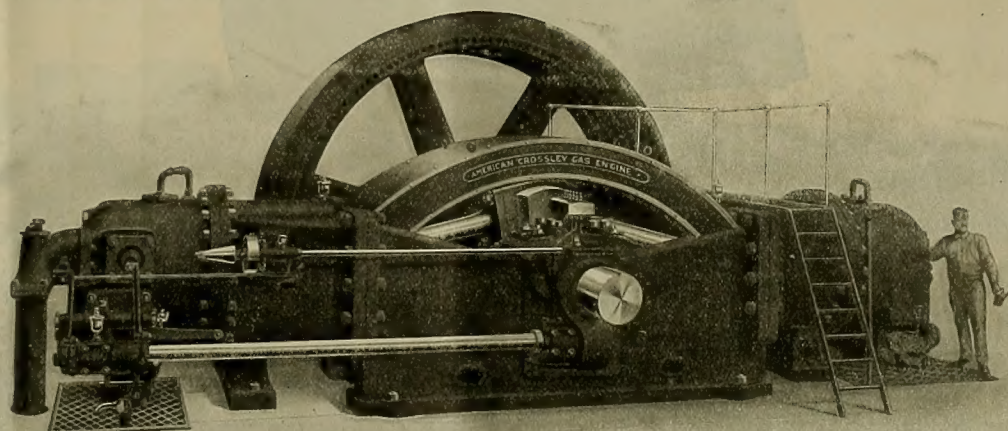


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CROSSLEY GAS ENGINE, 500 BRAKE HORSEPOWER.

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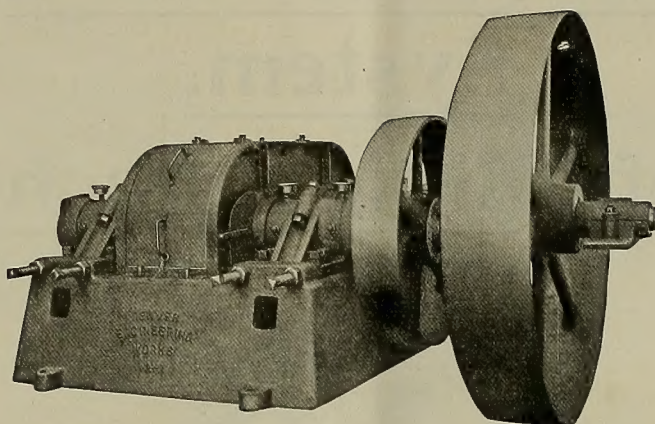
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# CRUSHING ROLLS

With Fixed Bearings and Without Springs.



Mr. Mill Man:

When you stand by your spring-full rolls, and your whole being vibrating in unison with them—and the mill—and you hear the pound of the jumping shells, the rattle of the dancing bolts, and the groan of the elevator loaded with oversize, do you not wish for a machine that would hold together for an hour that you might have peace?

If the springs cause so much trouble, why not do away with them? We make Rolls without springs.

If the proper adjustment on spring rolls is to set up the tension bolts that the shells do not separate when crushing ore, what is the sense of the springs?

It is just as wise to put a spring under every nut on the machine, or under every nail head in your mill.

Are springs used on the rolls in rolling steel rails or structural iron? Not unless they want irregular and oversized rails.

If you desire a uniform product and one less elevator, use our Rigid Rolls, which produce no oversize.

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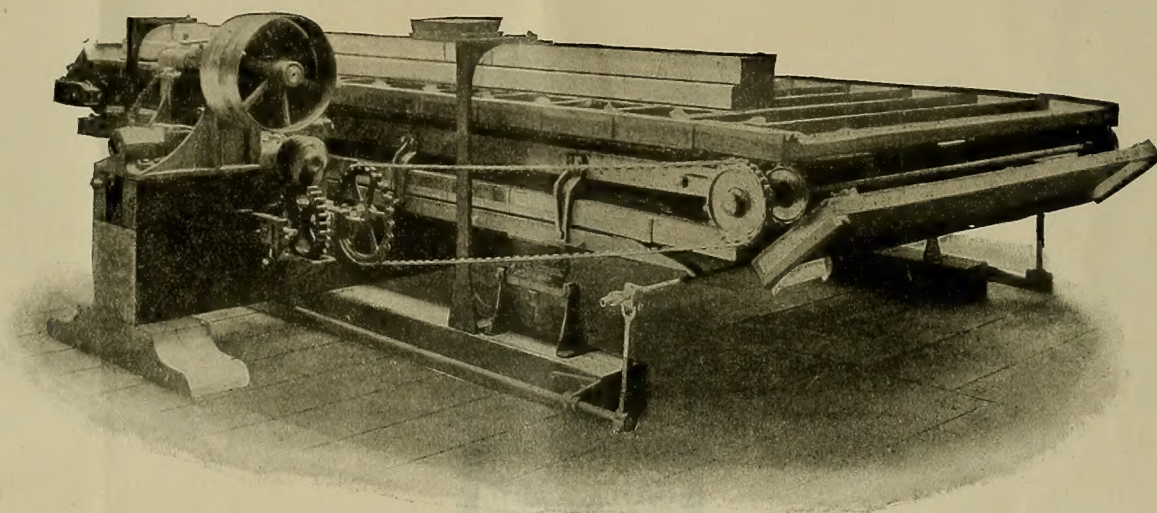


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Are you losing values in your tailings? Insure against such loss by installing the latest and best machine manufactured for handling such material. It has saved money for others, it will do the same for you. Don't delay! Write immediately for Bulletin No. 4. It describes fully the whys and wherefores of



## THE WILFLEY SLIME TABLE.

**THE WILFLEY SLIME TABLE** is an entirely new invention, using new principles for the separation of fine particles of mineral from its gangue.

The table consists of a number of small, shallow troughs having the bottom of each covered with duck or heavy canvas. These troughs are arranged side by side and attached to chain belts, forming in the whole a large belt which moves across the table very slowly, taking about 30 minutes to make one complete revolution. While this belt or series of trays is slowly moving lengthwise of the table an oscillating motion is given to deck crosswise. This motion is produced by a simple movement, similar to that used on the Wilfley Concentrator, the revolution of the belt being produced by worm gear and shaft geared to the head motion eccentric shaft. The belt is driven from this worm shaft by sprocket wheels and link chain. The oscillating motion carries off the particles of silica and gangue, while the smaller particles of ore, concentrates and slimes remain in the divisions or boxes of the main belt and pass slowly over the end of the table, where they gradually reach the under side of the table, and, as they pass over a concentrates box, the values are sprayed by a small stream of water and washed into the concentrates box. The compartments on the main table top or belt come upon the other side of the table cleaned and ready for the feed again. The tailings, silica, etc., pass off the end of the table into launders, which dispose of them on the dump as worthless matter.

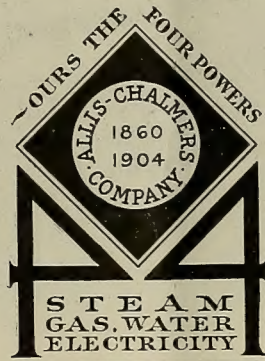
**THE WILFLEY SLIME TABLE** is designed to receive the entire tailings and wash water from one Concentrating Table, and reconcentrate the tailings. The slime table is adjusted to all classes of tailings by a simple adjustment of the stroke and the adjusting screws under the rocker supports.





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## CHICAGO



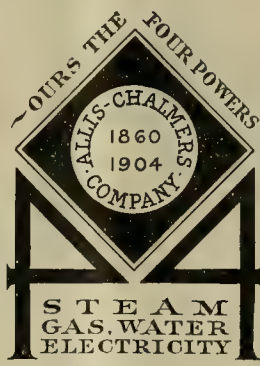
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Electrical Apparatus  
for all purposes.



# Allis-Chalmers Co

CHICAGO

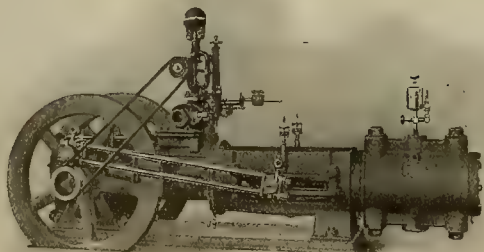


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## Sullivan Light Mining Compressors

are particularly adapted for small size operations and those located at high altitudes or in inaccessible regions.

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## THE PREJUDICE

Against the Electric Drill has been caused by inefficient drill mechanism.

## The NEW JACKSON ELECTRIC DRILL



is the greatest piece of drill mechanism in the world, combining, as it does, the only two successful means of cutting rock, namely: a combined hammer and piston movement.

WILL DO THE WORK OF AIR DRILLS, AT ONE-SEVENTH THE COST OF OPERATING.

No FLEXIBLE SHAFT; no separate MOTOR weighing 380 pounds; no water tank; no hollow tubes; no separate controller, making other Electric Drills unsatisfactory and impracticable.

HANDLED THE SAME AS AN AIR DRILL. WHEN THE DRILL IS MOUNTED IT IS ALL THERE.

Cost of repairs less than any drill now in use. Can be connected to any current or to any power.

Why purchase a cumbersome and expensive air compressor plant when you can install the JACKSON ELECTRIC DRILL at one-seventh the cost of operating and installing?

Write for information.

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See our Drill in operation at the St. Louis World's Fair; east corridor Mines and Metallurgy Building, opposite to the main entrance of the U. S. Government Building.



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¶ The splendid showing made by the Rand drills at the South African tests has turned the attention of rock drill users to the construction and "points" of our drills.



¶ They are made with "RAND" experience back of them.

¶ They have the earmarks of the honest maker—and those earmarks show up in such a test as the one held at Johannesburg.

¶ One-third less air consumption than all other drills taking part in the trials—that's their record.

¶ The other drills—we're not mentioning any names—did all sorts of embarrassing things and some of the agents wanted them run over again.

¶ One of our drills was unpacked from its box and set right to work.



¶ It worked.

¶ Compressors—do you need one? Our compressors have the "Rand Reputation" to sustain also.

¶ A new miniature Compressor Catalog just issued—want it?

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# A CATALOG OF AIR COMPRESSORS

(No. 35)

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**THE INGERSOLL-SERGEANT DRILL CO.**

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M 2



## IT'S FOR YOU TO DECIDE.

WALLSTREET, COLO., May 23, 1904.

C. H. SHAW P. T. CO.  
Denver, Colo.

DEAR SIR:

I have tried one of your Pneumatic drills for three weeks on stope work, shaft work and drift work, and I am satisfied that your drill is all right anywhere it is put. I worked it by the side of two Sullivans in a crosscut and could beat the Sullivan one-half. One Sullivan 2½, other 2½. I will bet \$100 against any drill that is made and if you can get any person or persons that want to take this offer, send them up with the money.

[Signed] JAMES CARBIS, Foreman,  
Wood Mountain Mine, Boulder, Colo.

[COPY]

We drilled four-foot holes as well as we could drill two feet.

## SHAW'S Eclipse Air-Hammer Rock Drill.

WE WANT TO HEAR FROM YOU.

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## GIVE UP DIAMONDS

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Will save \$15 per 24 hours.

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REDFIELD DRILL CO., Denver, Colo.

Gentlemen:—Purchased one of your drills from the Hammond Mfg. Co., Portland, Ore., March 10, 1904, and must say that the drill does first-class work. I am working two 9-hour shifts and making 2½ feet per shift, making a saving of \$3 per foot.

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Guaranteed to do double the work of any other hand-power rock drill on the market. Write us for details and catalog.

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and Davenport, Wash.



## MARVIN ELECTRIC ROCK DRILLS

Are in daily use that have been in constant service  
**SIX YEARS.**

Ordinary Men Taught to Use Them in Two to Four Weeks.

WORK AT ANY ALTITUDE OR TEMPERATURE, outside or underground.

Safe, Efficient, Durable, Simple.

Write for particulars to either

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## DIAMOND DRILLS

FOR PROSPECTING.

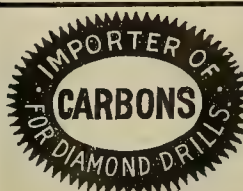
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Courses in Assaying and Ore Testing. Courses in Chemistry and Chemical Analysis. Courses for Miners and Prospectors. Instruction individual. Enter any time. Open evenings. J. DUNRAVEN YOUNG, Director, 1733 Monadnock Building.

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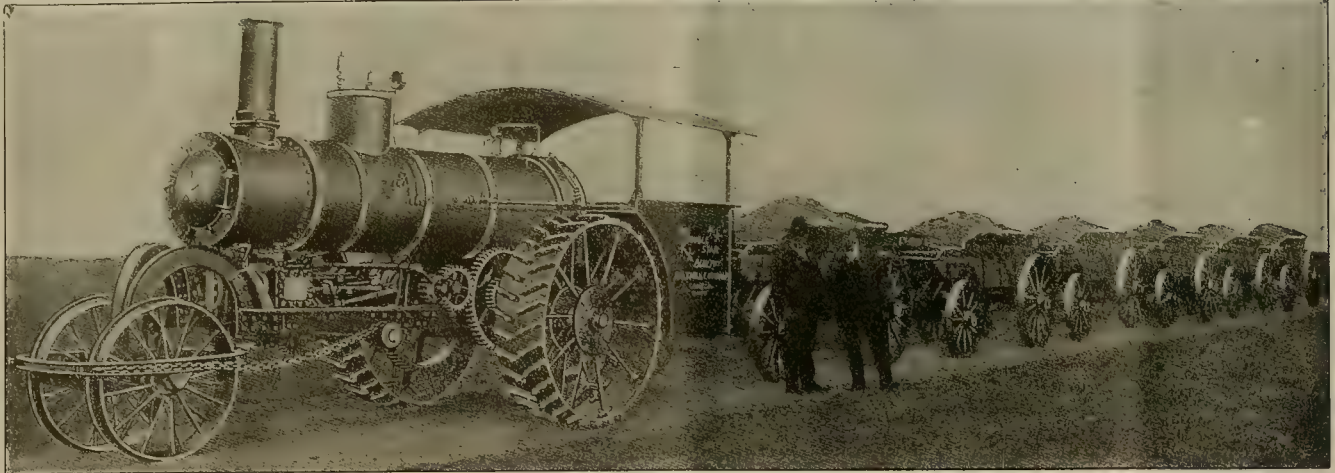


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A DOUBLE CYLINDER ENGINE DESIGNED ESPECIALLY FOR HEAVY HAULING. ALL MACHINERY BOLTED TO A SOLID STEEL FRAME LOCATED UNDER BOILER. POWER TRANSMITTED IN A STRAIGHT LINE FROM ENGINES TO TRACTION WHEELS. BOILER FREED FROM WEIGHTS AND STRAINS. NO BOLTS IN STEAM OR WATER SPACES. HIGH AND LOW SPEED GEARS. DOUBLE ENGINES PREVENT STOPPING ON DEAD CENTER. ALL PINIONS AND DRIVING GEARS MADE OF CAST STEEL. REPLACING STEEL WHEELS WITH CAST IRON ROLLS MAKES A SUPERIOR STEAM ROAD ROLLER. MACHINERY EASY TO INSPECT AND CLEAN.

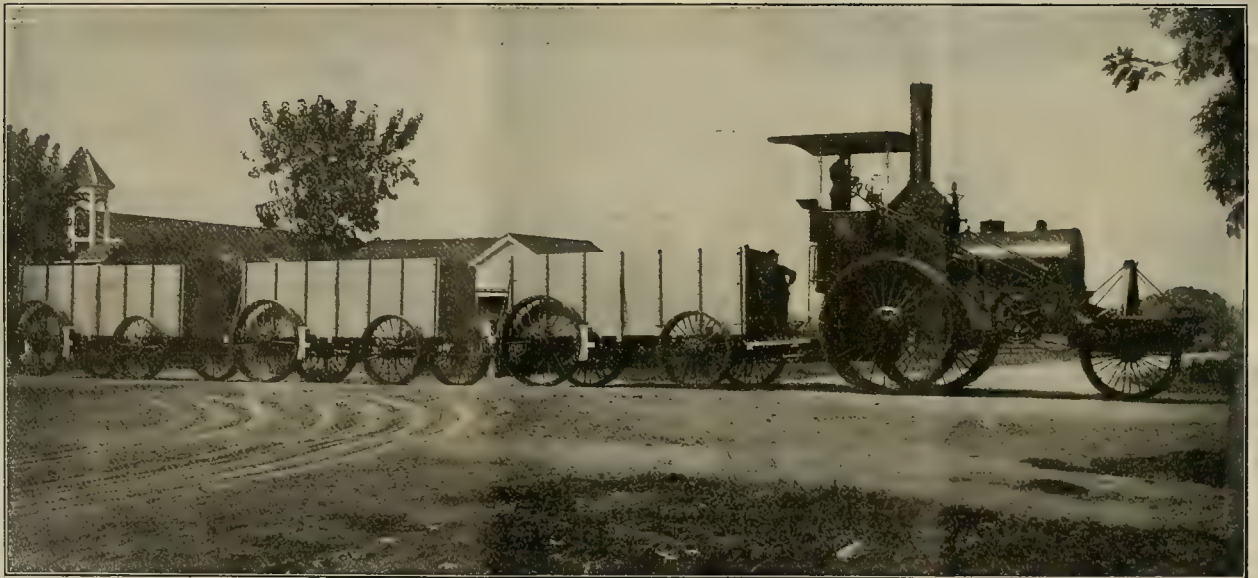
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Mention this paper.

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THE  
BEST**

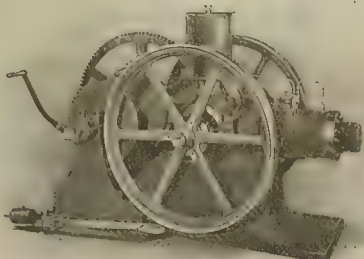
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make them.)



The above picture shows one of our Traction Engine outfits in use in Nicaragua, C. A.; was used during late war by that Government for transportation of troops and supplies. Engine, 110 H. P.; car capacity, 16 tons each. Can be used on from 5 to 30 per cent grades, depending upon conditions of roads. Over 150 in use on this coast alone, and every one a money maker. Let us know the kind of freight you are hauling, per cent of the grades, usual conditions of roads, and we will tell you how to save  $\frac{1}{2}$  to  $\frac{1}{3}$  of your present cost of hauling.

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**FOR PUMPING, ELECTRIC LIGHTING, CHARGING STORAGE BATTERIES, and All Other Power Purposes.**

**HOISTS, PUMPS, AIR COMPRESSORS, PORTABLE ENGINES, DYNAMOS.**

Highest Award for Direct Coupled Engines and Dynamo, Paris Exposition, 1900. Gold Medal, Pan-American Exposition, 1901. Gold Medal, Charleston (S. C.) Exposition, 1902.

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for Mine Pumps.

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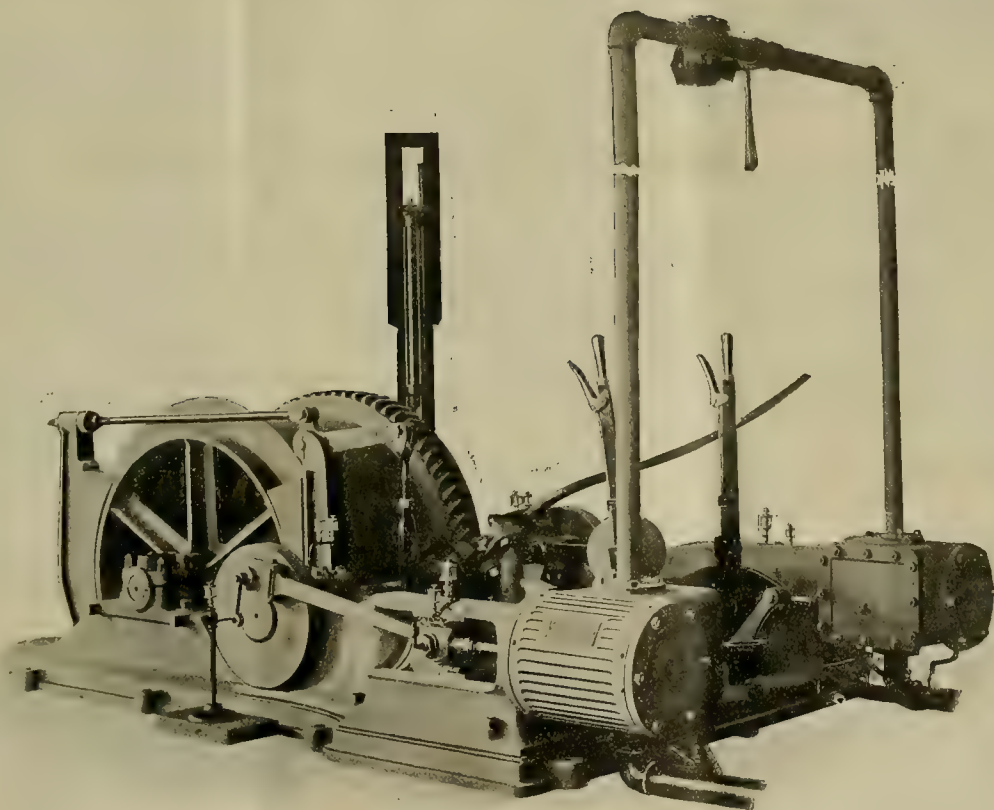
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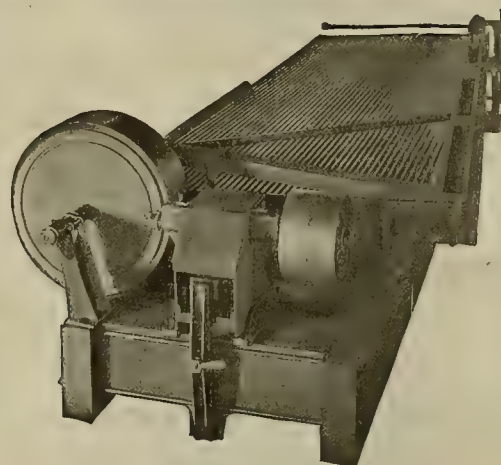
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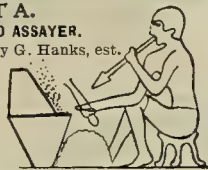
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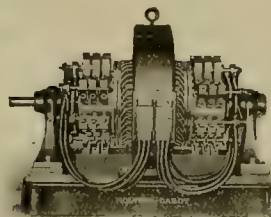
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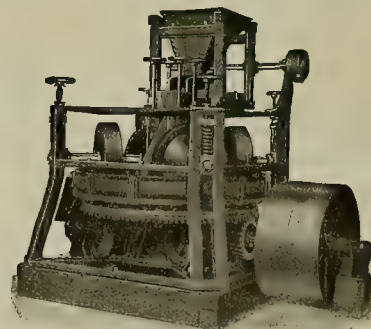
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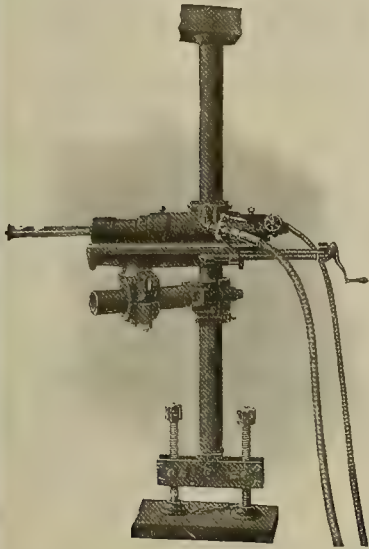


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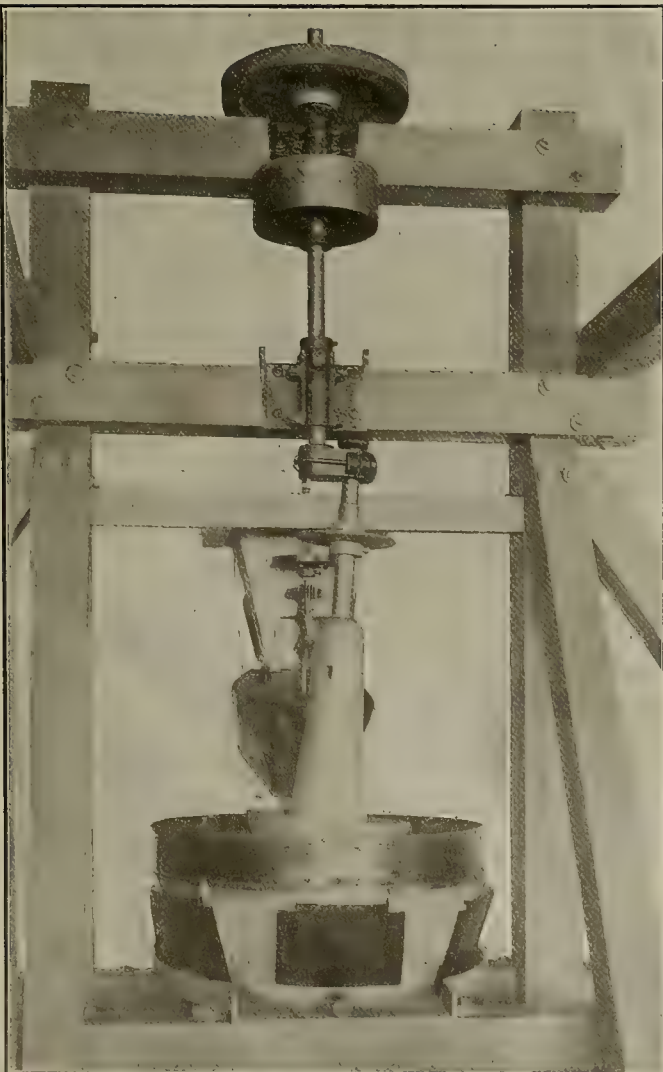
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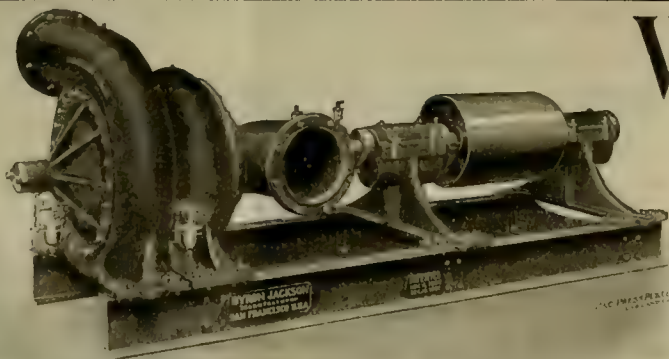
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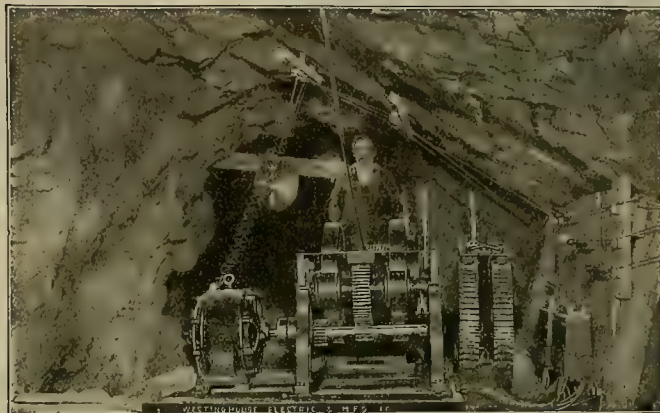
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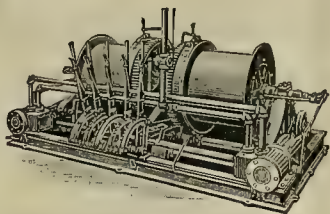
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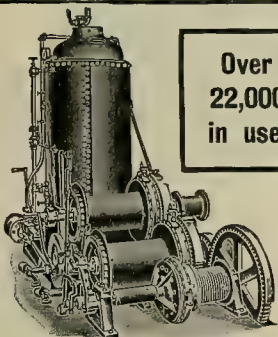
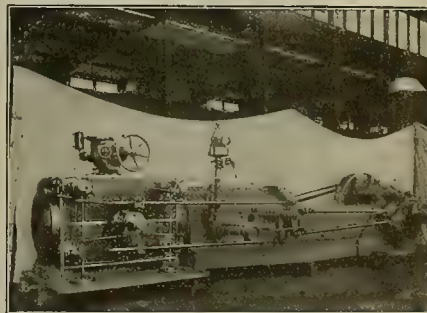
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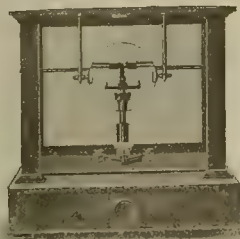
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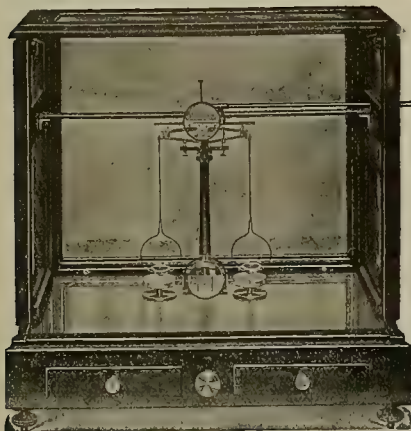


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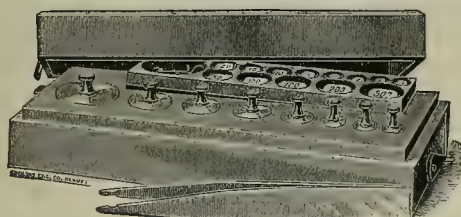
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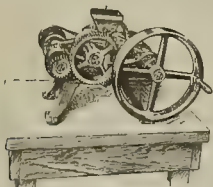
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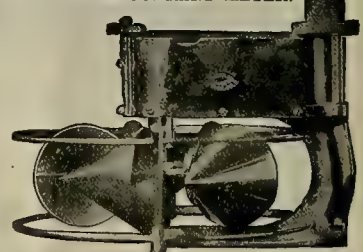
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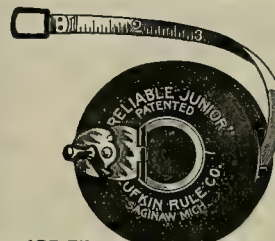
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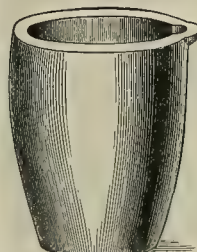
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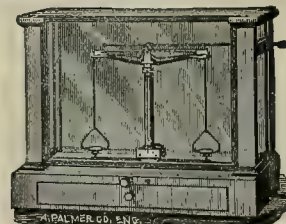
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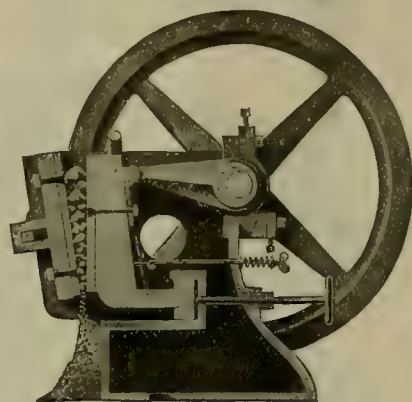
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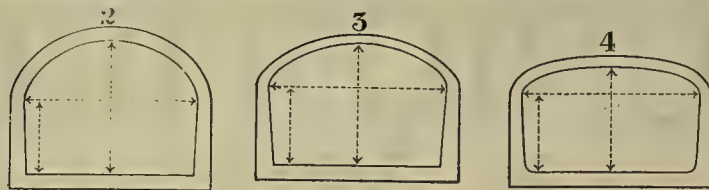
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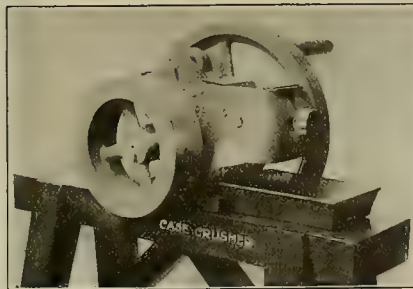
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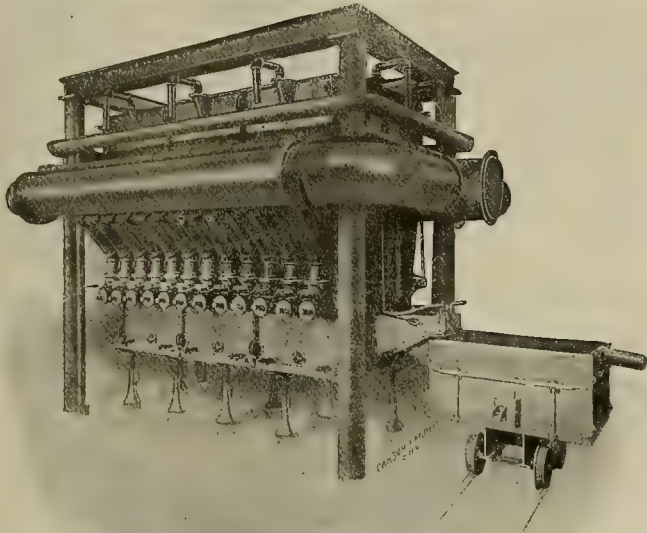
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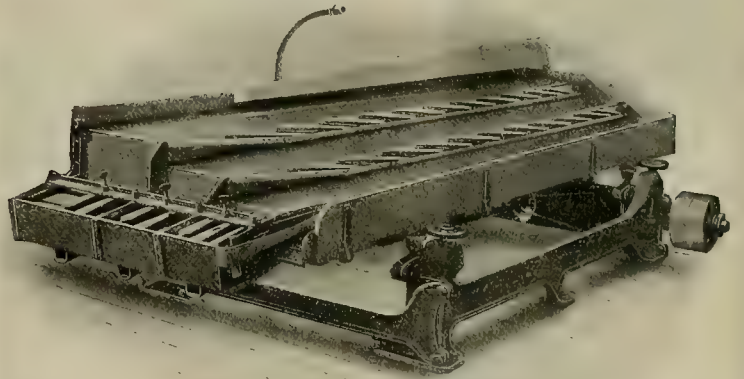
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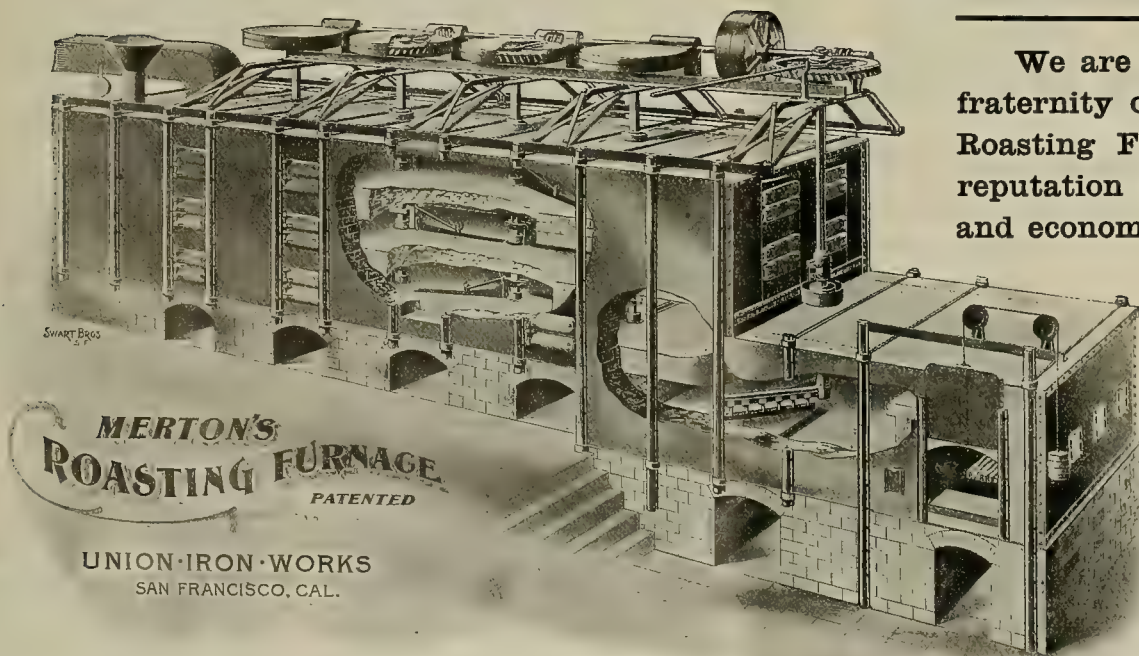
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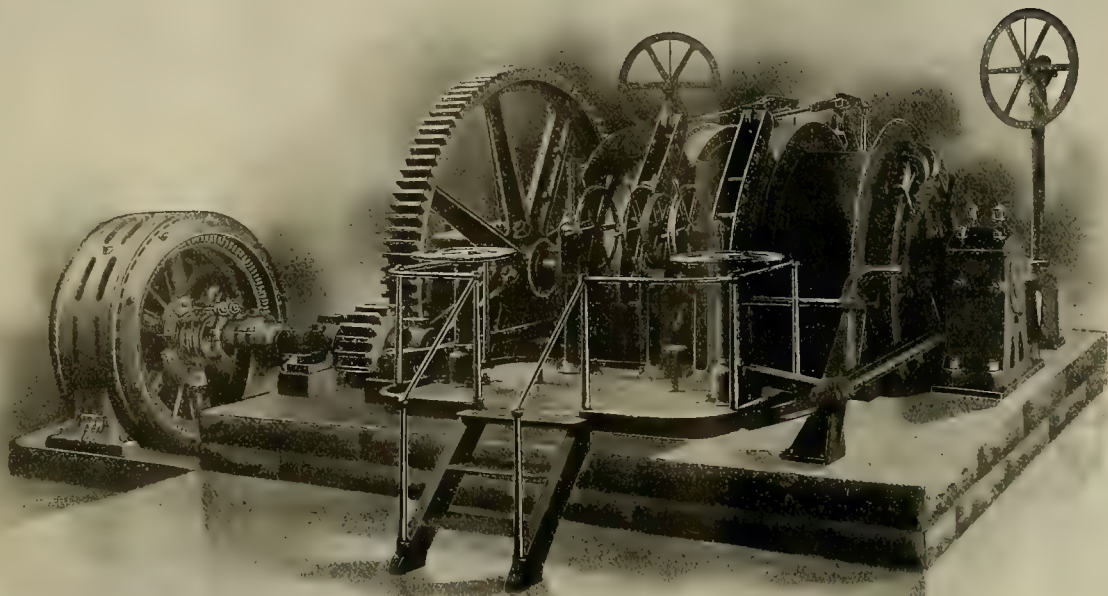
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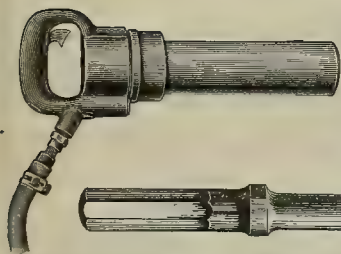
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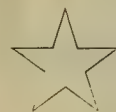


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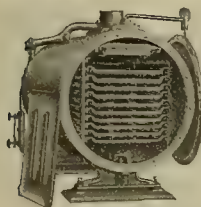


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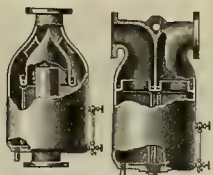


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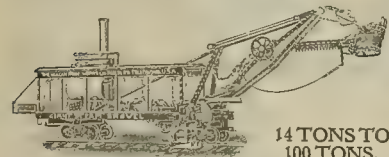
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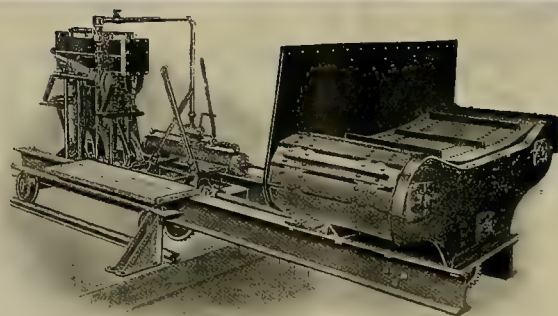


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## The Tunnel as a Factor in Mining.

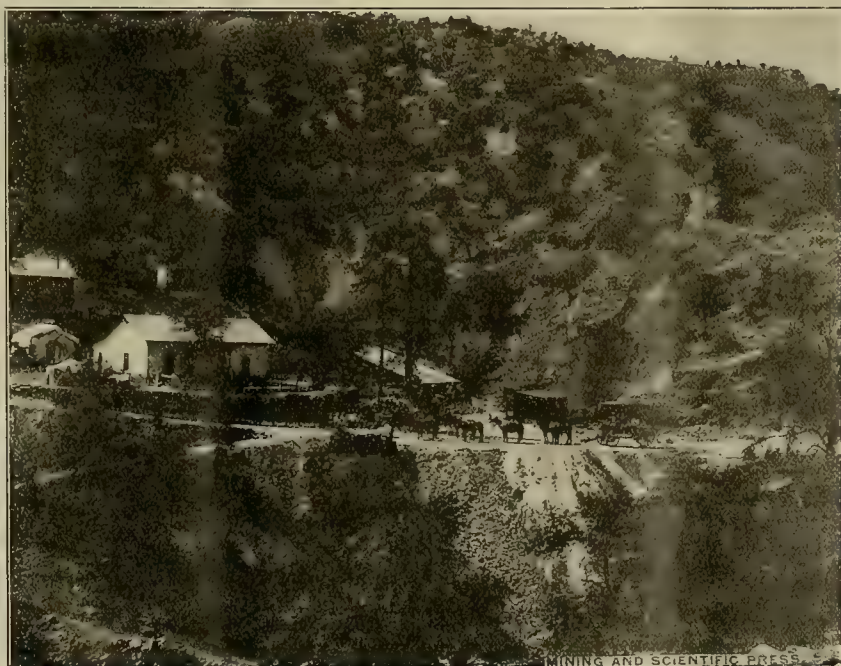
In the development and operation of extensive mining enterprises there are two things which are in many instances a constant source of expense and the cause of numerous difficulties. These are the problems of drainage and ventilation. A few years ago these were more serious matters than they are to-day, for the reason that the mechanical means of handling water and ventilating mine workings have been greatly improved within recent years. To a great extent the cumbersome and expensive Cornish pump system of mine drainage has been displaced by modern steam, electric or hydraulic pumping engines, which have a greater efficiency and greatly decreased expense in first cost, as well as in operating expense. The method of mine drainage by means of automatically operated skips has also been improved, and in some instances this method of mine drainage is preferred to any other mechanical means, though where the amount of water to be handled daily is very large, a special shaft and hoisting equipment is desirable, if not necessary, in order to admit of the product of the mine—ore or coal—as well as materials and men being handled. The means of ventilating have also been improved over old practice by the introduction of larger and better ventilating fans and reversible current devices. Although these much desired improvements have been made in the mechanical devices for handling water and for ventilating the workings, the method par excellence for both drainage and ventilation is by means of tunnels. There are many mines and mining regions so situated that tunnels which will intersect the workings at great depth are a physical impossibility, owing to the character of the topography of the country or its altitude. In the central gold belt of California the mine workings of numerous properties are several hundred feet below the level of the sea. Also in the Lake Superior copper region nearly all the extensively developed mines are not only below the level of Lake Superior, but several thousand feet below the level of the ocean. In such regions as these drainage by tunnel must be local and cannot effect the mine to great depth. There are places, however, where long tunnels are justified by the character and value of the mineral resources of the district. Not tunnels a few hundred, or a few thousand feet only in length, run for the development and



Josephine Mine, Harshaw, Arizona. (See Page 6.)

drainage of an individual property, or a restricted group, but tunnels run for the benefit of whole districts. In the State of Colorado, in Idaho, in some portions of California and Arizona, and also in Utah, as well as in other regions, tunnel schemes of this character are possible, which would drain and ventilate all mines connecting with the main tunnel, and afford an economical means for transportation of all the ores of the mines tributary to such adits. In some districts such tunnels as are here contemplated have been run, and in almost every instance the result has proven the wisdom of the projectors of these enterprises. There are a number of such enterprises in Colorado in which some work has been done, but in a number of these instances the rate of progress seems discouragingly slow, probably due to lack of the necessary financial aid. Such operations as these require large capital and energy behind them to push the enterprise to a completion as quickly as possible, as this is the only proper way in which to handle mining propositions of this magnitude and character.

In a district of superficially developed mines—down 1000 feet or less—where there are large bodies of profitable ore, it is the usual experience to find the values, if not decreasing it with depth, to be associated with new combinations, and unfortunately it is usually the case that the change in character of the ore necessitates a change in treatment with an increased expense per ton on that account. With increasing depth also comes additional expense for hoisting, ventilating and drainage, and not infrequently of labor as well, for the reason that miners cannot break ground as cheaply under the increasing difficulties and disadvantages as they can nearer the surface. All of these drawbacks the drainage and transportation tunnel minimizes with decreased cost. When such a project as here suggested is taken up for consideration the first important question should be, does the present condition and past record of the district justify the expense? That is a question which the miners of each district must determine for themselves. If the expense of operating the mines of a district to the depth of 1000 feet has been \$2.50 per ton for mining, and in depth this expense is increased to \$3.50, by reason of the drawbacks above mentioned, and which would be reduced to the former figure or below it by a tunnel run to drain and develop these mines in depth, then the amount of ore which would probably become available above the proposed tunnel level must determine the expediency of the enterprise. If the saving in mining expense can be shown to be \$1 per ton, and 1,000,000 tons of ore would be made available by the proposed tunnel, then it is a good business venture to run a tunnel which will cost not to exceed \$1,000,000. And if a greater amount of ore is considered as probably becoming available, then the enterprise will justify proportionally more expense. All this is based upon the presumption that the ore is of payable kind, which, without absolute knowledge, is somewhat speculative in itself, but great fortunes are expended in sinking shafts in a disappointing search for ore. Would it not be easier, and would not the money expended go farther, if put in a tunnel enterprise. Moreover, tunnels can reach a greater depth than shafts. The Simplon tunnel, now being driven in the Swiss Alps of Europe, has a back of over 6000 feet in one place, a greater vertical depth than any mine shaft ever reached. There are not many places where such depths as this can be attained in reasonable distance, but depths of 2000 to 3000 feet and over are permissible in many mining districts.



World's Fair Mine, Harshaw, Arizona. (See Page 6.)



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It has been the custom for many years to place in quicksilver flasks seventy-six and one-half pounds net of the metal. This practice was the outcome of the Spanish custom. The operators at Almaden for years charged their flasks with seventy-five pounds of quicksilver, and as the Spanish pound is equal to 1.0161 English pounds, it became the practice to place seventy-six and one-half English pounds in the flasks. Recently it was decided to reduce this amount to seventy-five English pounds both in Europe and America.

THE instance of a report by a mining engineer being changed by his clients to suit the requirements of their case, in a diamond mine of South Africa, is not the first of the kind on record. Not infrequently those who employ engineers to make a report on mining property find the report useless from a commercial standpoint, for the report, having dealt with facts, contains no inducement to investors. Accordingly only those portions of the report showing the favorable points are published, the less desirable portions being suppressed. Others less scrupulous even go so far as to change figures and make unwarranted additions to the report, all of which appears above the name of the engineer who made the examination. The only way engineers can guard against imposition of this kind is by rendering a verbal report, in the event of the property being worthless as far as physical evidence upon examination can determine. Ordinarily the engineer is not under contract to make a written report, and there is no law which will compel him to make other than a verbal report. In such an instance no improper use can be made of the name of the reputable engineer.

## Another Tailings Case.

The farmers living along the valley below Clifton and Morenci, Graham county, Arizona, are threatening to bring injunction suits against the copper companies at these towns whose concentrators send a constant stream of tailings into the river, it is claimed to the detriment of the agriculturists. The copper companies are making an earnest effort to lessen the evil by impounding the tailings, and allowing the clear water only to flow into the river. It is desired, if possible, to settle the matter out of the courts. The mines of the district employ a large number of men, and without doubt the direct benefit to the farmers living down the river must be great, but whether the damage from tailings is so extensive as to justify the threatened lawsuits it is difficult to say without a careful investigation. It often seems that great mining companies lack foresight in not anticipating the result of extensive metallurgical operations. Repeated experience in many places has demonstrated the almost futile efforts of smelters to render harmless the great volume of noxious gases rolling from their stacks. If the works are located anywhere else than on a desert or in a country where no damage is possible, some one is sure to claim great injury and the smelter is condemned in the public mind as a great evil, but if the smelter shuts down and a thousand or more men are thrown out of employment thereby, then the "injured farmer" has no further excuse in claims for injury sustained, and usually little excuse for longer remaining in that locality, for there is no demand or sale for his produce. In the case of mill tailings it is much the same as the slickens of the hydraulic miner. Large capital is invested in the operation, hundreds of men are given steady employment at good wages, and the whole community is prosperous in consequence, but a few—possibly twenty—ranchers are injured or claim to be damaged by the tailings and threaten suit. Had the company anticipated the result—which was to have been expected—all the farms damaged might have been bought before starting up the mill for the sum now demanded for one of them. An interesting case occurred in South Dakota, where millions of tons of tailings have been run from the mills about Lead and Central City for the past quarter of a century or more, covering several feet deep with sand some vegetable gardens and a few ranches of nominal and uncertain value, owing to the likelihood of spring floods, which at times destroy these places. Some of the farmers saw in this, their misfortune, an opportunity to claim extravagant damages from the Homestake Co., but on discovering that the tailings still contained payable values in gold, which could be recovered by the cyanide process, proceeded at once to assert their ownership to the tailings, and feared the Homestake Co. would lay claim to them.

IN response to the numerous petitions sent to President Roosevelt and to the Bureau of Labor at Washington requesting that the labor troubles in Colorado be investigated, the Commissioner of Labor will undertake the investigation of the causes which led up to the repeated troubles between capital and labor in that State within the past year. It is said to be the intention to go back into the history of these difficulties as far as may be necessary to determine the real cause of the repeated strikes and the lawlessness which has characterized them. It is hopeful that the inquiry will be conducted impartially and fully, and that the report will make clear to what extent, if at all, the strikes were justified. It is scarcely necessary to say that whatever justification there may have been in the several strikes, there was none at all in the numerous murders and other lawless acts which have been an accompaniment of these labor difficulties.

IN laying out turnouts and curves in underground track, mine foremen generally pay little regard to the theoretical niceties of the engineering features, but simply put in the track on a short, or long, or reverse curve to suit circumstances. It is largely a matter of convenience, and yet there are many instances where it would be well to give more consideration to the laying out of such curves and turnouts. If this were done there would be fewer cars derailed or dumped on the curves constructed at random.

## Safety in Hoisting Ropes.

There seems to be an increasing number of accidents in mines due to the breakage of hoisting ropes. In every well-appointed shaft the possibility of the rope parting is given consideration, and safety clutches or other devices to insure, as far as possible, the safety of men are provided, but aside from these precautionary measures, which should be made compulsory, the hoisting ropes should have a factor for safety of at least seven times the maximum load to be carried—in some localities the legal requirement is a factor of ten. One difficulty seems to be in the purchase of ropes of too small a diameter, and another the frequent winding of ropes having a sufficient diameter for safety over sheaves and drums of too small a diameter. This latter practice results in strains upon the rope which are likely to cause the rope to part without any outward evidence of weakness. When a wire rope is wound around a cylinder the outer wires and strands carry the greater portion of the load—a far greater amount than they alone are calculated to sustain. Ropes are often used longer than safety will admit, but this is reduced somewhat by periodically cutting off a yard or two of the rope from the end attached to the skip. It is not due to an over use of the cable, nor to an insufficient factor of safety, that the frequent breakage of ropes occurs, but rather to the tremendous strains resulting from sudden starting with a heavy load, or the equally sudden stopping of the rapidly descending skip or cage by too sudden application of the brakes. Still, there are instances where all the necessary factors for safety have been taken, and ropes part without any apparent reason, inspection of the broken rope showing no flaw. There are instances known where an 1½-inch steel cable snapped by the skip wheels coming into collision with an obstruction in the head frame track, when the same rope was sufficiently strong to have pulled the frame down if the pull had been started slowly and applied gradually. These instances emphasize the necessity of exercising care in starting and stopping loaded skips and cages, and avoiding, as far as possible, the unnecessary strains incident to sudden stopping and starting.

AT Pretoria, South African Republic, regulations have been made governing the introduction of Chinese into the Transvaal. In it provision is made in reference to transfer, vaccination, registration, passports, treatment, work, wages and inspection. Women, and children under ten years of age, may accompany men. As a bill has been passed by the Cape Colony Government prohibiting the importation of Chinese coolies, the port of disembarkation is Durban on the east coast, in Natal. The wages which the Chinese laborers are to receive are fixed at one shilling per day of ten hours. The Chinese are excluded from certain skilled callings, except as laborers in such callings. An important phase of the law is that "piece work" may be substituted for day's pay, if both parties to the contract are mutually agreeable. Although it is safe to say that upon their introduction to the deep levels of the Rand mines these strange laborers will be worth little more than a shilling per day and their "keep," it must only be a matter of a short time when they will be able to perform their duties in a manner which should make them at least the equal of the Kaffirs, who, as a class, if not difficult to handle, are at least discouragingly slow.

ONE of the surprising features of gold mining in Alaska is the fact that thus far nearly all the gold from the Yukon basin, from Nome and other districts, aside from that produced on Douglas and Unga islands and some other places along the southern coast, is from placers. The only noted exception being that on Solomon river in the Nome region, where a 10-stamp mill is crushing gold ore mined in veins of the district. The placers of Alaska must have derived their gold from veins, great or small, but with very few exceptions these veins have been little sought, or at any rate remain undeveloped, but the placers will be exhausted in a few years as they have been in other fields, and then will ensue active prospecting and development of the gold bearing veins which underlie the alluvials and rib the mountains.



## CONCENTRATES.

IN THE event of zinc shavings becoming covered with copper, add strong cyanide solution until the copper disappears.

COBALT NITRATE dissolved in water is said to be good antidote in case of cyanide poisoning if taken promptly after the poisoning.

A "DEMASIA" in Mexico is an area of mining ground of less than a full pertenencia in size and lying between previously denounced holdings—a fractional claim.

CHARCOAL has been successfully employed to precipitate gold from solution in both the chlorination and cyanide processes; it is not in general use, however.

THE terms "transit" and "theodolite" are often used interchangeably. By theodolite is generally understood a "Y" instrument, having a horizontal but no vertical movement of the telescope.

IN scientific literature most experiments on temperatures, melting points, etc., are referred to the centigrade thermometer, in which the freezing point of water at sea level is 0 and the boiling point of water is 100°.

A SOLID cubic foot of ordinary gold-bearing quartz will weigh about 165 pounds, and 13 cubic feet of such rock in place weighs one ton. When broken into the usual size for shoveling it requires 20 cubic feet to make one ton.

ANEROID BAROMETERS are made which will measure 3000 feet below the level of the sea. The better ones will read to 1 foot. They are mostly in use in the English coal mines, the workings of many of which are below sea level.

AN AUTHORITY states that there were in actual use in California, prior to the inhibition of hydraulic mining, 6000 miles of ditch, the construction of which had cost \$15,000,000. Portions of some of these ditches and flumes cost \$30,000 per mile.

IF the fuse is too large for the exploders it should be returned to the manufacturers, as it is likely to have been damaged. Triple tape fuse is the best and should always be used in a wet mine. Double tape can be used in outside work in dry weather.

WATER under 485 feet head will give about 1 H. P. per miner's inch (1.5 cubic feet per minute), if the pipe line be 8 inches or more in diameter and the length of the line not over 1 mile. The static pressure under this head is about 195 pounds per square inch.

WROUGHT IRON is less affected by acid vapors than steel, and for that reason is preferable in stacks through which such gases pass. It is suggested that where such stacks are built the interior be given several coats of paint, allowing each coat to dry thoroughly before applying the next.

AN improper and inconvenient arrangement of a mill or concentrator often is the cause of useless expense. In such cases, if the amount of ore to be handled justifies the expense, it were better to make the necessary change in mill arrangement, and reduce the tonnage expense as soon as possible.

A DRILL BIT for drilling sandstone cuts better if forged square across like a chisel, though with a taper on both sides, and with a flattened instead of a sharp cutting edge. A bit of this description disintegrates the sandstone rapidly, while a sharp edge will sink into it and soon become jammed.

THE amount of ore which may be broken down by a single blast, or series of blasts, depends upon the character of the ground and the amount of ore available. In extensive open-cut operations it is not uncommon to break over 1000 tons at a single round of holes. Underground the amount broken is usually much less than this.

THE relative consumption of steam per hour per indicated horse power for various types of steam engines is stated by an authority to be: Plain slide valve engine, 60 to 70 pounds; high speed, automatic engine, 30 to 50 pounds; simple Corliss engine, 25 to 35 pounds; compound Corliss engine, 15 to 20 pounds, and triple-expansion engine, 12 to 18 pounds.

THE average price paid per pound for plate mica in 1902 was 22 cents, and for uncut scrap about \$13 per ton. The price for plate mica varies greatly with the size of the plates and their transparency and freedom from flaws. The mica deposits of Nevada, as far as known, are at the present time too distant from cheap transportation to make mining for the mineral profitable.

IF a drill hole is too large for the sticks of nitro powder, the paper wrapping of the cartridges may be slit in several places, the length of the sticks, or if desired the paper may be removed entirely. The latter, however,

is seldom necessary, and should not be resorted to if it can be avoided, as the handling of the powder is likely to irritate the skin and is very injurious to the eyes.

WHEN attempting to agitate a tank charged with ore by means of compressed air, the introduction of the air beneath the false bottom and filter will not give satisfactory results, as the air will seek the sides of the vat and bubble up all around the edge of the charge instead of uniformly throughout it as desired. A system of perforated pipes must be placed above the false bottom.

WHEN calculating the size of wire which must be used to carry a given amount of electric current, it is necessary to select a wire which will have sufficient size to insure against heating, and must be large enough to keep the loss of volts or "drop" within stated limits. All conductors of electricity have more or less resistance, but one must be employed having sufficient area to keep it within bounds.

A WELL lubricated turn sheet is better than the average turntable as ordinarily built in mines. The latter are often out of repair, or became jammed by rocks working beneath the table. A turn sheet on which are riveted turned flaring rails as guides will answer every purpose, and will last longer than turntables, and may be quickly removed to another place when no longer required where first placed.

THE California courts have held that a contract giving the right to work a mine for a certain time, the gross product to be equally divided between the parties, is not a lease; that such a contract does not create the relation of landlord and tenant, but fixes a rule of compensation for services rendered, and is in all its essential features a contract for labor to be performed and to be paid for by a share of the profits.

IN one instance an ore containing stibnite (antimony sulphide), which yielded unsatisfactory results with fine crushing, is said to have yielded good results with coarse crushing. Some ores containing compounds of antimony may be worked by cyanide after removing the antimony by treating the crushed ore with a solution of sodium sulphide, which immediately dissolves the antimony, which may then be washed out.

THERE may be a slight difference in the meaning of the terms "location" and "claim." A location is usually construed as meaning a single piece of ground 600 by 1500 feet, being the maximum amount permitted under the laws, but a group of several such locations may be considered as constituting a claim. The words are used interchangeably, more or less, though a group of "claims" is never referred to as a "location."

IT does not pay to hoist waste rock to the surface if any place can be found for it underground. A mine should be so developed, as far as possible, to utilize all the waste broken in crosscuts, and other dead work not in ore, using it as filling in old stopes and other excavations, even if the ground stands well and requires no filling. It is cheaper to dump it down a winze than to hoist it to the surface and then tram it to the dump.

A CYANIDE is any substance which will tend to decompose or destroy the effectiveness of the cyanogen in the solution. It is usual that the percentage consumption of cyanide in tests of small lots of ore is greater than when working the same ore on a commercial scale. It is impossible to fix the limitations of ores which may be amenable to the cyanide process. It requires actual experimentation to discover whether or not an ore may be worked.

THE peculiar formation known as "saddle-reefs" occur at Bendigo, in Victoria; at Broken Hill, in New South Wales; at Waverly, in Nova Scotia; at the Santo Domingo mine, in Peru, and near Titiribe, in Antioquia, Colombia, and elsewhere. These formations consist of rolls or folds of metamorphic sedimentary rocks, in which silica has been deposited in the folds of the rock forming the anticlinal folds. Little ore has thus far been found in the synclinal folds.

ZINC "FUME" used in the bromo-cyanide process is obtained from the condensing chamber of the zinc reduction furnaces. It is thrown into the precipitating vat and the solution agitated with compressed air. This causes the fume to be distributed throughout the solution, causing a precipitation of the gold. Cyanide operators are not agreed as to the desirability of precipitation by this method, as it is said to require an excessive amount of zinc and to produce impure bullion.

WHERE it is necessary to place a rock breaker in a mill the machine may be placed on an independent structure of heavy timbers, disconnected from the mill frame or the ore bin timbers, thus obviating the vibration incident to its operation. There are instances where this additional expense has been made for the purpose indicated and subsequently the breaker frame was connected with the ore bins, thus destroying the advantage which might otherwise have been gained.

TO TEST TAILINGS for amount of free acid present make a standard solution of caustic soda by dissolving 10 grams of soda in one liter of water. Weigh out 200

grams of ore and place in a bottle. Add 250 c.c. of water. Titrate the water by adding the soda solution, employing litmus paper to determine when the acid has been neutralized. For each cubic centimeter of soda solution required there must be added to the charge of ore one-tenth pound of soda for each ton of ore, to neutralize the free acid.

EXPERIMENTS in concentration have shown that the facility with which heavy particles of mineral settle on any kind of a concentrating device, or in hydraulic classifiers, is not always in the ratio of their respective specific gravities, but to a great extent is dependent upon the shape of the grain or particles of equal weight. Round or solid granules of any metal or mineral settle more readily than flaky particles of like weight, but the same gravity. Thus granules of metallic copper settle more quickly than scales which have been flattened by rolls or stamps.

IF the pump uses a very large amount of steam, but runs slowly and with great apparent difficulty, there is probably too much friction, due to too tight packing. This can be remedied by cutting the rings a little short and breaking joints; then when the packing swells, on wetting, the joints will fit snugly, but not be too tight. After packing a pump, the condition of the packing can be ascertained by closing the valve of the discharge column just above the pump and turning on the steam. If it makes a stroke or two up and down and then stops of its own accord, the pump is well packed.

FOR laying out mining locations the ordinary compass, having folding sights, affords a fairly accurate means of properly staking the claim. If care be taken in measuring, two men may run the lines of a claim with a precision which will require little change in the monuments, if any, by the surveyor when later surveying for patent. "Stepping off" a claim is, at best, guess work, and the prospector may get more or less than he is entitled to. On his discovery stake, A must post a notice stating how many feet he claims along the lode in either direction from the point of discovery; and should he stake off more than the law allows, B may subsequently encroach upon A's claim to the proper point, beginning another claim where A's claim should properly end. Care in staking the claim will usually avoid such after-complications. Few claims are valuable when first staked, but many become so subsequently, and, in view of this fortunate contingency, the prospector should comply fully with the requirements of the law, and avoid as far as possible any probability of a lawsuit in the future. The more valuable a claim becomes the more likely it is that lawsuits will ensue.

IN RETORTING amalgam raise the heat gradually and continue to heat the charge in the retort as long as quicksilver continues to run from the pipe. During the latter stage of the operation strike the pipe occasionally and the fine globules of mercury will fall in the pipe and run out into the water. Do not allow the fire to go down as long as the delivery tube remains beneath the surface of the water, for should the heat decrease materially the pressure of air on the surface of the water may force some of the water up the pipe and into the retort, when an explosion is almost certain to result. When the quicksilver has all been vaporized from the gold remove the pipe from the water and no explosion is possible. There is much more likelihood of overheating than of overheating retorts. If the heat is insufficient, or is continued for too short a time there will be found quicksilver in the center of the sponge. The mill man weighs the sponge and calls it all gold, when there may remain from 5% to 10% mercury in the central portion of the sponge. When sent to the mint the difference in weight before and after melting may lead to unpleasantness. Another source of discrepancy in weight before and after melting the sponge is in the large amount of iron and other impurities in the amalgam which should have been removed before retorting by thoroughly cleaning the amalgam.

ORES are divided by assayers into three main divisions—siliceous or acid ores, consisting chiefly of silica (quartz or sand); basic ores, containing a considerable percentage of iron oxide, lime, magnesia or baryta; and sulphide ores, which contain a large percentage (10% or more) of pyrite or other sulphide mineral. When mixing charges for the assay of these ores the object is to make a mixture which will result in a fluid slag on fusion. Basic ores require an acid flux, such as silica, borax or glass, and acid ores should have a basic flux. This is usually provided in the form of bicarbonate of soda. Litharge is also added with these ores, and in such cases it acts in a dual role—as a flux and the lead reduced from it acts as a carrier of any precious metal present. When sulphide ores are to be assayed the sulphur is oxidized by means of nitre, or is taken up by the slag by uniting with nails or tacks or pieces of iron wire put into the assay charge. Some assayers roast sulphide ores before assaying, but if care is used in the nitre or nail assay the results by roasting are not better than those obtained by the other method. The fluxes principally used are carbonate and bicarbonate of soda, and carbonate of potassium. Charcoal is one of the best reducing agents known. It will reduce from 25 to 30 times its weight of lead from litharge. Flour will reduce from 12 to 15 times its weight of lead, and sugar about 14 times its weight. Argol reduces about 7 times its weight in lead from the litharge.



## The Young Quartz Miner.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by  
MATT. W. ALDERSON.

Some blacksmiths make a drill pointed like an ordinary cold chisel—square along the cutting edge, with a long taper (Fig. 2.) This is an excellent bit for



Fig. 2.



Fig. 3.

ordinary rock. Other blacksmiths make their bits with a crowning edge (Fig. 3). The writer's preference is for the latter shape, especially in very hard rock, and very soft rock. The bit will endure better under severe work without getting the "big jaw." It cushions in soft ground and one makes better time with it, the square-pointed bit going in deeper but sticking so it prevents one's keeping under steady motion. But good work may be done with either style. The workman may exercise his preference. One advantage of this chisel point is that the bit is more quickly and easily shaped. In either style the bit should be made as sharp as possible. For hard rock the bevel near the edge needs to be about 80° angle; for softer rock it may be 45° or less. It is necessary to make the short lengths, or starters, somewhat wider than those to follow. A set in use by the writer is of  $\frac{3}{4}$ -inch steel, the cutting edge of the starter is  $1\frac{1}{2}$  inch and the others to follow are each narrower in turn up to the drills 3 feet in length, which has a bit to cut  $\frac{1}{8}$  of an inch. With these bits holes are made which are easily charged with sticks of powder  $\frac{3}{4}$  inch in diameter. As the drills are shaped, they should be left where they may have opportunity to cool, before the edge is hardened.

When the drills are sharpened and cooled they are again placed in the fire, a few at a time (so there will be no danger of any one of them becoming overheated), where they are heated to a cherry red, care being taken not to heat more of the point than is necessary. As they reach the red color they are taken out and dipped in water, being moved about as they cool. They are thus hardened ready for use. Most sharpeners harden their steel on a rising heat, believing that in so doing the edge will be the hardest. The idea is that in hardening on a falling heat the body of the drill point would have more heat than the thin edge and would be made harder and be thus liable to "water check" or break in use. The best tool sharpener I ever had in my employ, however, held that with a quick, hot fire the outside of the steel might be hot before the inside would be hot enough. Tempering when steel was in this stage would make the outside harder than that just underneath, and he always hardened and tempered on what he called a falling heat, though it was really on a rising heat, but as that heat began to fall. Taking a tool from the fire, raised to the desired heat, he would hold it a few seconds, till it showed evidence of cooling by turning a shade darker, when he would plunge it. The part just back of the edge will thus be a little harder than that which will first be worn off in actual use.

In hardening bits in this way, the mistakes of the novice, and of some experienced persons, will be in having the steel too hot. Take an instance such as has come under the writer's observation more than once, where a man hardened his own drills. They worked nicely in ordinary ground. He came to very hard ground and the bits wouldn't stand. He made them harder, in an endeavor to make them stand, thereby increasing his troubles. Most miners would be surprised if you told them that their steel should be somewhat softer for very hard rock than for other kinds, yet such is the case. If a drill is too hard, the fact may never be discovered if it is used in soft rock, while it would break with the first few blows against hard rock. It is better for the sharpener to make the mistake of having his drills too soft than too hard, for they may be quickly sharpened and hardened again, if they are not broken. Remember that the hardness of the steel depends on how high it is heated before it is cooled. For ordinary rock, heat to cherry red. For very hard rock, do not have so high a heat, but plunge while the steel is a trifle darker in color. With a clear understanding of the theory, the drill sharpener will soon get so he can harden his drills to suit the rock in which they are to be used.

A mining pick should have a long, thin, sharp point. Taking a pick from a lot in my own shop, I

find the point has an angle of 18°. In other words, it slopes back from the point over 3 inches before it comes to where the shank is an inch thick (See Fig. 1). The writer has known blacksmiths who always left the point of their picks  $\frac{1}{4}$  inch across, and others who made the point with a 45° bevel, like the point



Fig. 4.

of a framing chisel (See Fig. 4). In soft ground, the point needs to be very sharp and thin, that it may be made to penetrate easily and get hold of enough ground to pay for the time needed in which to pry it off. In hard ground the point needs to be sharp, so it will enter crevices easily. If care is exercised so that the thin point is not overheated it may be easily tempered, so that it will stand in the hardest rock. In tempering, the pick point is heated to cherry red. It is then taken from the fire, held a few seconds, till it darkens the least bit, then plunged in water and removed. The point, which was red in color when placed in the water, is now steel gray, but as we watch it we see a blue-purple line flowing down from the shank to the point. This is the "drawing of the temper." There should be sufficient heat in the point to drive the blue-purple to the point with steady, continuous movement; otherwise, reheat. When the purple is within  $\frac{1}{4}$  inch of the point, plunge the point again and leave in the water until it is perfectly cool. The first  $\frac{1}{4}$  inch of the pick point, gray in color, is thus left very hard; just back of it is the purple and back of that the blue, colors on which steel is tempered for cutting metal. A pick point tempered thus is exceedingly tough and the writer has seen picks tempered in this way used in the hardest kind of rock without a single pick point being broken for months at a time. At the same time one may occasionally find a pick or a lot of picks which will not stand so high a temper, because of a greater proportion of carbon in the steel. If so, the remedy is obvious. The purple may be allowed to flow to the point in tempering, and if it is an exceptional pick in a lot that will stand the higher temper the handle may be marked so it will be recognized and tempered according to its needs.

Hardys, cold chisels and tools of similar character used for cutting iron, which may be purchased at hardware stores, are simply hardened and need tempering before being used. Temper them according to above directions for tempering a pick, stopping the flow on the blue, just after the purple has passed off the point. They may then be used to cut the hardest metal.

The gad is a very useful tool which seems to be almost wholly absent from many mines, possibly because so few tool sharpeners know how to shape and temper it. Oftentimes one sees gads of such shape that they would disgust anyone who would try to use them. The gad is a wedge and it needs a long, slim point, so a sufficient amount of the point may enter a crack to hold the gad in place in order that one may



Fig. 5.

Fig. 6.

strike it with a sledge. Fig. 5 shows a gad made by a skilled blacksmith. It required much persuasion to get him to make it what he called "so sharp." It was really dull at the point when made,  $\frac{1}{4}$  inch

across. It widened to the width of the steel in 2 inches. Good work could not be done with it. If it had been sharp it would have made a good maul, for cutting hitches in soft rock. The point was pyramidal in shape, as a maul's should be, but the taper was longer; that was all the difference. Fig. 6 is a well shaped gad. The point of this was sharp as it could be made and it tapered back 4 inches before it was the width of the steel— $1\frac{1}{2}$  inch. Wider on the point in one direction than Fig. 5, it was thinner the other way. It was an excellent gad and the illustration shows its shape after it had been used daily for over two months without sharpening. Most miners who would see such a shaped gad would say it wouldn't stand severe work because of its being so thin. How was it tempered? It was heated to a cherry red and then plunged. The blue was watched till it passed off the point. The gad was dipped again and then driven into soil, where it would cool slowly. The point of the gad was thus the only hard part and that not very hard. The body of the gad was tempered tough, so it would bend before it would break.

In mines where large numbers of men are employed the gad has largely fallen into disuse, not because of lack of recognition of its excellence as one of the tools used in mining, but because so few miners of the present day know how to use it intelligently. Then again it is easier to drill and shoot than to move ground by the pick and gad; so most miners do the drilling, and most foremen prefer that they do so, feeling that better results will follow. Nevertheless, there are times and places when one can advance his work more by the use of a gad than by drill and powder. This is especially true in blocky, jointy ground where the rock is hard. Its use calls for the exercise of judgment. Thus one must learn to know his ground, and if he can move more with the pick and gad than he can in the same time in drilling, he should use the gad. The gad is particularly useful in cleaning up after a round has been fired, in removing all loose rock.

For uniformity of results in tempering one needs as little variation in the light as possible. Steel looks hotter in the dark than in the bright sunlight and one must govern his work accordingly.

In the fall of 1903 I had a record kept of the amount of coal used by two prospectors in sharpening their tools. With a sack of ordinary blacksmith coal weighing 177 pounds, twenty-five fires were built and 760 points sharpened, an average of seven pounds of coal and 30.4 points each time the tools were sharpened, or 4.3 points to each pound of coal consumed.

(TO BE CONTINUED.)

## Finding the Magnetic Pole by Means of an Assay Balance.

TO THE EDITOR:—It is a fact well known to many assayers that a fairly good and reliable gold balance will at times exhibit freakish traits of character not at all in keeping with its ordinary conduct. At such a time an assayer of good judgment will not attempt to "tinker" the balance, knowing that if he judiciously leaves it alone, or treats it kindly, it will come out all right the next day. Meanwhile he has in mind some fellow whom he suspects of having used it, or touched the outside of the case, or cast an evil eye in its direction. Then he worries his way through the hand samples and defers until next day the work requiring greater precision, keeping his troubles mainly to himself.

One day during the past month a balance the writer was using became so unmanageable that for the time all attempts at weighing had to be abandoned. The behavior of the beam so much resembled the movements of a magnetic needle in unsettled weather that I determined on a certain line of investigation. The balance was a medium grade 8-inch beam by a well-known maker, had been in constant use about four years and was in fair condition. The day in question was not particularly stormy, just boisterous spring weather for a mountain region. A few scattered clouds scurrying around among the trees, the wind blowing in gusts and an occasional dash of rain or hail against the windows, but apparently no electrical disturbance. I examined telephone and light wires, but did not find anything that should produce induction effects, yet could not get the magnetic theory out of mind. After both the weather and balance had become calm the mine foreman came in and he was asked the direction of magnetic "north." He pointed across the room toward a percolator filled with mill tailings or some other equally interesting variety of dirt. The balance was pointed towards the percolator by sighting along the case, carefully leveled up and when it came to the zero the left-hand rider read 39. It was then reversed by turning 180° on the table, when the rider read 53, a difference of  $1\frac{1}{2}$  milligram, making it plain that the trouble had been due to the earth's variable magnetism that the balance had been hunting for the North Pole and became a victim of earth currents. The instrument was then turned 90°, the rider set at 46, the mean between the previous readings, but the pointer would not come to the zero. Evidently the



percolator was a false monument, but nearly right, and the magnetic north pole almost within reach. The balance was next turned little by little until the index came to zero and a line perpendicular to its position established as the true magnetic meridian. The beam when turned into this meridian read  $37\frac{1}{2}$  with a reverse reading of  $54\frac{1}{2}$ , a difference of 17, and the same mean as before.

The pointer or needle on further examination exhibited slight polarity, but did not seem to be strongly magnetized. The difficulty was partially, but not wholly, overcome by turning the balance on the table so that the beam is at right angles to the magnetic meridian, which here is about  $15^\circ$  east of north.

The fact that any piece of iron or steel left long in one position will become polarized by the earth's magnetism would seem to be a good reason why some other metal should be used in the moving parts of a delicate balance. But "there are a good many holes in a skimmer," and as man is not omniscient, one or two holes, more or less, are liable to escape notice. That is probably why everything was not discovered in the beginning.

JOHN RANDALL.

Deadwood, S. D., June 26.

## Geology of the Goldfields District, Nevada.\*

Written by J. E. SPURR.

Interest has been aroused in the new camp of Goldfields, Nye county, Nev. This district is situated  $23\frac{1}{2}$  miles southeast of Tonopah and about 6 miles due east of the old mining camp of Montezuma. Recently some good values in gold have been found; several hundred people have gone there, and ore has been sacked for shipment from some of the mines.

As early as June, 1903, shortly after it had been located, and while only a few men were working,

Peak and Belmont—we may suspect that the limestone is of Cambrian or Silurian age, and that the alaskite may be correlated with the granitic rock intrusive into the limestones in those districts.

The relation between the rhyolite and the alaskite is uncertain. Some phases of the alaskite are not distinguishable in the hand specimen from the rhyolite, and since they have about the same composition one is tempted to consider the hypothesis that they are differently crystallized portions of the same magma; but the strong flow structure of the rhyolite and its usually glassy groundmass indicate that, even if this is so, they were formed under different conditions and at different times, and that the rhyolite was formed near the surface, the alaskite at a considerable depth.

**AURIFEROUS VEINS.**—The chief veins or ore bodies being prospected at the time of the writer's visit are broad masses of white to purplish and reddish, iron-stained cherty quartz, extending irregularly in a northerly direction (N.  $10^\circ$  to  $15^\circ$  W.). There are usually no well-defined walls to these, and the width of the mineralized zones varies from many feet in one place to nothing in another. As reported, the assays made up to that time are very irregular, some average samples giving \$25 to \$50, others only a trace. The values of these are all in gold, very little or no silver being present.

When examined under the microscope, it was found that the ore is a highly silicified rhyolite, and the rhyolite country rock, wherever examined, is itself much silicified. There are many of these silicified reefs, usually forming the crests or combs of ridges on account of their greater hardness.

Near the southern end of the principal ridge described, an average sample of the alaskite from many different places was taken. This contains a trace of gold and 0.11 ounce silver. In the same place a sample was taken of a lens of feldspathic quartz, segregated in the alaskite. This gave a trace of gold and 0.05 ounce silver. This quartz and other similar lenses, however, are of different type

stones into which it is intrusive, within a broad belt following the intrusive contact. They do not occur in the Tertiary rocks.

(TO BE CONTINUED.)

## The Safety of Winding Ropes.

The inquiry into the cage accident at Aldwarke colliery recalls attention to a subject which is of the first importance to the colliery managers, says the Colliery Guardian of London. This accident, by which seven men lost their lives, occurred on February 23rd. About half an hour previous to the accident loaded corves had been hauled twice up and down the shaft to test the rope. On the afternoon of the preceding day the rope inspector had examined this particular rope, and made a satisfactory report upon it. But in spite of these precautions the rope failed shortly after the engineman had reversed his engine, which he did at a distance of six revolutions from the bottom of the shaft. An examination of the fracture did not betray any sign of internal corrosion. The separate strands were well protected from rusting by a tarry coating. The breaking strain of a new rope of the same pattern should be 56 tons; the actual breaking strain of the rope in question varied from  $15\frac{1}{2}$  to 44 tons. Now, the weight upon the rope at the point of fracture was made up of 1196 feet of rope, cage and appurtenances, and men, making altogether less than  $3\frac{1}{2}$  tons, whereas the full corves used for the trial weighed more than 4 tons. No conclusion was arrived at as to the cause of the fracture, and it remains a matter of doubt whether the rope possessed any inherent defect, or whether a sudden jerk, caused by the brake being operated too suddenly, had thrown a greater burden upon the rope than its minimum breaking strain. The tests made by Mr. Pickering's instruction clearly showed too low a fac-



Goldfields, the New Camp in Nye County, Nevada.

some good assays were reported, while other attempts did not succeed in finding much over a trace of gold. The district then was known as the "Grandpa," but the name has since been changed.

**GENERAL GEOLOGY.**—Topographically the district shows a number of low ridges. To the west are basalt-capped mesas, leading up into the higher mountains in the vicinity of Montezuma. The part of the district examined consists of one of the ridges mentioned, which runs in a north-south direction; this was followed for a distance of about 2 miles. On the north end of the ridge the rock is very much altered rhyolite, showing strong flow structure, a glassy groundmass, and porphyritic crystals of quartz, orthoclase, and biotite, which are, however, almost always decomposed. Near the north end of the ridge the igneous rock is chiefly alaskite (quartz-feldspar rock), sometimes of granitic structure, sometimes coarse and pegmatitic, frequently very fine grained. A variation of this is quartz-muscovite rock which, when fine grained, resembles somewhat metamorphosed quartzite. Some of these quartz-muscovite rocks seem to have been originally such, while in other portions the muscovite seems to have formed in little blades at the expense of original orthoclase feldspar. A process of endomorphism similar to that described by the writer in similar rocks at Belmont, is suggested; and since muscovite is, like orthoclase, essentially a silicate of aluminum and potassium, but, unlike it, usually contains a weighable amount of fluorine, the action of this gas is probable. In one of the thin sections a crystal of probable fluorite was detected. Another variation is pure quartz, which occurs in the alaskite in small blotches, lenses, and even in masses 2 to 4 feet in diameter. All these are intrusive into a dark siliceous rock (jasperoid), which is probably the result of the silicification of an original limestone. By analogy with the similar geologic conditions in other districts in the same general region—as at Silver

from the reefs of silicified rhyolite which form the principal ledges.

Lying westerly and northwesterly of Goldfields are Silver Peak and Lone Mountain districts. The Silver Peak quadrangle is mostly in southwestern Nevada, adjacent to the California boundary; one corner of it lies in California.

The area includes the Silver Peak range and the valley which lies east of it, together with some portions of outlying mountains, such as the Palmetto mountains in the southern portion of the quadrangle and Lone Mountain in the northeast portion.

There are at present only a few hundred people within the quadrangle, and the occupations of all of these are connected with the mining industry, and considerable prospecting is being done.

**GEOLOGY.**—The general geology of the region has been examined for the Survey by H. W. Turner. The chief rocks are Paleozoic limestones, granitic rocks of pre-Tertiary age (granites, diorites, etc.), with abundant Tertiary sediments, and Tertiary lavas, such as rhyolites, andesites, and basalts. As is the case in all this desert region, the Pleistocene wash from the mountains, which floors the valleys and fringes the mountains, forms a conspicuous geological feature.

**ORE DEPOSITS.**—Ore deposits are known to exist in several different parts of the Silver Peak quadrangle. The chief districts are the Silver Peak district proper, near its central part, occupying the mountain spur known as Mineral Ridge, west of the camp of Silver Peak; the Lone Mountain district, in the northwestern corner; the Windypah or Fesler district in the southern part of the Silver Peak range; and what may be called the Palmetto district, on the northern slope of the mountains of that name.

All of the districts, and indeed all the ore deposits known, occur in close connection with large intrusive bodies of pre-Tertiary granitic rock. The ore bodies sometimes occur within the granitic rock, but more usually in the Paleozoic (Cambrian and Silurian) lime-

tor of safety; and there can be but little doubt that the rope in question had for some cause or other deteriorated to such a degree that, while still to all appearances sound, it became liable to fracture under any sudden stress.

C. Le Neve Foster has called particular attention to the increase which has taken place in this class of accidents during the last few years. A return was recently made of all breakages of winding ropes used for raising and lowering men, irrespective of any injury resulting from such cause, and the total amounted in 1902 to sixty-four cases, of which six only were due to the failure of couplings. We are not now considering the question of safety catches, but simply the unsatisfactory increase which has occurred in recent years in the number of failures of winding ropes that had previously been considered trustworthy. In Belgium the regulations for winding ropes, in the absence of safety catches, include restrictions as to the permissible working load, which is not allowed to exceed one-tenth of the breaking strain when new, unless the length of 2 meters required to be cut off every three months from the end of the rope shows by actual test that the breaking strain has not been reduced more than one-third. In that country there has been only six cases of broken ropes within the last decade. Contrasted with Belgium, France, and Germany, Great Britain compares very unfavorably as regards the number of winding accidents, and the reflection is unavoidable that something is not quite right with respect either to our system of inspection of ropes or to the factor of safety permitted to exist. In calculating this factor it is obviously useless to estimate only the working load, irrespective of the velocity of arrest practiced by the engineman in winding. The suspicion gathers force that a large number of accidents of this class are to be explained by the sudden application of the brake to a cage falling with considerable velocity. The momentum acquired by a descending cage is considerable, and while the motion continues uniform the strain on the rope may be quite insignif-

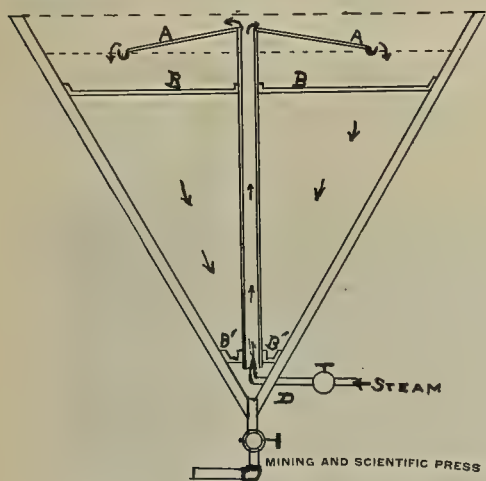


icant, and well within the safety factor, allowing even for a reasonable amount of deterioration. But, if we are to rely upon the Sheffield tests, the breaking strain of the Aldwarke rope had fallen to a minimum of 15½ tons, in which case it is not difficult to account for its sudden fracture.

The causes which bring about deterioration in steel ropes are probably more obscure than is generally admitted. Reduction of diameter by wear, and internal or external corrosion by oxidation, are obvious causes of loss of tensile strength; but even the best crucible steel can scarcely be expected to remain free from a certain amount of molecular rearrangement under the influence of a constant succession of strains. Without considering the mysterious influence of fatigue to which metals are liable, winding ropes are subjected while in use to constant elongating influences, which often exceed the elastic limit and induce a permanent set. Small as these effects may be, they are cumulative in their results, and the last straw may be added by a too sudden application of the brake. The remedies appear to be obvious, if in the opinion of the authorities the occasion should demand some revision of existing regulations.

### A Novel Agitator.

TO THE EDITOR:—In the treatment of slimes by the cyanide process there are two important mechanical operations to be performed, viz: The mixture of the cyanide solution with the particles of ore, and the subsequent separation of the precious metals from this mixture. This may be accomplished either by electrolysis, by decanting the liquid, or by filter pressing, and precipitating with zinc, or by other means. There are various devices called agitators, more or less complicated for mixing the pulp and keeping it stirred in order to get the precious metals into solution.



Del Mar Agitator.

I offer an illustration of an agitator that can be used in a conical bottom tank, or a "V" shaped tank, and one which has the advantage of extreme simplicity, and heats the solution, while at the same time agitating it. It is inexpensive to construct and no machinery is required except a boiler supplying steam.

This agitator bears the same relation to mechanical agitators that a steam turbine does to a steam engine, the application of power direct. It may be objected that the solution will absorb the steam before it has done its work. This may be true to a certain extent, but not before the motion is communicated to the surrounding mass. The heating shortens the time of agitation required for a given ore. The action that takes place is the following: The steam from "D" blowing up the tube or pipe "C" causes a circulation of pulp up this tube over the circular plate "A," where it is aerated and continues down to be again forced up the pipe.

Using the decantation process, when the precious metals have been dissolved, the pulp is allowed to settle, the clear liquid drawn off and the pulp is again agitated with water and settled. The tank can be emptied through a drain pipe from the bottom or by forcing the pulp up the pipe and leading it away. "B B" are braces to keep the pipe in place.

Should some process of electrolysis be employed to solve the second mechanical feature, the plates could be attached to the circular plate "A" and the process completed.

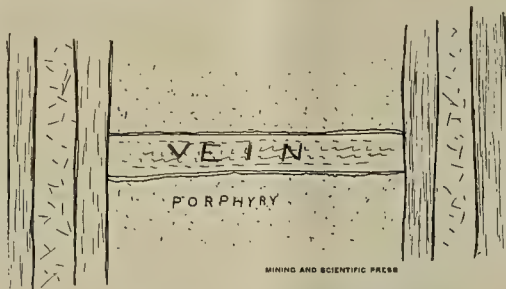
It has been urged by some to whom this idea has been suggested that the continuous passing of the pulp over the plate would result in scouring. It is not apparent that the scouring action would be more pronounced than on an ordinary inclined mill plate. Possibly the placing of an annular trough-like section around the base of the conical plate might prove of some value in catching any mercury or amalgam that might escape the plate.

ALGERNON DEL MAR.

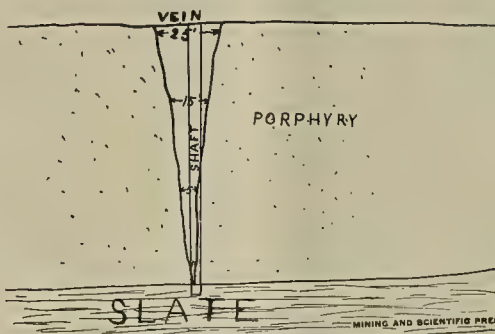
San Francisco, June 20.

### A Gash Vein in Folded Formation.

TO THE EDITOR:—The accompanying sketches are of a folded formation containing a gold-bearing quartz vein, situated in Summit county, Colo. When this mine was discovered the ore was very rich and about 25 feet wide at the surface. The vein matter was silicified quartz porphyry, oxidized and free milling. At the 100-foot level the vein had narrowed down to 15 feet width, though still oxidized and free, but at the



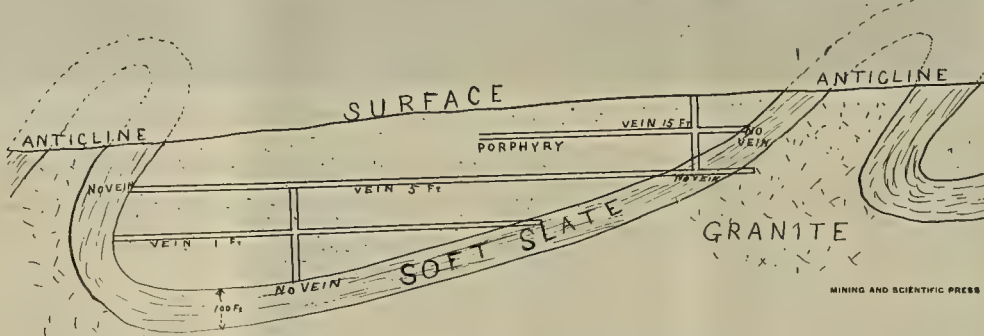
Plan Showing Vein and Outcrop of Folded Slates.



Vertical Cross Section of Vein.



Condition Presumed from Surface Indications, and Before Development.



Longitudinal Section of Vein Showing Folded Strata.

175-foot level the vein was only about 5 feet wide, carrying iron sulphide, and had decreased in gold value and the vein matrix had become kaolinized, and at the contact with the black slate the vein had pinched to nothing and had entirely disappeared, not entering the slate at all or following the contact, which was nearly flat. The surface indications here show the tops of these slate folds eroded so that a dike-like appearance is presented by the porphyry and slate, and the veins cross the porphyry at nearly right angles to the dikes, the vein being nearly vertical. This mine had at one time a 30-stamp mill.

Baker City, Or., June 24.

PH. REARDEN.

### Boundaries of the United States.

Bulletin No. 226, entitled "Boundaries of the United States and of the Several States and Territories, With an Outline of the History of all Important Changes of Territory," has just been published by the United States Geological Survey for gratuitous distribution. The author is Henry Gannett, who prepared this paper in its first form in 1885, when it was published as Bulletin No. 13. A second edition, much enlarged, constituted Bulletin No. 171, published in 1900. The present work is, therefore, a third edition, and is its own recommendation.

Besides giving the present boundaries of the country and of the several States and Territories, as

defined by treaty, charter or statute, Mr. Gannett presents briefly the history of all important changes of territory and the laws appertaining to those changes. He shows how the boundaries of our country have been affected by the provisional treaty of the United States with Great Britain in 1782, by the treaty with Spain in 1798, by the definite treaty with Great Britain in 1783, by the treaty of London in 1794, by the treaty of Ghent in 1814, by the treaty with Great Britain in 1842, and by the Webster-Ashburton treaty with Great Britain in 1846.

The additions of territory that have come to the United States and the consequent changes in boundary lines are described. They include the Louisiana purchase, the Florida purchase, the Texas accession, the Mexican cession, the Gadsden purchase, the Alaska purchase, and the acquisition of the Hawaiian Islands, Porto Rico, Guam, the Philippine Islands and Tutuila.

A historical review is given of the changes that have occurred in the public domain. A detailed account is also presented of the way in which the present boundary lines of the various States and Territories have been developed. The bulletin, in short, contains in convenient form a great quantity of information that will be useful to the student, teacher, legislator and general reader.

### Mines of Harshaw, Arizona.\*

[FROM A SPECIAL STAFF CORRESPONDENT.]

In the Patagonia mountains, Santa Cruz county, Ariz., is the mineral section variously known as Harshaw, Washington camp, or Palmetto district. It may be reached from Nogales by an 18-mile stage ride to Washington camp, or from the station of Patagonia by stage 8 miles to Harshaw. The district is one of the old new mining fields of Arizona. The old Mowry mine, discovered by Lieut. Mowry, stationed then at Fort Crittenden in the early '60s, and during the civil war was worked by the government for its lead. Twenty years ago the Hermosa mine was worked by Carr & Haggin for its silver. They worked it through a tunnel, and from the upper levels took out more than \$1,000,000 worth of the white metal. Side by side with these is the prospect of Westinghouse, the Du Quesne, with a probability of becoming a great copper producer, and the World's Fair mine, with possibilities in its silver-lead ores. This property is illustrated by one of the accompanying engravings.

Harshaw is the western center of the district, postoffice, store, etc. A hundred yards from it C. B. Adams of the Hermosa M. & M. Co. is erecting a new 50-ton mill. Last August he interested E. L. Conklin and R. Hoffman of Chandler, Okla., and H. F. Burt of Guthrie, Okla., in the purchase of the old

Hermosa property, which had been idle for almost twenty years, and while the upper levels have been stoped out nothing had ever been done below 300 feet. Mr. Adams ran a new tunnel 178 feet below the previous work, and since September has done between 1200 and 1300 feet of work and blocked out ore enough to justify a mill. The ore will be carried 1 mile by mule tram to the mill and treated by Huntington mills and tank amalgamation. Like most ore of the district, it is silver-lead, and is expected to average over 20 ounces silver. Wood at \$4 per cord will supply fuel and there is an abundance of water, which, under the old company, handled much more ore than the present owners expect to produce. The new mill, under the management of N. A. McDonald, will begin operations this month.

Three miles south of Harshaw the World's Fair group, owned by F. Powers and under bond to R. Ferguson and Z. F. Rawson, with Winona, Minn., capital, is making a good showing. The mine is worked through an 800-foot tunnel, at the end of which is a 200-foot winze. Drifting, stoping and sinking are being carried on simultaneously and high-grade ore being shipped.

Near this is the Josephine mine (illustrated in the accompanying engraving), one of the oldest in the district, belonging to R. Farrell and known as the Humboldt M. Co., formerly the Old Trench. It has

\*See illustrations on front page.



two 500-foot shafts and 4000 feet of development work, and \$500,000 has been taken out. At present it is idle.

East of these properties is Cunningham camp, the Endless Chain M. Co. They are driving a 400-foot tunnel to cut a vein, and while they have not yet reached the objective point have cut several other veins. The property consists of eight claims. A few men are steadily employed.

Midway between Harshaw and Washington camp is the old Mowry mine, operated by J. N. Curtis under name of the American Industrial Development Co. While worked for so many years not much depth was obtained, and the present company is sinking and drifting. About 200,000 gallons of water per day is pumped out.

Near the Mowry the Four Metals M. Co. is operating under management of G. D. Gross. The company is composed of Phoenix men; L. B. Christy is president and F. L. Blumer secretary and treasurer. Others interested are G. Luhrs and A. J. Edwards.

Near Mowry, also, is the Chicago & Patagonia C. & G. M. Co., with the Old Soldier group. It is in charge of J. T. Brickwood of Nogales. A. W. Brickwood and E. K. Walker of Chicago are heavily interested. About 300 feet of work has been done in the past four months and about fifteen men are employed. It has one shaft 170 feet, another 110 feet and one of 250 feet of drifting. There are six claims in the group.

At Washington camp, where the Pride of the West M. Co. has a large concentrating plant and furnace, nothing is now being done. A large amount of money has been invested in improvements, which is apparently justified by mineral indications, and it may at any time be again operated.

A mile from this is the camp of the Du Quesne M. & R. Co., the Westinghouse property, with H. S. Stewart in charge. At present the 600-foot shaft is being retimbered, but no development work is being done. The ore is of high grade and lies in a basin of

parture of the body from a vertical, during the time of its rise, will be the integral of velocity times time, for the whole vertical filament, during the time of rise. Dividing the distance which the body has moved downstream by the time of rising gives the average downstream velocity of water in the vertical filament. It is proposed to apply this principle by releasing a ball of wood, celluloid, or hollow brass, at the bottom of the channel from a trap, at a noted instant of time, and then noting the moment at which it appears at the surface. The distance of "departure" may be measured by a floating graduated rod, extended downstream from the vertical rod (or sounding rope) where the ball was released. If lateral departure is to be expected, so that the precise distance from the starting point may not be measured exactly in this manner, it is suggested that a horizontal net set in a wooden frame may be spread on the surface of the water, to catch the ball at the moment it reaches the surface; this would allow the true departure to be measured quite accurately. The author of this principle made some experiments on the time required for different bodies to rise from different depths. He found that the time varies with the specific weight and with the diameter of the ball, but in still water is constant for a given diameter and given specific weight. The time of rise varies directly with the depth. In currents of any appreciable velocity it was found that the disturbance is great enough to make it necessary to measure the time of rise directly, instead of computing it from the (known) depth of water.

### Belt Conveying Systems.

Throughout the West, in Missouri, Colorado, Arizona, Idaho, Montana, Utah and California, the belt conveyor is now being used extensively for handling ores, tailings and all kinds of mineral products. The simplicity and adaptability of the belt conveyor for

of products. Herewith is shown several cuts of belt conveyor carriers of the system referred to as furnished on recent equipments.

The carrier shown in Fig. 1 is made for belts from 14 inches to 42 inches wide, with troughing idlers set at an angle of 20°, running on solid shafts, centrally drilled and fitted with grease cups. These carriers can also be furnished with troughing idlers of 30° or 35°.

The tendency in designing belt conveyors seems to be toward using carriers designed with troughing rollers of moderate angles, say from 20° to 35°, depending somewhat upon the character of the material to be conveyed. The advantage of having troughing idlers and supporting rollers mounted upon independent shafts, with strong supporting side brackets, is apparent. These carriers are being used on systems recently installed for handling gravel, ores, clay, cement, sand, stone, etc.

Figs. 2 and 3 show a two-pulley mounted carrier, designed for belts from 12 inches to 18 inches wide. These have also been installed for conveying heavy materials.

Fig. 4 represents a standard flat belt carrier. Flat conveying belts are used for handling various products, either heavy or light, and under some conditions are preferred to the troughed belts. In using flat conveying belts, however, it is advisable to use troughing idlers at the points where the load is received.

The carriers shown by the accompanying illustrations are made by the Stephens-Adamson Manufacturing Co. of Aurora, Ill., and are illustrated fully in their catalogue No. 7, recently issued.

### The Assay Lead Button.

TO THE EDITOR:—In the issue of the MINING AND SCIENTIFIC PRESS for June 18, "Concentrates" had a paragraph concerning "The adhering of the re-



Fig. 1—Standard Mounted Carrier.



Fig. 3—Two-Pulley Mounted Carrier on Hard Pine Planks.

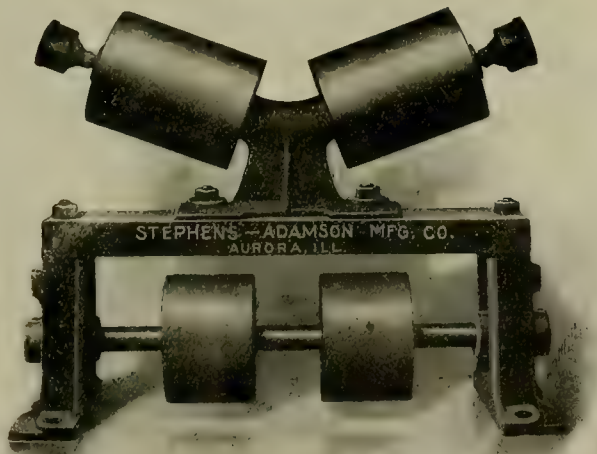


Fig. 2—Two-Pulley Pedestal Carrier on Steel Channel Bars.

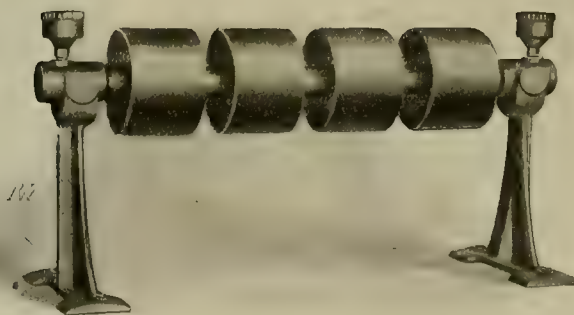


Fig. 4—Standard Flat Belt Carrier.

lime, with porphyry contact, similar to the formation at Bisbee. The property consists of over thirty claims, with a smelter site on the river near Nogales.

R. R. Richardson of Patagonia holds more property in various parts of the district than any other one man. He is not directly engaged in the mining industry, but conducts a general merchandise store.

### New Method of Stream Measurement.

To measure current velocities by direct integration for an entire vertical filament of the cross-section of a channel, S. Hajos, a Hungarian engineer, proposes a novel method which is at least theoretically interesting, says the Engineering News. The principle is as follows: If a body of specific gravity less than 1 is released at the bottom of the channel, it will rise to the surface and simultaneously be carried downstream. The downstream force exerted upon it at each point will be proportional to the velocity at that point. Consequently the total de-

different locations and different kinds of work are features that appeal strongly to all mechanical engineers. The few parts connected with the system consist practically of the conveyor belt, which is usually of rubber, with an extra thick surface of pure soft rubber on the carrying surface, and the carriers together with the head and tail pulleys.

In addition to these appliances there are frequently used distributing trippers for discharging the product at intermediate points, and also loading hoppers for receiving the material at different points. Two important factors in any belt conveyor system are the idlers or carriers and the conveying belt. This belt must be of the best quality of rubber, with an extra thickness of pure soft rubber on the carrying surface from  $\frac{1}{4}$ -inch to  $\frac{1}{2}$ -inch thick, depending upon the character of the material to be conveyed. The "S. A." special conveyor belt has been produced to meet the extreme requirements of heavy conveying. This belt has been tested in some of the largest plants in the country for the past three years and the manufacturers say has met every requirement, and that it is adapted for handling all classes

duced lead in an assay charge to the slag." It has been my experience that in nearly every case this may be overcome by a fluxing suitable to the mineral composition of the ore, and that this fluxing should be done when the charge is first made and not after fusion. It has been my observation that most of the inaccuracies of the assayer's results for the treatment of the sample are due to improper fluxing on account of carelessness or ignorance, or to overheating in an attempt to remedy this, or to rush the work.

Some time ago I was operating with an ore that presented unusual difficulties in the crucible and which were increased by the presence of large quantities of graphite. In this particular instance the fluxing which would secure a desirable slag would also develop all the undesirable features of the graphite, and would cause an excessive amount of reduced lead separated into pellets which settled with the unoxidized graphite and be very troublesome for subsequent manipulation. After experimenting, I hit upon the scheme of fluxing irrespective of the graphite except that I used only enough litharge for the desired size of button and then when the



melt was apparently finished and ready to pour, of adding a quantity of litharge (5 to 25 grams) to the contents of the crucible while still in the furnace, and pouring after allowing only sufficient time for the litharge to fuse and settle. When the pour had cooled I would have a clean bright button surrounded by the fused litharge and surmounted by a clean brittle slag.

I found upon further experimenting that the results would be from 5 cents to 30 cents higher on ton charges according to the grade of the ore. And it was also apparent that the final addition of litharge is an advantage when the ores contain sulphur, arsenic, antimony, and especially when the lead pellets had a tendency to float in the crucible, and even better than to have so great a surplus of the material at the beginning.

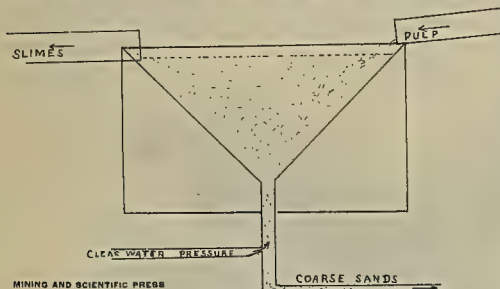
ALBERT B. CHITTENDEN.

Los Angeles, Cal., June 27.

### A New Form of Spitzlute.

Within recent years a great deal of attention has been given in California to the concentration of auriferous sulphides in the tailings of stamp mills after passing the concentrating machines. These tailings have been passed on canvas tables of various design, and in most cases the operation has proven profitable. One of the most extensive slimes plants of this description is that at the Zeila mine at Jackson, Amador county, Cal., a description of which has already been published herein. When in operation, the managers of these plants are usually experimenting, with a view to making improvements whereby a closer saving of values may be made or cost of running reduced.

The accompanying sketch shows a change and im-



Hydraulic Sizer, Zeila Mine, Amador County, Cal.

provement in the separator of the Zeila plant, designed by A. M. Hambric of Jackson.

This was installed after the plant had been in operation for some time as an improvement over the original separator. It effects a better separation and requires less water. The slimes are treated on the canvas plant and the coarse sands concentrated on tables.

In operation the principle is similar to that employed in the spitzlute—the upward current created by a stream introduced below under pressure. This causes the slimes to rise, while the coarse material passes out at the bottom.

### Limit to High Voltage in Electric Transmission.

The principal thing which at present limits the distance to which electric power can be transmitted is voltage, or rather insulation, writes Paul M. Lincoln in the electrical number of Cassier's Magazine. The amount of copper, which constitutes a large proportion of the total cost of any given transmission scheme, is directly proportional to the square of the distance and the amount of power transmitted, and is inversely proportional to the square of the voltage used and the loss that takes place in the conductors. It is evident, therefore, that if we could increase the voltage indefinitely, we could increase the transmission distance indefinitely; but we soon come to a limit beyond which we find it is impossible to increase the voltage. Just what this limit in voltage is at present is somewhat a matter of individual opinion, and what it will be in the future involves an exercise of prophetic vision which is beyond the scope of this discussion to assume.

The highest voltage actually in use at the present time is about 55,000. This voltage is used in the Canon Ferry-Butte transmission in Montana, a distance of about 65 miles, and the Shawinigan-Montreal transmission in Canada, a distance of about 80 miles. Higher voltages have been proposed, and in some cases have even been prepared for, in the design of lines and transformers; but up to the present time none higher than 55,000 volts has been put into successful commercial operation.

The most serious difficulties encountered in increasing the voltages of transmission are:

1. Difficulty in maintaining perfect insulation.
2. Difficulty in obtaining proper protection from lightning discharges and other static troubles.
3. Loss of power due to brush discharges from high-tension conductors.
4. Deterioration of high-tension conductors, due

to the fact that compounds which attack the metal are formed by the action of these brush discharges upon the atmosphere.

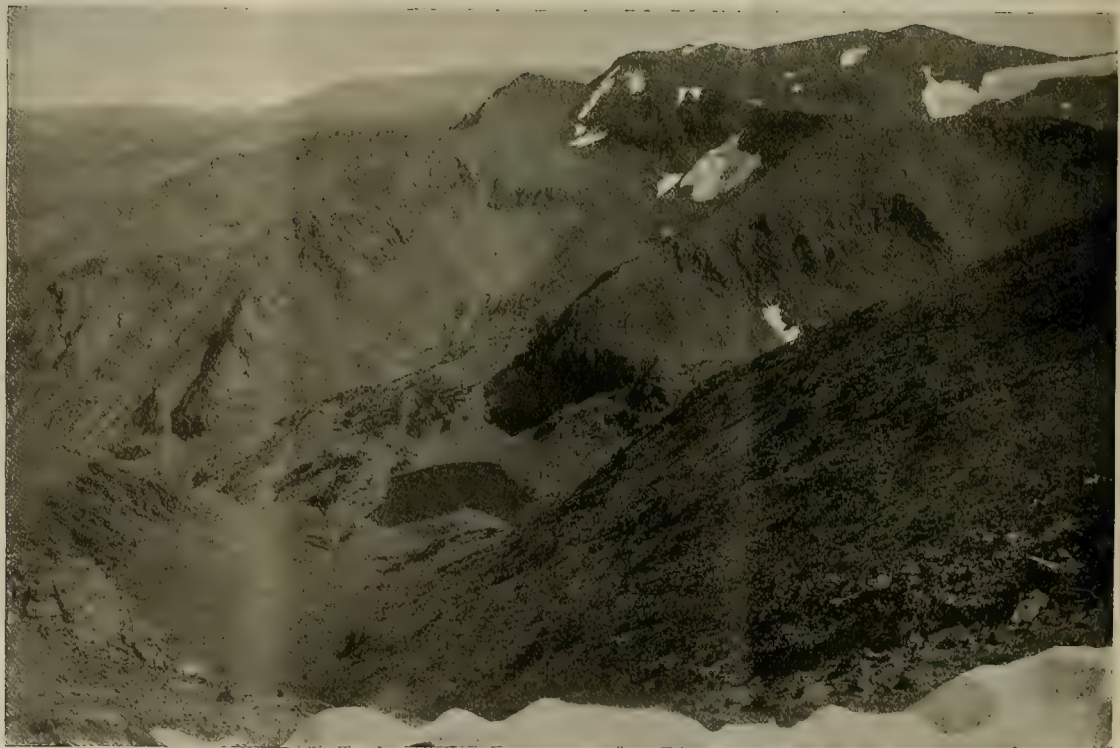
### Mines of the High Sierra.

The recent discovery of rich ore in the neighborhood of Bridgeport, Mono county, Cal., has again attracted attention to the mineral resources of that portion of the high Sierra region. In the earlier days of mining in California men of means were less

Small lots of rich ore were taken from Blind Spring and other less prominent districts, but in Lake district the Mammoth Company's mines and mills, located at Pine City and Mammoth City, employed a large force. The company built an expensive road, and in 1878 built a 20-stamp mill, which was increased to forty stamps in 1879. The mine was developed by several tunnels run at various levels. For a time the property made a large output, but the lower tunnels having failed to develop large bodies of high grade ore the work was discontinued and the mill closed down. More or less prospecting with encouraging



Head of the Tuolumne River, Cal., Showing Character of Country on West Slope of the Sierra Nevada Mountains.



Sardine Lake, on the Line of the Tioga Road, Mono County, Cal.

the main Sierras lying to the westward of Bodie. cautious in their investments, and any ore deposit that would afford good assay values looked attractive, and for this reason large investments were made in that region. Among those most prominent were the mines of Homer, Tioga and Lake districts. The most noted district in that section—Mono county—is that about Bodie. The veins in that district occur in andesite and have produced upwards of \$25,000,000 in gold, much of the rock being high grade. The success of several mines of Bodie stimulated the development and equipment of numerous others in that district which proved to be unprofitable. The industry gave, directly and indirectly, employment to a large number of men, and as a natural result prospecting extended upward into

results has been done in the district since. The ores carry gold, silver and lead, and in some instances copper. The bullion is worth usually about \$12 per ounce. In Homer district the principal mine is the May Lundy, which has been extensively developed by tunnels run on the vein. The mine was equipped with stamp mill and a large amount of bullion produced. Recently the tailings have been successfully worked by cyanide process. In Tioga district, south of the Lundy district, the Great Sierra M. Co. owns large interests. The claims have been developed extensively by means of tunnels. Some of the mines are at an altitude of about 10,000 feet. The character of the country in the neighborhood of the mines on the summit of the Sierras is illustrated in the accompanying engravings. Open park-like valleys



are surrounded by rugged snow-clad peaks, in the shadows of some of which are living glaciers, the remnants of a once extensive ice field. In some instances the scenery is grand, great canyons having been cut deep into the rocks by ice and water, and this ruggedness renders the mines easy of attack by means of tunnels. There are numerous glacial lakes, and meadows which were at one time lakes, now filled with sediment. Timber is abundant and water for power and all other purposes is obtainable in almost every ravine and canyon. In addition to the mines and mining districts above mentioned there are

to construct a State highway over the Sierra through the Tioga district, which will make several of these old camps more easily accessible.

## THE PROSPECTOR.

The rock specimens from Kingman, Ariz., are: No. 1, quartz diorite; much altered and effervescing with acid, showing that the lime-soda feldspars are

Needles, Cal., is mountain cork, a variety of asbestos. Other similar minerals are mountain leather, which occurs in sheets, and mountain wood, which has a fibrous appearance resembling dried wood.

The prospector should include in his outfit a pole pick, shovel, small mortar and pestle, hornspoon or small pan, bottles of muriatic and nitric acid, and also ammonia (for testing for silver and copper, also for distinguishing gold from other substances resembling it when in a very fine state of division), also numerous sample sacks and cards and pencil for marking the locality where each rock or sample is obtained. Often a prospector picks up a piece of float and, after glancing at it, puts it in his pocket or in a sack. During the day he may pick up a number of such pieces, depending on his memory to find the place from which any one of them came, if it seems necessary to look it up again. On prospecting the day's harvest of rocks in camp in the evening or the following day, it is discovered that one of them contains valuable mineral. He endeavors to find the place from which the specimen came, but is unable to do so. If the sample had been placed in a sack with proper description on the accompanying card, or merely a number, with the description in the book, there would be no difficulty in rediscovering the place.

The mineral specimens from Forbestown, Cal., are: No. 1, talc schist altered from greenstone (diorite or diabase). This may not be the proper hanging wall. Crosscut, and, if the rock continues soft, drive through it until hard rock or a vein is reached. No. 2 is a splintery, semi-schistose metamorphic rock carrying some pyrite. This rock may be, and probably is, the wall. No. 3 is a semi-schistose rock altered from diorite. It contains a very little extremely fine pyrite. Otherwise it is similar to No. 2. No. 4 is similar to No. 3. Evidently the country is changing for the better at the face of the tunnel. No. 5 is talc schist with a little quartz and considerable pyrite. The latter may be gold bearing. This can be told by assay. No. 6 is felsite, a variety of dike rock, and from explanation given of its occurrence is a "good sign." The little vein should be explored further. No. 7 is quartz with iron sulphide (pyrite) and looks well. A similar ore should be found near No. 2. No. 8 is quartz and pyrite, and No. 9 quartz with galena and a little pyrite. No explanation is given in the diagram of why the offset was made in the tunnel nor why it was again turned back in line with its former direction. If a good body of ore is cut at the face of the tunnel or beyond, the tunnel should be straightened to obviate the two unnecessary turns.

The prospector who starts out on his quest for a mine with a fixed idea of how his mine must look is likely to be disappointed. The secret of successful prospecting lies in casting aside all preconceived notions and to overlook nothing. A few years ago no prospector believed that gold or silver ore would be found in a dike. Now it is known that many dikes carry valuable ores of gold, silver and copper. Many still think that it is useless to look in limestone for a gold mine. The fact is there are numerous valuable gold mines in limestone, and not infrequently limestone or marble contain payable gold. That any particular formation or combination of formations is necessary to the occurrence of good ore is another fallacy. The old miner's expression "gold is where you find it" is a truism that no prospector can afford to forget. As a rule large white quartz croppings do not carry payable values, though there are important exceptions. One of the best indications of a permanent and valuable vein is a soft, decomposed and mineral-stained country rock along the course of the vein, no matter what the character of the rock. The outcrop accompanying veins, large and small, which become great producers of gold, silver, copper, lead and other minerals, usually shows extensive mineralization of the country rock along the course of the vein, and generally the rock has become softened by the decomposition which has taken place at and near the surface. The characteristic features are brown or red iron oxides, soft ground, and honeycombed quartz. Greenstones (diorite, diabase, etc.) are altered to soft yellowish brown rock which can be easily picked. Black slates are bleached nearly white or light yellow, sometimes are stained brown or even red, and are soft and easily picked. Schists become brown or red. Andesites often show kaolinization as well as stains of iron oxide. Black oxide of manganese and iron oxides are the most common signs of the vein proper, as well as the masses of ferruginous quartz. The prospector should be able to recognize an outcrop when he sees one, but such is not always the case. In one instance two men, who discovered a valuable mine, were placer mining below it, and sat on the outcrop of their vein to eat their lunch for several weeks before discovering that the rock was rich in gold.

The height to which water will follow the partial vacuum created by the piston of a pump is theoretically about 33 feet at sea level; but the suction and valves must be almost perfect to secure these results, while at great altitudes it is much less, owing to decreased air pressure.



Camp Curry, Tioga, Cal., Elevation 10,318 Feet.



Levinig Creek, Near Tioga, Cal., Showing Character of Country on East Side of Crest of Sierra Nevada Mountains.

numerous others both north and south of those named, forming a mineral belt which extends along the region near the crest of the Sierra for many miles. Mills have been built, aerial tramways erected and other improvements made, but most of this was at a time when metallurgy had not reached the advanced stage it now occupies. Comparatively little new development or equipment has been made within the past ten years, but within that period a marked advance in metallurgical knowledge has been made, and if it were not for the difficulties of transportation these districts would be active at the present time. The long winter season, with its deep snows and tempestuous weather, has constituted a material drawback to the steady and successful operation of these mines, but steps have been taken

decomposed. No. 2 is a metamorphic schistose to slaty rock, and also shows the presence of much lime. This rock is also probably of eruptive origin.

The mineral specimen from Los Angeles, Cal., is pro-chlorite, and contains no uranium mineral. It has all of the physical properties of the chlorite and few, if any, of uran-mica.

The mineral specimens from Idaho Springs, Colo., are largely composed of garnet, with quartz, and one specimen also shows considerable biotite (black mica), another shows much iron oxide (limonite) with crystallized quartz.

The specimen from Arizona, 8 miles east of

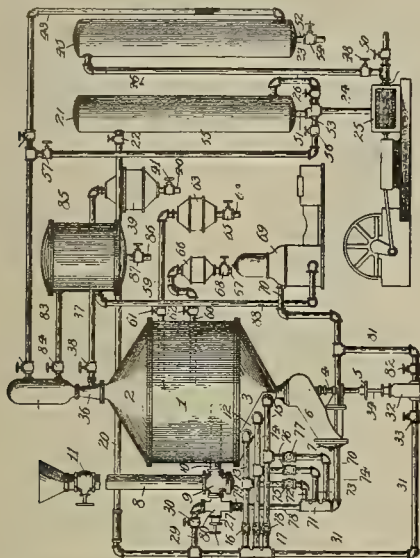


## Mining and Metallurgical Patents.

PATENTS ISSUED JUNE 21, 1904.

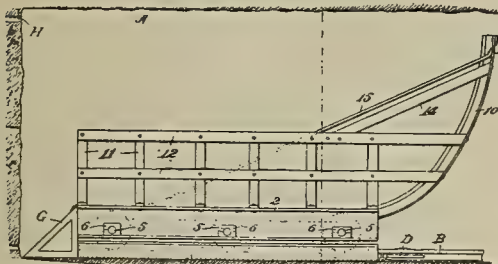
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR SEPARATING MATERIALS OF DIFFERENT GRAVITIES.—No. 762,870; H. A. Allen, Chicago, Ill.



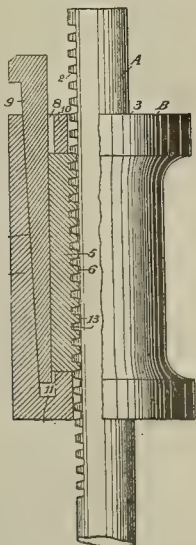
Ore separator in which is combined closed separating vessel, means for introducing thereto materials to be separated, independent sources of liquid and gaseous fluid supplies, independent conduits forming circular systems leading in closed circuits away from and back to separating vessel, means for discharging separated materials while apparatus is in operation, means for independently forcing gaseous and liquid fluid circulations through separating systems and suitable valves for controlling circulations.

MINING AND EXCAVATING APPARATUS.—No. 763,030; C. H. Thompson, Los Angeles, Cal.



In apparatus of class described, combination with track, of car provided with means for directing material from blast into car and retaining such material on car, and means for raising and rigidly supporting car above track to adapt cars to receive impact of loosened material from blast without injury to running gear of car.

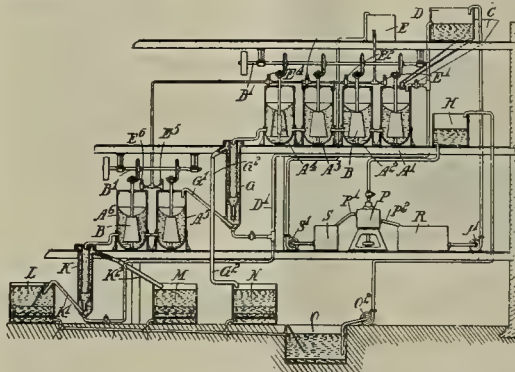
STAMP TAPPET AND SECURING MEANS THEREFOR.—No. 763,146; C. Brown, Bishop, and F. Hayes, Elmonte, Cal.



Combination with stamp-stem, of tappet having

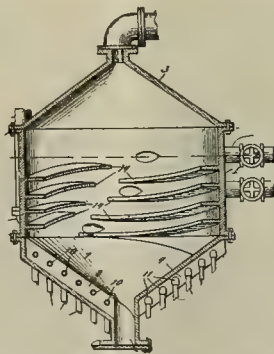
central bore to receive stem and having, at one side of bore, inner longitudinally extending chamber with bottom wall 11, upper end of tappet being recessed to communicate with chamber and inner wall of chamber being inclined in direction of length of tappet, inclined wall extending to point below bottom wall 11 to form recess, and bottom wall and corresponding integral portion of top of tappet between recess and bore forming stops or shoulders; gib of such thickness that it is capable of endwise insertion through top of recess of tappet and adapted to enter chamber and occupy space between top and bottom stops, gib and corresponding portion of stem being serrated and adapted to interlock; and single tapering key disposed longitudinally of stem and insertible through top recess of tappet and adapted to lie between inclined wall and back of gib, key having continuous bearing at all points on back of latter and having lower end or point to enter bottom recess.

CLASSIFICATION OF THE METALLIC CONSTITUENTS OF ORES.—No. 763,259; A. E. Cattermole, London, England.



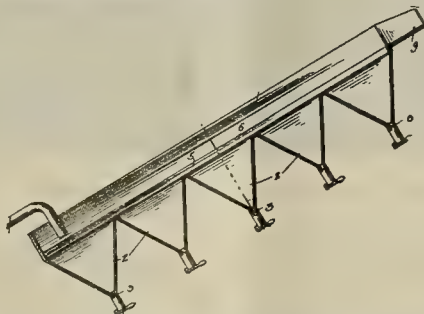
Process of classifying metalliferous minerals agglomerated by oil which consists in successively agitating agglomerated minerals with emulsifying agents of varying strength progressively to free several minerals in succession separating out each mineral in turn by separating device and adding oil in requisite small amounts to keep granules of proper size and consistency.

ORE SEPARATOR.—No. 762,867; H. A. Allen, Chicago, Ill.



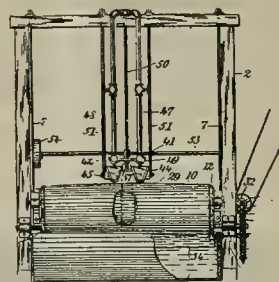
Apparatus in which is combined closed receptacle having tapered bottom consisting of plurality of surfaces inclined to plane at right angles to axis of receptacle, inlet pipes projecting through vertical members of stepped portions, means for admitting ore to body of vessel, discharge opening at bottom and one or more discharge openings upon higher level than that at which ore is admitted.

ORE SIZER AND CONCENTRATOR.—No. 763,019; A. H. Phinney, Turner, Mich.



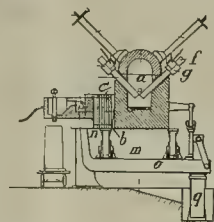
Ore sizer and concentrator comprising vat having discharge element at one end, plurality of hoppers below level of discharge element and forming series of water chambers, and screen forming false bottom extending over hoppers and extending below water level of vat, screen being provided with longitudinally disposed bars spaced apart and having upwardly converging inclined sides, bars forming series of straight guiding channels opening at bottom into hoppers and extending from feed to discharge ends of device.

ORE SLIMER.—No. 763,197; I. F. Monell, Boulder, Colo.



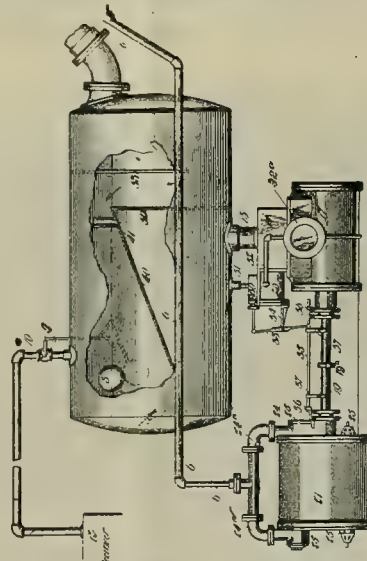
Ore slimer comprising main frame, belt frame supported in main frame, rollers at ends of belt frame, rollers being tapered from centers outward, small rollers arranged between first-named rollers, and tapered from centers outward, endless belt movable over several rollers, and means for distributing stock onto belt, and washer for cleaning values from belt.

ELECTRIC FURNACE.—No. 763,330; C. P. E. Schneider, Le Creusot, France.



In combination, electric furnace chamber, electrodes therein, and means for adjusting same whereby they may be lowered and raised in chamber, pipe leading from and returning to bottom of chamber adapted for circulating molten metal, and transformer linking pipe and adapted to heat molten metal therein.

HYDRAULIC AIR COMPRESSOR.—No. 763,239; J. H. Alexander, Ymir, Canada.



The combination in air-compressing apparatus of pipe for conducting falling column of water under due pressure, and having outlet to atmosphere, separating tank into which pipe discharges, storage tank and supplemental air-compressing mechanism, comprising hydraulic cylinder having piston arranged for operation by water discharged under pressure from separating tank, air cylinder and piston, air piston being connected with piston of hydraulic cylinder for operation thereby, and pipe 6 connecting supplemental air-compressing mechanism and vertical pipe leading to separating tank, whereby air compressed by supplemental mechanism is conveyed into pipe 6 and thus into separating tank.

DURING 1904, in California, the areal geology of the Redding quadrangle will be revised by J. S. Diller. He will also complete an areal and economic survey of the Indian Valley special quadrangle, and A. C. Spencer will co-operate with W. Lindgren in making an investigation of the economic geology of the Redding quadrangle. G. K. Gilbert will continue his investigations of the glaciology and physiography of the high Sierras. In Colorado, under the direction of Whitman Cross, detailed areal mappings will be continued in the San Juan region. The Ouray quadrangle would be surveyed and the work extended as far as possible into the adjoining Lake City quadrangle. The survey of the Engineer Mountain quadrangle will also be completed. Dr. Cross will have the assistance of Ernest Howe, W. H. Emmons and A. Johannsen.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

Niblack reports say ore has been struck in the crosscut on the 150-foot level of the Niblack mine, near Ketchikan. The formation at the lower level corresponds with that 100 feet nearer the surface, except that the ore appears more uniform in character. By next month it is expected the mine will be in position to start shipments to the smelter at the rate of fifty tons per day, and to increase its product as fast as room can be made for an increased force of miners. The company is working forty men.

Foreman J. Perelli of the Alaska-Juneau mine, on Silver Bow Basin, near Juneau, reports the thirty stamps dropping steadily with satisfactory results.

## ARIZONA.

### Cochise County.

Progress is being made in the new Sacramento shaft of the Copper Queen Co. at Bisbee. Sinking is going forward with two shifts of miners. It is expected it will take two years before the shaft will be in shape for adding its quota to the production of the company's mines. Sacramento shaft will, when completed, be of three and one-half compartments, and will be sunk to a depth of 1000 feet before much ore will be taken out. To operate this shaft the company will put in hoisting and other machinery of a large capacity. At present the miners have attained a depth of 50 feet.

### Gila County.

At the Old Dominion mine, at Globe, construction work is progressing. The iron and concrete work on the dust chamber has been finished, and laying 200,000 brick in the side walls has begun. The pump, set up in the new shaft, is in operation. The work of putting in the foundations for ten ore bins above the smelter has been started. The grading for the concentrator, which has been under way for some time, will be finished this week. An addition to the plant that has been decided upon is a machine shop, says Manager L. D. Ricketts, to be located on the railroad spur back of the superintendent's residence. The shop will be constructed of steel and will be larger and better equipped than the present shop. Two of the old furnaces continue in blast.

### Graham County.

It is reported that the New England & Clifton Co. has bought the Julius Lezynsky claims, in Greenlee district, on Chase creek, near Clifton. There are between thirty and forty of these claims, upon some of which development work has been done and concentrating ore opened. This gives the company an outlet on Chase creek. It is said one of these claims has a body of concentrating ore 70 feet in width which averages 4% copper. It is also reported that the New England Co. has a controlling interest in the Antietam mine, near Metcalf.

The Home Co. at Morenci proposes to put down a shaft. It will start on ore on the Will Do claim, in the bottom of a gulch, at one of the most favorable points for development. N. L. Jenkins is superintendent.

### Martinez County.

C. F. Goddard, manager of the Goddard M. Co., whose property is 2 miles north-east of Wickenburg, says he has men working in ore averaging \$12. They have put up a whim on the 90-foot shaft, and will put in a gasoline engine later in the season.

### Mohave County.

The Stockton Hill M. Co. reports that in the crosscut from the 400-foot level of the De la Fontaine mine at Stockton Hill 3 feet of lead ore has been cut. On the tunnel level a shoot of lead ore was opened up in the wall. Milling machinery will be put in.

The Leland M. Co., near Chloride, is dropping ten stamps of the mill on ores from outside mines, the Midnight furnishing a large part of the tonnage.—T. Nay, E. Purcell and J. Thompson have a lease on the east end of the Leland mine and the north end has been leased to other parties. It is stated the mine shows streaks of high-grade ore.

The Gold Giant M. Co. has bought the Homestake mill and will remove it to the Mossback mines, near Chloride, in August. The mill is of twenty stamps. The company is putting in a 12 H. P. hoisting plant on the Mossback mine and intends to sink the shaft to 300 feet, says Manager Slocum.

The Gold Road M. Co., near Acme, is making improvements for its milling plant. One of these is the change from dry to wet milling. Water sufficient for

this purpose has been developed near Little Meadows and by converging the many springs in the canyon south of Little Meadows and establishment of a pumping plant at that point, all the water will be forced over the mountain. As soon as the pipe lines have been laid, it is intended to also pump the oil, which is used as fuel, thus obviating the heavy mountain haul. When these improvements have been made the company intends to put amalgamators in the mill for taking up the heavy gold before the pulp goes to the cyanide tanks.

Men have been put to work on the C. O. D. mine, Stockton hill, on the shaft, says Superintendent Alexander. The shaft will be sunk to tap the vein below the old workings, and will be of two compartments. At the 400-foot level the old shaft stopped. It is thought ore will be opened up on the 400 and 500 levels when the new shaft reaches those points. The old shaft was sunk on east end of the ore body.

S. C. Bagg, of Kingman, manager of the New Comstock mines, near Mohave City, says men have been put to work and will pile ore on the dump of the Katherine mine for a month or more. At present, the Colorado river is too high to admit of operating the mill, the pumps being under 10 feet of water. As soon as the water subsides the mill will be started up.

J. D. Jordan has a contract to run several hundred feet of drifts from the 400-foot level of the Golden Gem mine, at Cerbat, says the Kingman Miner. Work has begun. As soon as these drifts have been carried through the ore bodies another 100 feet will be sunk in the main shaft. J. W. Morgan is superintendent for the company.

H. F. Best, president of the Treasure Hill M. Co., at Stockton Hill, reports the water has been pumped from the shaft of the mine and the crosscut will be run to the veins on the north and south side of the shaft.

### Yavapai County.

The Farwell M. Co. at Zonia, near Kirkland, reports progress. Sinking is going on at rate of 100 feet a month. It is proposed to build a reduction plant.

C. K. Tibbetts, manager of the Pfau G. M. & R. Co., with properties at Cherry, 8 miles southwest of Jerome, says he is preparing to put in a 100-ton cyanide plant, boilers, engines and a compressor plant. The Pfau vein shows a width of 40 feet and carries average values of \$5.50 per ton.

## CALIFORNIA.

### Butte County.

Oroville reports say preliminary work to dredging is under way on the Hearst estate, which has extensive land holdings near Palermo, 6 miles below Oroville and 4 miles from the Feather river. Work is in progress in two different places on one of the Hearst ranches. As a means of prospecting ground to determine its value for dredging, those in charge are sinking shafts and the entire prospecting work will be done by this method if the prospectors do not strike more water than they can handle. Should this occur, the work will be completed by drilling. The work is under supervision of M. Grier.

A prospecting drill has been placed on the eastern part of the Diggs farm, near Oroville, and boring commenced. This is part of the 1200 acres bonded to the Vilora M. Co., an English company, at \$360,000.

### Calaveras County.

At the Royal Con. mine at Hodson chlorination works have been completed with two furnaces. This plant will be sufficient to handle the concentrates from the 120-stamp mill.—Negotiations are in progress with the Union Water Co. to convey water into Hodson, as well as Copperopolis. The Royal mine has the only water right in Hodson at present, pumping the water from the Salt Spring valley reservoir. This is an expensive process, and it is said the Royal is interested with the Mountain King in the new water project.

### Del Norte County.

Quartz locations on Shelly creek, near Crescent City, are being developed. The mineral belt of that section is 3 miles in width and as yet, with the exception of the Monumental mine, no extensive work has been done, says the Del Norte Record. Reports from Shelly creek say the Monumental M. & M. Co. is rushing work on the sawmill getting out lumber for buildings. Thirty men are at work. The work of getting out ore will follow. There is said to be a copper ledge that crosses Smith river near the mouth of Myrtle creek.

### El Dorado County.

(Special Correspondence).—At the River Hill mine, 1½ mile from Placerville, the outlook is reported promising. The shaft is down 1050 feet between the two veins and they are crosscutting from the 300,

400, 500 and 700-foot levels toward either vein. The 2400-foot drainage tunnel, completed six months ago, runs into the 700-foot level and will form an economical means for working and draining the mine. This tunnel is said to have been run at a cost of under \$5 per foot. It cuts several ledges. Most of the waste is being used for filling, although a little is run out through the tunnel. The ore is hoisted and given a coarse crushing at the galows-frame. It is then trammed by gravity 150 feet to the mill by means of a system in which the loaded descending car pulls up the empty ascending one. Here it is crushed finer and fed to the 20-stamp mill. The sulphurets are saved on four Willeyes and the fine tailings from these are caught on Frue vanners. These vanners are a recent installation, the table tailings formerly running to waste. Two more vanners will be put in. It is proposed to build a 40-stamp mill and chlorination works at the mouth of the tunnel. Water under 230-foot head is used as power for the 20-stamp mill, thence it is carried to the mouth of the tunnel, where, under 596-foot head, it runs the compressor furnishing air for hoisting, running coarse crusher and operating machine drills. The reheating of air for hoist and crusher has given 35% increase in efficiency. G. Clark is superintendent and T. Clark manager.

The Rivera gravel mine, near Placerville, is doing considerable development work and running all rock so extracted through their gravel mill. The very coarse gold is caught in the discharge riffles and the finer material is recovered on an amalgamator. The plant is run by water power at 170 pounds pressure.

Placerville, June 29.

(Special Correspondence).—W. T. Bailey has a lease and is working the Eagle King mine.—At Cap's crossing on the north fork of the Cosumnes river, 9 miles from Grizzly Flat, W. Davis has relocated and is working an old gravel mine with six men.

The Contention mine, owned by J. Lyons, is working with eight men. A 2-stamp mill is in operation.—The Morey mine is producing ore and is keeping four stamps dropping.

The Mount Pleasant mine, J. T. Gribble, superintendent, is the chief producer of Grizzly Flat. A new 4x4-foot two-compartment shaft is down 200 feet. This is at the south end of the claim. Twenty men are employed.

Grizzly Flat, June 29.

### Fresno County.

The Kern Trading & Oil Co. (the S. P. oil department) is rushing work on its pipe system, and next week expects to have all S. P. leases at Coalinga from the Commercial to the Union, inclusive, connected up with the receiving station. This will afford a measure of relief to many of the west end operators, as the railroad will take all oil from producing leases. The K. T. & O. Co. is already taking all the production of the Genesee, Section 7, and Penn-Coalinga companies. It is estimated the amount of oil to be received from the leases will approximate 4000 barrels a day. E. W. Allen is local field manager.

### Kern County.

At Randsburg mining is reported improving. The Yellow Aster is working full handed, double shift. The Butte Lode, Sunshine and Baltic are making steady outputs, also the leases in the King Solomon group and Stringer district.

### Mono County.

B. D. Phillips, a prospector of Masonic mountain, 10 miles from Bridgeport, reports finding quartz assaying \$9 per ton. He dug a shaft 20 feet and found a 5-foot ledge of \$25 ore. Prospectors are rushing to the find. J. Sawyer reports having a claim with a 6-foot ledge assaying \$20 on the cropping. The Rough and Ready claim has a 3-foot ledge. The ores are largely free milling. It is hilly country and wood and water are plentiful.

### Nevada County.

The Union G. & S. Con. M. Co. has been incorporated and has started developing the Union mine at Banner Hill, near Nevada City. The board of directors is composed of N. J. Weber, W. H. Dunlap, S. L. Leiter, W. Palmer, W. Black, F. Woodman, S. Hieronimus and P. F. Simonds.

The Conlin mine, near Grass Valley, is reported to have struck the ledge. Under Superintendent Holland's direction a crosscut was started from the 300-foot level.

Experiments having been satisfactory, the North Star M. Co. at Grass Valley is grading for a cyanide plant near the mill at Central shaft. A small sand plant has worked the tailings to some extent below the mill. Superintendent Foote says the experimental cyanide plant has been handling the output of ten stamps, and is operated by a system of agitation. This small plant determined the company on erection of a large one to handle the entire output of the Central shaft 40-stamp

mill. It will be at the edge of the road to the Omaha mine, a short distance below the mill, and the sulphurets will be carried thither by a sluice. To reduce the sulphurets to the required fineness, a Chilian mill will be used, says the Union. The new works will be built of fireproof material. The new 40-stamp mill will be ready for operation this month. Up to the present time the mines in the district have shipped their sulphurets to the smelter or hauled them to the local chlorination works.

Work is under way on the Blue Hill mine in Willow valley, near Nevada City. The machinery of the American Hill mine has been bought by R. Simmons for the Blue Hill Co.—Work at the Union mine, near Banner hill, is being increased. Retimbering the shaft is under way.—G. Coppers is developing his property in New York canyon, near Snow point, during the last few weeks. He reports striking ore that shows free gold.

At the New York-Grass Valley Con. mine, near Grass Valley, Manager Root says underground work is progressing. Between the fifth and sixth levels a shoot has been cut showing free gold. It is intended to drift farther east in No. 6 level to strike the shoot showing in No. 5. Sinking will resume, it being intended to send the shaft down 300 feet farther. Another compressor will be added, increasing the present power one-third.

The Nevada County mine on Deer creek in Nevada City will be reopened and worked. A. Maltman, superintendent of the Murchie mines, has a lease. The incline will be pumped out and sinking resumed. Drifts will also be run south along the ledge. The machinery will be placed in condition and a pipe line will be run to connect with the one that furnishes power for the Sierra Queen mine. On the property is a 10-stamp mill.

### Plumas County.

Superintendent Goodhue says work is progressing satisfactorily at the Five Bears mine in Genesee valley, near Genesee. The grinding mill has been placed in position and the work of putting in the cyanide plant taken up. The tunnel for the development of the ledge is being driven ahead, the showing being reported satisfactory both as to quality and quantity of ore.

The quartz ledge uncovered in the Gold Run hydraulic mine near Elizabethtown, north of Quincy, says C. A. Poage, manager of the Gold Run Co., has been unwatered for 200 feet, the width showing 8 feet. The sluiceway of the gravel mine crosses it diagonally. At that point the ledge is cut to a depth of 8 feet and a distance of 20 feet along the vein. Free gold shows, with pyrite and galena. The ledge dips to the east at an angle of 70°, with slate on the foot and porphyry on the hanging wall.

### San Diego County.

The Stonewall mine near Cuyamaca will resume operations this week. G. H. Clark, formerly of Auburn, Me., is business manager and S. H. Lucas is superintendent. The plan, as outlined by Superintendent Lucas, is the pumping out of the mine and retimbering, and the sinking of the shaft an additional 600 feet. The sawmill will be started getting out the necessary timbers for retimbering the mine.

### San Francisco County.

Plans will be prepared for a parting plant to be built at San Francisco by the American S. & R. Co., says E. B. Braden of Helena, Mont., general Northwestern representative of the American S. & R. Co. The plant will cost approximately \$75,000. It will be for the parting of gold and silver. The plant will handle the bullion of the Northwest and Alaska and a large amount of dore bullion of California.

### Shasta County.

Within the past month the number of miners at the Iron Mountain mine, near Keswick, has been reduced from 400 to 150, says the Redding Searchlight. The reduction in force has been general throughout the property at Iron Mountain. But three men are employed in the quarry where they had twenty-five heretofore. The number of blacksmiths at the mine has been reduced to two. What the company purposes doing has not been given out, but a line has been surveyed and laid out for a railroad from the Hornet mine, owned by the company, around the mountain to the ore bunkers at the Iron Mountain mine. The deposit of copper ore in the Hornet group is reported to be more extensive than the deposit in the Iron Mountain mine, but the ore is lower grade. The ore of the Iron Mountain mine is said to average 7% or 8% in copper, while that of the Hornet mine averages but 4%.

At the Mountain Lion mine, between Shasta and the Mt. Shasta mine, fifteen men are at work. Farnley & Gladwin have been doing development on the



group, and have opened up the mine, showing ore. The mill is nearly completed and will be in operation by August 1st.

#### Sierra County.

It is reported the Columbia mine at American Hill, near Forest City, will be reopened. Manager Harper is at Forest and has given a contract to run 400 feet of tunnel.

The Alleghany M. Co., J. W. Morrill manager, has bought the bond on the Young America group, south of Forest. The Deep Blue M. Co. has started to drift off to the right of the main tunnel. Good gravel is reported in sight.

Operations have resumed at the Columbia gravel mine near American hill, near Forest City, with J. M. Harper of Nevada City as manager. The gravel channel is expected to be reached before the winter sets in, being a distance of 400 feet from the face of the hill.

#### Siskiyou County.

The New York mine on Indian creek near Hooperville, near Fort Jones, is keeping the mill going steadily with 30 men employed. Manager Bryant, operating the Crocker ledge, on Deadwood creek, is building roads from the mine to the west fork of Deadwood, where the mill will be placed. Lumber and machinery are being hauled in.

A. C. Brokaw of Etna, operating Scott valley mines, reports gold-bearing quartz taken from the Advance mine at Russian creek on the Salmon river. The ledge is 4 feet wide. He is running a lower tunnel to strike the ledge deeper. Brokaw is always sinking a shaft in the Hull Gulch quartz mine in Quartz Valley district, the mill being idle awhile, but started a new mill last week on the Golden Eagle in Indian Creek district, where he has a ledge 4 feet in width. J. B. Scott is also running his quartz mill at the New York mine, opposite the Golden Eagle.

#### Trinity County.

The Fairview M. Co., near Minersville, has 125 men on the payroll under Managing Owner J. H. Porter. The mine is equipped with ten stamps, but the company is putting in twenty more stamps. Men are at work on the construction of a ditch which will take water out of Stewart's Fork above the Van Matre farm, and convey it to the site of the power plant to be built by the Fairview M. Co. on the west bank of Trinity river. The mine and mill are on the east bank of the river and power will be transmitted by cable, a distance of 600 feet.

W. H. Christie of San Francisco has an option on the Sykes M. Co. property, the Larsen mine and the Vollmer's ranch at Trinity Center, comprising 1400 acres of gravel, of which 800 acres are dredging ground. A prospecting drill is at work. The drill is run with two shifts, night and day. The Sykes M. Co. report having moved a large amount of gravel this season. Superintendent Payne has started the dredger on the Boyce property for the season's work. He employs six men.

The Cariboo G. M. Co. has started work on its quartz claims on Cariboo mountain, near Trinity Center. They have shipped in supplies and employ about twenty men. They are taking in a stamp mill. At the Yellow Rose of Texas mine the contractors are driving the lower tunnel.

H. Z. Osborne of Los Angeles, at the Dorleska mine, near Dedrick, is preparing for the summer's work. P. A. Wagner has started work on the Wagner quartz mines on Coffee creek. Considerable repair work will have to be done, as a slide took away the mill and did other damage last winter.

P. Peterson and H. Harbine, lessees in the Brown Bear mine at Deadwood, report in six months in the upper workings they have taken out 170 tons of ore which has been run through the Brown Bear mill under supervision of T. Dobler, manager of the Brown Bear property. The ore averaged \$14.30 per ton and yielded \$2500, of which sum they received \$1500, or 60%, the remainder being retained by the Brown Bear Co. as royalty. A number of other lessees have cleaned up their season's work. J. H. Blagrove et al. cleaned up \$2600, while T. Gruss et al. took out \$2300 worth of ore. C. Paulsen and L. Blakemore of Lewiston are getting out \$30 ore. It is understood the Brown Bear Co. will let a number of contracts for drifting in the lower workings. The mill has two 5-stamp batteries.

M. A. Brady and R. E. Cochran of Weaverville, owners in the Lappin, at Deadwood, are pumping water out of the shaft, preparatory to beginning operations. W. Richards et al. are again taking out ore from their mine on Eastman gulch and are getting high-grade free-milling quartz. They have completed reduction of a fifty-ton lot in their small mill which gave returns of \$2500.

#### Tuolumne County.

The Confidence mine at Confidence is being worked full handed. Seventy-three

men are on the payroll. The Kanaka mine, near Groveland, is reported to be in shape for active mining and milling operations. The Soulsby mine at Soulsbyville continues to show payable ore, says the Sonora Democrat. The working force numbers fifty men.

On the 1300 level of the App mine at Quartz a body of ore is reported struck. The vein is 12 feet in width and is supposed to be a junction with the Knox and Boyle vein.

The Calico mine, near Stent, in which a shoot of ore has been found, is being re-timbered and unwatered. R. A. Keller, superintendent, reports that a mill will be built.

The main shaft of the Dutch mine at Quartz is being sunk from the 1400 to the 1550-foot level, while stoping is in progress on several levels, and considerable drifting is being done. Tests have been made to cyanide the pulp as it comes from the amalgamating plates, before going over the concentrators, by which a saving of \$20 is said to be made. It is planned to build a cyanide plant for this purpose, says Manager Trittenbach, and do away with expense of shipping sulphurets.

#### Yuba County.

At Smartsville E. L. Hutchinson of Los Angeles says the Deer Creek, Blue Gravel, Money Flat Hydraulic M. Co., which is incorporated under Arizona laws, has a bond on the Excelsior and Campbell mines, and that they will work them by hydraulicking. C. H. Hill, who has a bond on several properties in the Smartsville district, is associated with them. The mine is at present being worked by drift process. It is intended to build dams at the river at the mouth of the canyon and back the debris up behind it.

### COLORADO.

#### Clear Creek County.

(Special Correspondence).—In northern Clear Creek county, especially Alice and Yankee districts, mining is resuming. Hart Bros. are starting to sink on their property and are putting on a whim. Later, as the ore shows up well in development, they will put on other machinery.

Alice, June 26.

(Special Correspondence).—J. S. Waugh, in charge of the 94 Tunnel M. Co., is getting ready to start up the mill. This plant has the dry concentration process, with capacity of fifty tons per day. He has 2000 feet of development work in the tunnel and the ore runs \$15 per ton. Most of the mine work is done by hand, although they have a compressor.

Over the hill from the 94 in Cumberland gulch are the Cumberland mines, owned and operated by the Yankee Con. M. & M. Co., H. I. Seeman manager. This company has started up the 15-stamp mill. Five more stamps will be added. The mill contains stamps, plates and concentrators. Concentrates are hauled to Idaho Springs for shipment.

Yankee, June 26.

(Special Correspondence).—The Gold Fissure Mining Co. is operating its property near the head of Lyon gulch at North Empire. The mill dirt is treated at the Clear Creek mill.

The Silver Mountain M. & M. Co. group, which has been idle the past year, is being cleaned out and put in shape for operation under management of F. G. Bishopp. The shaft is 500 feet in depth. The last three years the mine was operated it produced \$150,000. The shaft is connected with the Empress tunnel. The mine is equipped with 7x10 double hoist, 60 H. P. boiler and 25 H. P. electric plant for lighting purposes and operating power drills. The mine is located on Silver mountain. The Clear Creek mill, which is owned and operated by the same company, is at the junction of the middle and south branches of Clear creek, near the station on the Colorado & Southern Railway. They have a power plant at the mill capable of developing 167 H. P. The mill contains crusher, rolls, jigs, Huntington mill, vanners and concentrator. It has a capacity of thirty-five tons per day. The mill is running steadily on ore from the Gold Fissure and Empire Tunnel Co. ores.

The Empire Tunnel Co.'s strike on the sixth level of the Empress is showing up satisfactorily. The vein is 4 feet wide. This company has been doing mostly development work and not shipping much ore. The ore which is being shipped runs three ounces in gold per ton and the mill dirt averages \$10 per ton. By July 15 they expect to be in position to ship a heavier tonnage. Electric drills are in use in the mine. D. Ward is foreman at the Empress.

P. G. Lundh of Lamartine has just completed 100-foot contract in the Marshall-Russell tunnel. The tunnel is in 600 feet.

Empire, June 26.

(Special Correspondence).—About 1 mile from the forks of Fall river and

Clear creek the Lucania T. T. M. & D. Co. is driving a tunnel through Bellevue mountain for drainage as well as for transportation. When finished it will connect with the mines of Russell Gulch and vicinity. It is in 1000 feet and driving at the rate of 25 feet per week. J. McColl is superintendent.

The Golconda tunnel, 5 miles from Idaho Springs, on Fall river, is being made ready for operations. Superintendent A. L. Drake is putting in a 4-drill compressor and expects to start up next week. This company has a 10-stamp mill on the property, but it will not be put in commission at present. The tunnel is in 750 feet and will be extended. The Buffalo & St. Louis M. & M. Co. are owners and operators.

Idaho Springs, June 27.

(Special Correspondence).—At the Pelican-Dives mine an electric drill is being operated by the students at work there. There is said to be about 20 miles of underground workings on the property of this company. Tests are being made with a view of putting in a mill at the mine. Ore is being shipped to the mill at Dumont. The ore carries gold, silver and lead. J. Glasson is foreman at the Pelican and H. Sidney foreman at the 7-30 mine, and O. O. McReynolds is superintendent of the group.

Stevens & McGrath have a lease on the Mendota mine and mill. They are shipping 200 tons of concentrates per month and working 23 men. The tunnel is 1250 feet in length and the shaft from the tunnel level is 400 feet deep. All ore from the shaft is taken out through the tunnel. The mill has a capacity of 60 tons per day.

The Terrible mines, under management of B. C. Catren, are producing steadily. The mill has been put in shape for handling the ore from the mine.

Silver Plume, June 27.

(Special Correspondence).—The mining industry in upper Clear Creek county is improving. Recent strikes in a number of the properties have given mining renewed activity. Besides the strikes in the mines, there is a possibility of new railroads being built in the section, as well as one or two mills. The Board of Mines and Commerce at Georgetown has issued a pamphlet setting forth the advantages of upper Clear Creek. While the mines of this district have been noted for silver, yet gold is also found, particularly in the Centennial mine in Georgetown, and at Silver Plume all of the mines carry some gold.

The Vidler tunnel on McClelland mountain, R. C. Vidler manager, is in 500 feet and has cut six veins. They have a large body of low-grade ore which averages \$10 per ton. They are cutting another vein and are preparing to put in a power plant. The Harris mine, on the line of the tunnel, is shipping high-grade silver ore.

There are three different lessees shipping ore from the Sunburst mine of the Red Oak Co. on Democrat mountain. The strike which was recently made in the Scepter mine of this company is reported showing a better grade of ore than was at first cut in the tunnel.

G. W. Teagarden, manager of the St. Paul M. Co., is getting the mine in shape to put a larger number of men at work. He will operate through four tunnels. Electric drills will be put in.

The repairs which were being made on the Centennial G. M. Co.'s mill were held up during the absence of Manager D. Kennedy. Since his return from the East work has been resumed. He will increase the capacity of the mill by adding Huntingtons or other machinery. The output from the mine is curtailed waiting completion of the mill. He is doing timber work in the mine. Some of the ore has high-grade gold values.

Manager W. Cooper of the Capital Prize mine is still using hand drills, but will change to power drills this summer. The Kelly tunnel, closed some time ago, is still shut down.

Georgetown, June 27.

(Special Correspondence).—The mining business in Idaho Springs section is showing up satisfactorily. Nearly all the mills are in operation and receiving all the ore they can handle from the mines in Clear Creek and Gilpin counties. T. B. Crow, manager of the Alpine Con. G. & S. M. Co., states his 100-ton mill is running steadily. Most of the ore is coming from Silver Plume, although he receives ore from the Old Town mine at Russell gulch, Lillian, Big Five, Centurian and old Freeland mines. The mill is equipped with Huntingtons, jigs, tables, slime tanks, vanners and sizers. He is making a lead and zinc separation from the Silver Plume ores.

The Waltham Co., on Chicago creek, has been operating its 10-stamp mill the past month. A grinding mill is being put in. W. Boardman, who has charge of the construction work of the 60-ton concentrating mill of the Hudson Reduction

Co., expects to have the same in operation by July 10.

The K. R. S. Co.'s slimes plant is preparing to handle the tailings from the Jackson concentrator and the old Newton mill. They are handling tailings from the Newton annex. They expect also to handle the material from the Hudson mill when it is running. The tailings are first elevated to height of 25 feet by two elevators and run into a sizer. The coarse stuff goes to a concentrating table and the fines run onto twenty-four canvas tables. The concentrates from the canvas tables are elevated to settlers and from the settlers run to a mixer and from the mixer to vanners. The final product is shipped. The plant has a capacity of 200 tons per day. W. P. Thomas has charge of the plant. The Bonieta mill is being enlarged, as the capacity of the plant was inadequate to handle the amount of ore received.

J. E. Spurr of the U. S. Geological Survey is expected to arrive in Idaho Springs in the next fifteen days to take charge of the work being done in the district by the department. S. H. Ball of the Survey is on the ground with several men looking after the work. It is stated they will complete three quadrangles. A year ago they mapped the topography of the district and they are now working on the geology. Idaho Springs, June 28.

#### Custer County.

The Bassick G. M. Co., near Rosita, will rebuild its mill that was burned two months ago, at a cost of \$50,000, and the Little Jim M. & L. Co. has completed arrangements for La Rand mill on Grape creek, east of the Rio Grande depot at Westcliffe. The mill will handle forty tons of ore per day, and it is intended to start working this week on the low-grade ore that has been struck and of which there are 1000 tons on the dump averaging \$14 to the ton.

#### Fremont County.

The Denver M., M. & Dev. Co. has awarded a contract for construction of a 50x100-foot slimes department to the main mill and work has been started. This makes the third extension of the Dorcas plant at Florence since it was built, four years ago. Having closed contracts for high-grade Cripple Creek ore, the addition must be finished before September. With the completion of another addition, under contemplation, the capacity of the plant will be doubled. The Colorado L., T. & M. Co., owners of the Florence mill, reports the company's mill at Florence running full blast after an eight years' idleness.

#### Lake County.

Up Little Frying Pan creek, on the slope of Sugar Loaf mountain, near Leadville, ore is being taken out from the Golden Curry and other properties and result of the discovery is being manifested in the activity in properties on all sides of the Golden Curry. Three properties are being worked and ore is being taken from all of them. In addition to these there is a great deal of prospecting being done. As a result of the discovery in the Golden Curry, work will be resumed on the Welsh shaft, which is down the gulch from the Golden Curry and below the Venture. Three lessees have taken charge of the Welsh and are placing machinery at the shaft. The Venture, which is being operated by Superintendent Stacy, is between the Welsh and the Golden Curry. The tunnel has been driven in and a body of ore carrying sulphurets has been opened up. The extent of the ore body has not yet been determined, but twenty tons of the mineral of fair grade have been taken out and is in the bins at the mouth of the tunnel. The Tiger, above the Golden Curry, is being steadily operated.

#### Teller County.

R. H. Atchison, who has a lease on the Spicer mine at Victor, has completed placing a plant of machinery. The main shaft has been sunk to a depth of 400 feet and 1000 feet of lateral work done. The mine has been closed down since the Victor fire in August, 1899. It will require considerable preliminary work before the mine is in condition to be worked at a profit, says Manager Thompson, who is straightening and building up the collar of the shaft. After the present improvements are made crosscutting will be started at a depth of 500 feet.

The Cripple Creek Gold Temple Co., operating under lease the Gold Sovereign property on Bull hill, Cripple Creek, is sending out shipments and will increase production. There are forty men at work, nearly all employed in timbering the stopes and drifts and relining the shafts. When this work is finished the property will be in condition for larger production. The Short Line spur has been built to the mine and ore will be sent out at the rate of fifty tons per day. The ore is reported to return values of \$40 to the ton.

J. Sears of Goldfield has a bond and lease on the Joe Ann mine, between the



Easter Bell and Victor, on Bull hill, at Victor. The Joe Ann property embraces twenty acres. The bond is for \$75,000 and is for two years. Sears has put in machinery. There are two shafts. One is 160 feet and the other 200 feet in depth. The machinery has been placed over the 160-foot hole. At its bottom is a vein 4 feet in width. Mill runs give returns of \$10 gold per ton.

## IDAHO.

### Blaine County.

Operations are resumed at the Hattie group of mines, on the Hailey gold belt, near Hailey. The Hattie mine is being pumped and the drifts cleaned out. Superintendent Wadley, of the Cambridge Placer M. Co., operating on the Little Smoky, reports taking out gold from his claims. With six men he expects to hydraulic 4000 yards of gravel per day of twenty-four hours. He expects to have all the water he can use for the next six weeks.

T. Brennan has bought the I. E. Rockwell interests in the Idaho Democrat group of the Della Mountain M. Co., near Hailey, and has taken charge as manager, with intention of increasing developments. A tunnel was started, to be 3300 feet long, and to afford backs of 500 feet. It still lacks 200 feet of reaching the ledge.

### Boise County.

N. J. Sorensen of Sumpter, Or., manager of the Friday mine, at Pearl, says the stamp mill in course of erection will be started up this week.

### Custer County.

O. McGuinty and R. Moore are working the tunnel in the McGuinty group, 4 miles southwest of Mackay, and have struck the first ore body. They have crosscut that, and are driving ahead to tap the main body which crops for width of 90 feet on surface. They have ore on the dump, and will put teams to work hauling to the smelter before this season is over. Superintendent Fitzgerald has resumed operations on the Alder Creek tunnel, driving through a body of lime to cut a ledge of copper ore in a contact of lime and granite. This is 8 miles southwest of Mackay.

Foundations are completed for another blowing engine at the White Knob C. Co. at Mackay. It is being set up for use in case of an accident to the other one. The copper output of the White Knob C. Co. for month of May was 427,500 pounds of copper. The entire State produced during 1902 but 227,500 pounds of copper, says the Telegraph.

### Idaho County.

G. B. Holleran, of Boise, has at Johnson creek, Warm Lake district, started work on the W. A. White and Sunshine groups of claims of which he is managing owner, says the Boise Statesman.

Secretary Lybrook of the Rainbow G. M. Co. says a mill will be put on the company's property on Monumental creek, near Roosevelt, as soon as the wagon road is completed. The company is composed of Charlotte, Nashville and Battle Creek, Mich., men and owns the Harrisburg group. G. Wertz, of Boise, is manager.

Hump reports say a strike has been made in the Atlas mine. A body of high-grade free milling ore has been broken into 80 feet from the shaft in the lower tunnel. The Trilby and Whistler are said to be showing a vein of 11 feet, while the vein of the Majestic, owned by E. Feltham, is 17 feet in width. These claims are 4½ miles south of Hump.

R. W. Purdum and E. H. Dewey of Nampa are preparing to put in a grinding mill for the Sunnyside mine, at Thunder mountain, of sixty tons capacity, to add to the 40-stamp mill. Much of the machinery has been shipped in for construction of a double-wire tramway, 1½ mile in length, to connect the mine with the reduction plant on Marble creek. The tramway will have a capacity for 400 tons daily. Six mills are to be built this year in the Thunder mountain and Big creek sections, near Roosevelt, says Purdum. C. J. Perkins of New York, owning the H. Y. and Climax properties, south of the Sunnyside, is arranging for a 20-stamp mill. L. C. Van Riper has shipped two mills, one of thirty stamps and one of twenty stamps, for properties in the Big creek country. On both of these properties development work has been done to an extent that large ore bodies are ready for the mill. G. W. Snow of Nampa has shipped a 10-stamp mill for Thunderbolt mountain, 60 miles south of Thunder mountain, on the new State wagon road.

W. A. Douglas, superintendent of the South Dewey M. Co. at Thunder mountain, at Roosevelt, says he is putting men to work resuming development. The company owns ten claims and there have been 600 feet of development work done, showing ore. It is intended to open up the ore bodies by tunneling and sinking.

The company has planned to put in a mill this year.

### Owyhee County.

At the Trade Dollar Extension mine, near Silver City, work is progressing. They are driving into Florida mountain to tap a ledge and 700 feet of the main tunnel has been made since last fall. It is thought within the next 200 feet ore will be struck. An electrically driven air compressor 3200 feet down the hill furnishes power for the machine drills and ventilation. Drills, pipe, rails and cars have been added to the equipment. A. Boundy is superintendent. In the face of a drift, run on a quartz seam, which is in 100 feet from the main tunnel, there are 2 feet of ledge matter which runs thirty-five ounces in silver and \$5 in gold. With three 8-hour shifts they are advancing from 35 to 50 feet each week in the main tunnel.

### Shoshone County.

All mining at the Hercules mine, near Burke, is being done in the upper tunnel. In the lower tunnel, the narrow-gauge track for the mine cars is being torn up, and the company will put in a trolley system with larger cars. The trolley equipment is on the ground. The power plant, recently completed, is reported working satisfactorily and the tunnel is lighted by electricity. The power for the trolley system will be furnished by the same plant. The lower tunnel is 500 feet below the upper and connected with it by a three-compartment raise. When the trolley system is completed the ore will all be taken out through the lower tunnel. The tunnels are in 3000 feet each. The upper one is being driven ahead for the upper side of the mountain, where the company owns timber. The plan is to cut the timber on the other side of the mountain and take it through the tunnel for use in the mine. This will save the expense of hauling timbers up the hill. In time it is expected the Hercules company will drive a tunnel to the property from Burke, a distance of 1½ mile. A right of way has been secured for a tunnel through the ground owned by the St. Louis & Idaho M. Co., and the Hercules owners have a millsite at Burke. The Moonlight mine adjoins the Hercules and the owners say they have the Hercules lead. The Humming Bird is closed. In Canyon creek, it is said, there were 1000 miners at work, of whom 800 are working in dividend paying mines and 200 on prospects.

At the Hecla mine, at Burke, steam power has been supplanted by electricity, which is transmitted 100 miles. The pumps are electrically operated and all the ore is mined and transported by electricity, requiring a total of 220 H. P.

The Independence Con. M. Co. has transferred its properties to A. Paulsen. The group includes four claims and a fraction in the Hunter mining district, between the Morning and the Gold Hunter mines, north of Mullan.

At Osburn work has started on the Evolution mine, the shaft house of which was destroyed by fire. Most of the machinery can be used again after a few repairs. Ore has been cut in the bottom of the shaft, but it will be necessary to sink 100 feet farther before the main body of ore is opened. The ore carries values in silver and lead, with traces of copper and gold.

### Washington County.

Work is under way on the excavation on the site for the Ladd Metals Co.'s 60-ton smelter at Landore in the Seven Devils district, near Mineral. It is expected to have the plant in operation by Nov. 1. The company will do custom work in addition to handling its own ore. Ore buying will begin Aug. 1.

## KANSAS.

Chanute reports say the present tankage of the Standard Oil Co. in the Kansas and Indian Territory oil fields, with a storage capacity for 3,000,000 barrels of crude oil, will be increased to 10,000,000 barrels as fast as the tanks can be built. In the meantime no move will be made toward increasing the refining capacity, except that the Kansas City refinery will be completed to handle 4500 barrels of crude oil daily. This gives a refining capacity to Neodesha and Kansas City combined of 7000 barrels of crude oil daily. The field is producing 15,000 barrels of oil daily. It is given out that there is no home market for more refined oil than is now being produced, and if the field at the end of two years is holding up and producing as much crude oil as at present, a pipe line will be built either to the Gulf or to Whiting. Refined oil cannot be piped nor shipped so cheaply as crude oil.

Chanute reports to the Daily Mining Record say during month of May in the Kansas oil fields 227 wells were completed, the new production was 5958 barrels and the dry holes numbered 43. Compared with April, there was a gain of 7 completed wells and 17 dusters, with a loss of

736 barrels in production. At close of May there were 64 rigs and 152 wells drilling in Kansas, as compared with 55 rigs and 176 wells drilling at close of April. There were 2556 producing wells in the Kansas fields on May 25. In the principal oil producing Eastern States, the new wells for May summed up as follows:

State.	Wells Completed.	Pro- duction.	Dry.
New York.....	6	218	5
Pennsylvania.....	312	1,204	51
West Virginia.....	188	2,863	61
Southeast Ohio.....	202	1,832	69
Northwest Ohio.....	213	2,424	30
Indiana.....	305	4,571	46
Kentucky.....	39	1,604	6
Kansas.....	227	5,958	13
Totals.....	1,523	21,004	310
Totals April.....	1,450	20,361	284

### Cherokee County.

At Baxter Springs the Sunny Side mill is running steadily and turning out jack. The Dark Horse M. Co. has its derrick up and its steam hoist in place. The Ford, Troupe & Co. mill, on the Gaines-Brewster lease, is in operation.

Two or three shafts will be started this month on the Gaines & Thompson lease, near Baxter Springs, where ore has been found by drilling. An Omaha company is reported figuring on developing another forty acres of the Gaines-Brewster lease. D. B. Perkins has his shaft down nearly to the ore body.

Ruby & Co. of Joplin, Mo., have leased the Tom Clark diggings, near Baxter Springs, and will increase development. The Grace Hill M. Co. has started drilling.

Adams & Co. on the South Side at Galena are pumping water. The underground men were driven out by water, and so far have been unable to work the holdings. The Black Jack mill on the South Side M. Co. lease has ceased operations for the present on account of shortage of dirt.

A shaft is being sunk on the ground of the Galena Dev. Co. at Cave Springs. A drill hole struck ore there. The Merchants' M. Co. is pumping the water from the Boston & Missouri M. Co. ground at Cave Springs. The water is down 90 feet and it is expected to pump the 180-foot level dry, when the lots and mill will be leased.

Basse & Co., on the North Empire lease, near Galena, have suspended operations until arrangements can be made for water to clean the dirt. The shutting down of the Wilkes pumps caused the shortage of water. The tramways leading from shafts 1, 2 and 3 to the mill on the Pittsburg-Crowe lease have been completed and the work of transferring the dirt from the shafts will start this week. The pump on the Pittsburg-Bonanza mine has been removed to the adjoining lot on account of a richer strike of ore in the west shaft which necessitates the combined efforts of the pumps to hold the water in check, says the News-Herald.

## MICHIGAN.

### Houghton County.

Houghton reports say the Atlantic mine, southwest of Houghton, was closed down last week and 700 men are idle, because of a strike of 120 trammers, who objected to one of the underground bosses.

## MISSOURI.

### Jasper County.

In Webb City and Cartersville district the tailings mill on the Aylor land has started operations. The mill will be known as the Great Scott and will handle the tailings and slimes from the Lucky Budge, Holy Smoke, Avondale and Old Dominion mines, says Manager Durby. Gates & Nail, mining at Four Corners, west of Webb City, have completed their shaft east of the crusher platform and have found the run of lead ore which they have been working from their south shaft. The run of ore found in the shaft is 80 feet from the head of the drift.

The shaft being sunk by A. Bendalari & Co., on the Guinn land near Webb City, is progressing and is down 172 feet. Water has been struck and a small pump placed in the shaft. The top of the sheet run of ore will be cut in about 10 feet. The Chicago L. & Z. Co., on the Guinn land, has completed its mill and will be ready to clean ore this month.

G. Hubbard, manager for Forristall & O'Donald leases, near Webb City, has started his mill. J. W. Durby has bought the interests of his partners in the Venturer lease and mill. Stepp & Kaiser have shut down their mill on the Guinn land temporarily to put in a larger air compressor. The compressor in use would not furnish enough air to do the drilling necessary to keep the mill in operation.

The Carthage L. & Z. M. Co. is sinking a shaft on the Palmer land, north of Carthage, and is down 86 feet and reports promising indications. Manager J. Gray has put in a steam hoist. They expect to

make a strike at the 113-foot level, as a prospect drill hole showed a face of ore at that depth.

## MONTANA.

### Deer Lodge County.

Arrangements have all been made for building a 50-ton concentrator at the Emery mine, 8 miles east of Deer Lodge, and the plant is expected to be in operation by September.

### Flathead County.

R. Gregg of Troy, superintendent of the Great Northwest silver and lead mines in the Grouse mountain district, says in the main tunnel they have struck the ledge at a depth of 125 feet, the ledge showing 7 feet wide with values of \$45 a ton. Four men have been drifting on the ledge, but sinking from the tunnel has been started. They will sink 50 feet without machinery. The matter of incorporating is under consideration. The mine is 14 miles from Troy and is near the B. & B. mine, owned by Larson & Greenough. The Diamond Hitch mine, controlled by A. B. Raitton of Spokane, Wash., is idle, but work will be resumed. The Diamond Hitch is 3 miles from the Great Northwest and is supposed to be on the same lead, but the ore carries copper and gold. The B. & B., owned by Larson & Greenough, has been closed down since August last, due to a disagreement with the minority stockholders. J. Talkey of Troy is running a tunnel to tap the lead on the Silver Tip mine.

The copper strike on Callahan creek is 10 miles beyond the B. & B. mine, which is 6 miles southwest of Troy. A wagon road runs to the B. & B. mine. Prospectors are going into the district.

### Madison County.

The Shafter M. Co. has been incorporated to operate mining properties in Madison county. The company will maintain offices at Virginia City, Mont., and at Grand Forks, N. D. The directors are W. A. Currie, G. Salisbury and E. T. Spafford, of Grand Forks, N. D.

The Revenue G. M. Co., which is operating the Revenue mine on Richmond Flats, near Norris, is laying the 4 miles of pipe line which will be used to supply water for the cyanide mill. The ditch is finished, and the pipe line is expected to be completed next week. The work is under J. M. Harper, of Butte. The pipe is of wood, wire bound, with an inside diameter of 5 inches. Water in sufficient quantity to supply the mill at all seasons of the year has been secured. The mill building, which is 81x52 feet, with additions for boiler rooms, etc., is going up rapidly. R. C. Knox is superintendent of the Revenue company. It is intended to have the mill in operation by fall.

## NEVADA.

### Esmeralda County.

The January mine at Goldfields is reported showing improvement and sinking is being increased, as the steam hoist is working. To date the mine has shipped 505 tons, of net value of \$55,431.34, the last smelter returns for thirty-seven tons being \$675.75 net. There is reported in transit \$60,000 worth of ore and 7000 tons on the dump worth \$35 per ton. On the Sweeney lease on the Florence mine the gasoline hoist has been put in operation and ore will be shipped.

### Lincoln County.

A strike of ore is reported at the Point mines, 4 miles west of Pioche, which have been worked by the Pioche Nevada M. Co., with C. E. Rives superintendent, under a bond, says the Pioche Record. The vein appears to be vertical, the other veins in that section being more or less flat. It is a contact between limestone on the east and shale on the west. The filling is 7 feet of quartz, carrying galena. The strike of the vein is southeast.

C. Fournier of Rossland, B. C., at Muddy Peak, near Moapa, has an option on four free gold-bearing claims for \$20,000. He has had men working on these claims for the last two months taking out ore and sampling to ledges. He will put in a mill. The group is 14 miles south of Moapa Summit, on the San Pedro right of way, half way between the Muddy river and Las Vegas ranch. Barrett & Smith, owners of the Bald Eagle group of gold-copper mines, 18 miles northwest from Moapa, have taken in a complete mining outfit for their men working on the claims. Assays of ore show returns of \$16 gold and 2½ copper.

Reports from Panaca mine, at Chief district, near Pioche, show the shaft has reached 300 feet, with drifts north and south along the vein, in ore with gold values. The shaft is as deep as it can be made with present appliances, and work has been suspended pending increase of equipment, says the Pioche Record.

The Good Hope M. & M. Co. has taken hold of the Good Hope group of mines, near Searchlight. F. F. Oster of San



Bernardino, Cal., is president. The Quartette group is parallel and adjoining on the south, and on the north is the Duplex property. The company has resumed operations. Two shifts are driving a west drift on the 400-foot level. This drift is being run to reach a shoot of ore from which, in the prospect shaft, a shipment of high-grade ore was made to the mill at Barstow.

#### Lyon County.

W. D. Davidson, who with M. Lockwood owns the Crabb mine, south of Yerington, is putting in a small stamp mill. The mine is reported showing up a body of fair-grade ore. The mill is of two stamps, with triple discharge, and concentrating equipment. It will be run by water power. The ore will have to be hauled a few miles.

#### Nye County.

The Tonopah & California M. Co. will resume operations at Tonopah on completion of the railroad. At the Little Tonopah mine, the shaft being sunk by the Tonopah Geodetic Co. is down 500 feet and satisfactory progress is reported. S. A. Knapp, manager of the Ohio-Tonopah, says work at the mine will be resumed this week.

Development work has been started by E. G. Wheeler on four claims of the Milwaukee-Tonopah M. Co. ground, 6 miles north of Tonopah, near the Ray road. At the Tonopah Extension mine the west drifts are in ore, but work will not be increased until the 10-drill compressor plant has been set up. A 125 H. P. boiler will be added, which will make the total 190 H. P.

The Arivada M. & M. Co., incorporated last year, will start operations this month. The company owns a group of seven claims 60 miles north of Tonopah, on the west slope of the Jefferson range. A shaft has been sunk 140 feet, and 600 tons of ore shipped by the original owners netted \$100 per ton, says the Bonanza. The vein has since been opened up on the surface for 2000 feet, showing values. W. Rodgers is president and J. S. Cook secretary.

The Tonopah M. M. & Dev. Co. mill at Tonopah is running on ore from Lease No. 1, owned by Cutting, Edwards and Douglass. The clean-up of the crushing from the Douglass, Stewart and McQuillan lease on the Valley View is reported satisfactory, from 85% to 87% of values having been recovered.

The Jim Butler M. Co. has bought the property of the Tonopah and Salt Lake M. Co., consisting of the Stone Cabin and Wandering Boy claims, at Tonopah. This transfer was the final step in a consolidation bringing together under one management all the properties of the Gold Hill, Salt Lake, Fraction and Tonopah City companies, and a number of individual claims contiguous to these properties. J. W. Brock is president and C. A. Heller secretary. F. A. Keith, manager and superintendent of the Tonopah Co., will have direct supervision of the operations of the new company. The Jim Butler Co. has leased the Valley View shaft from the Tonopah Co., and work has begun through that shaft. The holdings of the company embrace 300 acres of mineral ground adjoining the Valley View on the east, south and west. The Valley View ledge is said to extend through the Stone Cabin. There are other ledges south of the Valley View and parallel with it which are expected to be cut in the Stone Cabin and Wandering Boy, the Gold Hill claims, and the Fraction property. One of these ledges will be selected and drifted on in both directions. The principal development work will be done on the 500-foot level. The consolidation of the Salt Lake property by the Jim Butler Co. ended the litigation which had been pending for two years between the Salt Lake Co. and the Tonopah Co.

A consolidation in the Ray district, north of Tonopah, has been effected by J. L. Makeever of Makeever Bros. of New York, N. Y., and Chicago, Ill., combining the Ray-Tonopah G. M. Co. and the Ray & O'Brien G. M. Co., under title of the Ray Con. G. M. Co. The Ray Con. M. Co. acquires eight claims of the Ray-Tonopah Co. and five claims of the Ray & O'Brien Co., being the discovery locations in that district, the whole comprising 260 contiguous acres. On the Ray-Tonopah mine, Manager Makeever has 1100 feet of development work done at a cost of \$17,500, including equipment and machinery, and there are ore bodies blocked out on the 225 and 160-foot levels to surface that average \$40 per ton in lead, silver and gold, besides ore on the lump. On the Ray & O'Brien 1500 feet of work have been done, two shafts having been sunk to depths of 300 and 225 feet with drifts on the 160, 225 and 300-foot levels; the vein is said to be a contact between lime and porphyry varying from 3 to 7 feet in width values in lead, silver and gold. The 12 H. P. gasoline hoist will be removed from the Ray-Tonopah

to the Ray & O'Brien mine and the shaft will be sunk to the 500-foot level, while stopping on the 160 and 225 levels will be continued, from which high-grade sand carbonate of lead is being extracted and first shipments will be sent out. At the Ray-Tonopah a whim will be used while a crosscut is being run east on the 160-foot level to a ledge which was cut by the shaft but dipped away at an angle of 65°. Three carloads of ore from this mine are ready for shipment, awaiting teams. Manager Makeever proposes putting in a heavier hoist and a concentrating mill. Coal and crude oil for fuel will be available on completion of the railroad and water will be obtainable from Rye Patch pipe line or wells in the neighborhood.

### NEW MEXICO.

#### Grant County.

Manager C. S. Laughren at Silver City has arranged for a complete machine shop and foundry for the Comanche smelter. In the outfit are lathes, planers, drill press, pipe machine, bolt cutters, etc. H. W. Edwards of Grand Junction, Colo., will be superintendent of the plant.

#### Lincoln County.

The Jicarilla M. & R. Co. has made foundations for its concentrator at Jicarilla. The mill will have a capacity of fifty tons per day. The engines will be 80 H. P. and the boiler 125 H. P. Shafting will be put up for a 100-ton plant so as to be in position when the mill is enlarged. The Free Milling Co. at Jicarilla reports satisfactory results from its placer machine that it is running.

#### Rio Arriba County.

The Bromide district is 20 miles south of the Colorado border and 14 miles west of Tres Piedras, and has 200 inhabitants, mostly engaged in mining and prospecting, says A. Royal of Pueblo, Colo., who is operating there. The altitude is 9500 to 10,000 feet. A good wagon road connects it with the railway station. The mineral belt is 10 miles long by 6 miles wide. The workable veins, nearly all in schist, vary from 2 to 12 feet in width, carrying sulphides of copper, with gold and silver values. There are no reduction works in the district. The bulk of the mineral must be concentrated to render it marketable. It costs \$3.50 per ton to haul by wagon to Tres Piedras, and the railway charge to Pueblo is \$4 per ton. The deepest shaft in the district is 250 feet deep. Others range between prospect pits and 100 feet. There is no coal, but abundant timber, with sufficient water for milling purposes. If a productive camp is established at Bromide, there are points between Antonito and Tres Piedras from which a spur of the Rio Grande railway may be built over easy grades. The distance would be less than 30 miles. The principal property is the Bromide group, on which a shaft has been sunk 150 feet. The company is running a crosscut tunnel to intersect the vein at a depth of 400 feet. It is in 400 feet and has 300 feet to go before it will strike the objective point. The manager is working one electric drill. The principals are Philadelphia, Mo.—A. Royal is manager of the Belle Royal M. & M. Co., whose shaft is down 100 feet on the Whale mine. The vein matter is 6 feet wide between walls and carries an average of \$60 per ton in gold, silver and copper. The company owns eighty acres of mining ground.—A Milwaukee company is operating a property called the Tusas Peak. The shaft is 250 feet deep and is in ore. Manager F. Balton has let a contract to send the shaft down to 500 feet. The vein is 4 to 6 feet wide. Two carloads of the ore were shipped to Denver, Colo., for testing, with satisfactory results. The company proposes building a concentrating mill. It has a good surface plant and is working steam drills. The Strawberry mine has a well-equipped plant, with air drills. Its shaft is 150 feet deep, and there are several drifts from it. The St. Michael also has machinery and is engaged in development work. The Pennsylvania M. Co. properties are being developed by Manager F. P. Elliott.

#### San Miguel County.

The Las Vegas Optic says in the Tecolote copper district work is being pushed on the Elliott C. M. Co. mill preparatory to making another test run. Lumber and other supplies have been taken to the district. The parties at work have options on all the copper properties of the district.

#### Santa Fe County.

J. Martin reports opening up a turquoise prospect near Cerrillos.

#### Socorro County.

Development work on Colorado mines Nos. 1, 2, 3 and 4 at Estey City, owned by the Dividend M. Co., is being increased. The ore is a carbonate and will be treated by leaching and precipitation. The mill is nearing completion. The machinery includes two 125 H. P. boilers and four engines ranging from 30 to 125 H. P. The

crushers, dynamos and blowers are on the ground. The crusher has a daily capacity of 200 tons, while the mill and the smelter will handle 250 tons daily. A 90,000-gallon storage tank, a laboratory and an assay office have been built. A contract has been let to drill a deep well.—Men are at work on the Mocking Bird claim at Estey City.

For the first time in twenty years Cooney creek in the Mogollon district is reported dry and the Cooney mill at Mogollon had to close down for lack of water. The Last Chance mill continues running, although its water supply is also short.

The Socorro Chieftain says five carloads is the average amount of zinc carbonate ore being brought down from the Magdalena district daily. To mine and handle this ore keeps 100 men at work. The mines at Kelly give employment to 150 men. The Kelly is working two shifts a day, and the Graphic is shipping 1000 tons a month.

### OREGON.

#### Baker County.

R. N. Jackson of Spokane, Wash., president and manager of the Fortune M. & M. Co., has opened operations for the season on the Humboldt mine near Greenhorn. The sawmill is on the ground, and Jackson says it is planned to push development. Any ore mined will be treated at the Belcher mill, of which G. W. Daines is president and manager. Jackson says preparations will be made for a mill.

A. P. Smith has a bond on the Nine Strike group on Little Cracker creek, near Sumpter, for \$50,000. Smith has put men to work driving a lower tunnel than any of the present workings. The Nine Strike consists of seven claims, the southern extension adjoining the Cracker Jack and affording a millsite in the basin of Little Cracker creek.

E. Bamberger, of Salt Lake City, Utah, says, at the Gold Ridge mill, near Baker City, a cyanide plant will be added to the stamps. Of the mine, he says the ores are maintaining a good general average.

Asbestos is reported being taken from a mining property 15 miles from Sumpter, owned by J. H. McVickers of Sumpter. He says he located the asbestos fissures on either side of a porphyry dike cutting the formation on the Burnt river side of the slope. It is 8 miles from the railway and a wagon road could be built. The asbestos is said to be of merchantable quality.

#### Douglas County.

The Oregon Securities Co., which owns properties at Bohemia, will begin operating its 30-stamp mill next week. Ore has been blocked out in the Music mine, one of a group of seven which it owns. The company is driving a tunnel through the mountain from the Champion basin to the Music mine, a distance of 2000 feet, and progress is being made at the rate of 10 feet a day, with the use of air drills.

S. Bowden has bought the Sunset and Lily May group of gold claims, near Kerby, and has placed men to work to develop them. The ledge is 40 feet in width, of quartz, carrying values from wall to wall of from \$2.60 to \$4.60 a ton. Bowden is driving two tunnels 600 feet apart, each of which will tap the main ore body at a depth of 400 feet. The mountain is steep and thus depth is made fast, and a good millsite is afforded, as all ore can be moved out by gravity, says the Telegram. There is an abundance of timber on the claims and a good water right, ample to supply power for six months each season without assistance of steam. After opening up the property Bowden will put in a cyanide plant.

#### Jackson County.

Concentrates are being shipped to the smelter from the Opp mine, says the Jacksonville Sentinel. Work is being increased by J. W. Opp, the owner, and the mill is run steadily. The property consists of 400 acres of land, 1½ mile west of Jacksonville, on which are several ledges.

E. T. Staples has bonded the McKinley group of mines on Wagner creek for \$20,000. The claims are an extension of the Ashland mine, near Jacksonville. Staples has started sinking an incline shaft.

#### Josephine County.

A. C. Hofer, of Portland, manager of the Mount Pitt Hydraulic & Q. M. Co., operating on Jump-off-Joe creek, near Grants Pass, says the crosscut tunnel has cut a 10-foot ledge at depth of 75 feet. The ledge carries gold values from wall to wall. Several hundred acres are embraced in the Mount Pitt Co.'s holdings. Aside from the quartz claims being developed, there is an area of placer ground, in Bummers Gulch. The country is well timbered, and watered.

The Rand M. Co., composed of Washington men, who have bought the Yank group of gold and copper claims of the Galice district, on Rogue river, near Grants Pass, for \$60,000, have placed a crew and begun development work for

the summer. The workings of the mine consist of 700 feet of well-timbered tunnels and drifts, on the mountain above Rogue river. The new owners have begun driving a tunnel several hundred feet below the old workings and nearer the level of the river. A raise will connect the two levels. There is a site for a smelter, plenty of water and timber.

At a depth of 100 feet a body of ore carrying values in gold is reported opened by Riggs & Flamm in the Red Bean mine, of Starveout creek, near Grants Pass.

#### Lane County.

Consequent on the decision by the Circuit Court in the case involving title to the Doctor mine at Blue River, growing out of the adverse claim filed in the land office at Roseburg, it is expected, says the Telegram, that this season the present 15-ton capacity mill will be increased to a 50-ton plant to concentrate the gold from the ledge opened under Manager Candiani of Portland. Development work will be resumed.

### SOUTH DAKOTA.

#### Custer County.

The Extreme M. Co., operating the Minnie May mine near Custer, is supplying its 10-stamp mill with ore from an open cut. The ore is reported improving. The men have advanced 20 feet northerly from the old opening and are now working in an easterly direction, following the zone of the greatest oxidation.

#### Lawrence County.

F. G. Underwood has leased the bed of Homestake sands at Pluma and is preparing for their treatment with cyanide. There is estimated to be from 60,000 to 75,000 tons of the sand and assays show \$3. Underwood is building a 10-ton tank on the dump for testing. This accomplished, he intends to put in two tanks, each of fifty tons capacity. These sands were impounded several years ago by diverting the waters bearing them from the main channel of the creek and allowing them to settle in a depression.

The mills and cyanide plant of the Horseshoe M. Co. continue in steady operation, no time having been lost there on account of the floods. The company is working in its mines which escaped damage. The Ben Hur mine was flooded, and is not expected to be unwatered until the volume of surface water decreases. From its other openings the company has increased shipments.

Treasurer H. F. Wells of the Lexington Hill G. M. Co., operating near Deadwood, in his report to the stockholders says the working tunnel, in 400 feet, is progressing at a rate of 7 feet per day, and the same will, by August 20th, have cut the quartzite bed, which will constitute the main supply of milling ore. From that point the tunnel will be driven ahead while additional men will develop the quartzite body and block out ore. Surveys show the quartzite body will be cut 750 feet from the mouth of the tunnel, and by extending same another 250 feet will connect with a shaft sunk on the Champion mine. The shaft will furnish ventilation for all underground workings and will also serve as an outlet for the ore left in the upper part of the Highland Mary vertical vein. The lower part of this vein, separated from the upper by a porphyry intrusion, will be opened on the tunnel level below. The management has decided not to start the mill before a substantial body of ore is developed in the tunnel, although the mill is being put in condition to be ready for operation as soon as needed. Amalgamating plates for saving free gold are in the mill.

The Gilt Edge-Maid M. Co., operating on Strawberry gulch in Bear Butte district, 2 miles west of Galena, reports work progressing on its mill. G. A. Duncan is manager and J. L. Turner of Springfield, S. D., is president of the company. The mill will be wet crushing, with capacity of 150 tons daily. Chili mills and slimes separators will be used. Power will be obtained by electrical transmission from Pluma. The company owns the Gilt Edge and Dakota Maid mines and has been making ore shipments to the smelters, hauling the ore by wagons a distance of 8 miles. A railroad siding has been built from the Burlington line to the site of the mill.

The Michigan G. M. Co., J. B. Mars of Deadwood president and manager, expects to resume work on its group in Strawberry gulch, near Galena.

O. O. Stromsness and G. M. Johnson, who have been sinking a shaft on their claims in Bear gulch section, have suspended work temporarily due to excess of surface water, which they cannot handle with their whim. The shaft is down 230 feet. They own 600 acres of mineral land between Bear gulch and Sand creek, 2 miles north of Tinton. Johnson says he will equip an assay office at the mine.

A. Dunn reports opening up a body of galena on the Belle Eldridge claim in



Spruce gulch, near Deadwood, carrying values in gold, lead and silver.

The Commonwealth M. Co. has been organized to operate in the Black Hills, and owns property adjoining that of the Globe M. Co. in Lead.

Pennington County.

The Pittsburg M. Co., owning the Kimball group on Newton's Fork, near Hill City, consisting of 400 acres, is arranging to increase development work. Machinery, consisting of hoists and air compressors, is on the ground and operations will begin next week. The gold is free milling, but is refractory as depth is attained. The ore has average value of \$6 per ton. Work will be started by the company on King hill.

The Black Eagle M. Co. is putting in a Huntington mill on the Black Eagle group in Hornblende camp, near Rochford. The washing out of the wagon road has delayed delivery of building materials and machinery. Water for the plant will be pumped from Castle creek. The Black Eagle group joins the Golden West M. Co. holdings. J. Hartgering of Deadwood is superintending the mill construction.—The Golden West M. Co. sawmill, which has been getting out lumber for the company's flume, is idle temporarily due to the roads being washed out so that saw logs cannot be delivered. E. J. Kennedy, manager, says a quartz mill is proposed and will be operated by water power, the water to be obtained from Castle creek. Part of the fluming and ditch have been built, and the company is driving a tunnel to get through a hill on the course of the proposed ditch.

UTAH.

Beaver County.

Frisco reports say W. H. and O. B. Peck have a contract for a large tonnage of zinc ores from the Horn Silver M. Co., and are preparing to put up a plant for the reduction of the refractory ore. The buildings will require 300,000 feet of lumber, the contract for which, it is said, has been let. It is said the Newhouse M. & S. Co. will sell the necessary water for the operation of the plant if built at the mine below Frisco, and W. H. Peck is looking into the feasibility of building a pipe line over the mountains. To do this a pumping plant would be required to bring the water up to the summit from the reservoir at Newhouse, and thence it would make its way on down to the millsite by way of gravity. The pipe line would be about 3 miles in length.

The tunnel through which the ores of the Cactus group of mines at Newhouse are to be extracted has passed the station 4000 feet from its mouth, with 1800 feet additional to drive to a connection with the ore bodies, says Manager Johnson. The raises from the station with which the tunnel will connect on the 600-foot level are going up rapidly.

Manager Tarbet of the Estella mine, near Milford, reports development work progressing. He is awaiting arrival of milling machinery. A few men are kept busy in the mine blocking out ore. The mill will begin with a small battery of stamps, sufficient to crush from twenty to thirty tons of ore daily. The ore is free-milling gold, and amalgamating plates will be used.

Juab County.

Manager S. McIntyre of Salt Lake City of the Mammoth Co.'s mines at Robinson reports a body of arsenical copper ore broken into in the east crosscut. The drift, it seems, had been paralleling the shoot for some little distance, a fact that was established when a round of holes were fired in the side. This shoot of ore is thought to be a continuation of that cut on the 1700-foot level. They are driving in same direction on the 1800-foot level. The ore carries silver and gold values with the copper. About 2000 tons of high-grade ore per month are being marketed.

Work will be resumed at the General Logan property, west of the Bullion-Beck ground, near Eureka, this summer. The office of the company will be moved from Salt Lake City to Eureka. W. D. Meyers of Eureka is part owner.

The consolidation of the Bullion-Beck Tunnel Co. and La Reine M. Co. is reported completed and the Beck Tunnel Co. Co. organized. The officers of the consolidated company are: J. Knight, president, with J. Evans, R. E. Allen, H. Dinwoody and E. H. Mead directors. The headquarters of the company will be at Provo.

Salt Lake County.

Machinery, consisting of a compressor plant, engines and other equipment, for the Bingham West Dip M. Co., has arrived at Bingham. Manager L. La Vine says it will be set up this month.

The new smelter equipment at the Utah Con. C. Co. plant near Murray was put in operation last week, says Manager Channing. The additional improvements to the Utah Con. plants represent an out-

lay of \$250,000. During the past year the company's mines at Bingham have been required to furnish daily tonnage of 500 tons; but with the new equipment in service the company is prepared to handle at least 800 tons daily.

Work has been resumed at the Wheeler & Wilson group, in the Big Cottonwood district, near Alta, says Superintendent Grey.

The fourth furnace at the Bingham Con. C. Co. smelter at Bingham was blown in last week, and the plant is equipped for the reduction of the usual volume of ore. The foundation for the fifth furnace has been started, says Manager D. McVichie. With the fifth furnace in blast the management will be able to reduce 1000 tons of ore daily.

Summit County.

The pumps at the South Quincy mine at Park City are working again and the mine is being drained to resume development, says Manager G. D. Turner.

At the Liberty mine, near Park City, development work will be increased. Men are at work driving a tunnel, which is in 600 feet. It is intended to send this tunnel to depth of 1000 feet. Work is being done by hand drills, but a compressor and machine drill will be put in. W. M. Ferry is manager.

Tooele County.

The mill on the properties of the Overland M. Co. at Sunshine will be put in operation between July 15th and 20th, says F. Pierce of Salt Lake City. Receiver Clark is rushing repairs and alterations. Underground there will be no exploratory work until the earnings of the mine justify it. On the contrary, he expects to make a profit on the 100,000 tons which have been blocked out by the company. At the Ophir Hill mines and mill in Ophir canyon, of which Clark is manager, the mill is operating with two shifts.

It is reported there is a shortage of miners at Mercur. The starting of the Overland and the resumption at the Ophir Hill has had the effect of drawing the men from the Con. Mercur and Sacramento mines. It is claimed the mines in the gold camp could use fifty additional men.

Utah County.

A bond and lease have been given to W. S. Lyle of San Francisco, Cal., on the North Star No. 1 mining claim in the Silver Lake mining district, in American Fork canyon, near American Fork. The claim adjoins the Ontario on the north. Consideration was \$3000 and 25% of the net proceeds of all shipping ores that may be marketed and 15% of milling ores that may be milled and sold.

The Utah Fire Clay Co. has bought for \$130,000 a group of mining locations in Lehi mining district, near Provo.

WASHINGTON.

Ferry County.

(Special Correspondence).—There is no inducement to extract ore or do any considerable development work, as no time can be predicted when the smelters will get ready to take a few more tons of ore. A number of mines have been kept in operation for a year or two with the hope and promise that the ore would be treated in considerable quantities. The smelters have failed to take the ore as fast as mined, and, thus hampered, the mine owners were compelled to close down, as it was not profitable to mine on so small a scale. Owing to the impossibility of getting adequate treatment for the ores, only two companies are working, and these only on a limited scale. To a layman this appears like an ideal place for a custom smelter. It could have 500 tons daily for a starter, and this amount could be increased to 1000 tons inside of sixty days. There are fifteen mines to draw upon having a capacity of producing from 15 to 150 tons each per day. Two lines of railway offer all necessary facilities for cheap and rapid transportation. There is every variety of ore necessary for fluxing and also all the water which will be necessary. It would be possible to operate the plant with water, steam or electric power at the option of the builder. Coke would have to be shipped in—all other things are here. The mine managers are willing to sign contracts for supplying the ore in any desired quantity.

The great iron belt a few miles east of Republic is capable of furnishing all the ore of that character which can be consumed by a smelter. The ores carry gold, copper and silver to the value of about \$15 per ton.

The Belcher mine is developed to a depth of 250 feet. The ledge has been drifted upon for 400 feet. Within a few months it will have a tram in operation between the mine and the Kettle Valley and Great Northern Railroads.

A short distance east of the Belcher is the Midnight—a copper, silver, gold and lead property. It is to be operated on an

extensive scale as soon as the necessary buildings for the accommodation of the men can be completed. The mine is located on the summit of a mountain some 2000 feet above Lambert Creek valley. An aerial tram will be constructed from the mine to the valley for the transportation of the ore and for getting supplies to the mine. At the points where opened the ledge is 5 feet in width.

Republic, June 25.

The Belcher M. Co., at Republic, is arranging for an eight drill air compressor plant and an impact wheel for driving it by water power. Two shifts are at work on the Belcher No. 2 tunnel.

Pierce County.

The Tacoma smelter, employing 400 men, has planned to add an electrolytic copper refinery plant to cost \$250,000 and to put on 100 more men. Wire works will be built by the company connected with the smelter company for making copper wire, either at Tacoma or in San Francisco, Cal. T. K. Wilkinson will be superintendent of the electrolytic refinery.

Sachomish County.

The Ethel Con. M. Co. property at Index is reported closed down for lack of ore, the work on the tunnel on which work has been progressing since July, 1903, to locate at greater depth the ore discovered in the upper levels having proved futile, says Secretary Greer, of New Castle, Pa. The company is a consolidation of the Ethel C. M. Co. and the John D. C. M. Co. and there is a concentrating mill built at the mines.

Stevens County.

Placer miners on the Nigger creek diggings of the Hudson Bay Co., 4 miles above Northport, on the opposite side of the Columbia river, say gold values are being found, but it is too fine to be saved by cradle or the sluice box method.

WYOMING.

Crook County.

The Warren's Peak M. Co. has development work under way in the Bear Lodge range of mountains, near Sundance, Wyoming. The company is owned chiefly by the Bock Brothers of Rochford, S. D. E. A. Bock is president. Warren's Peak is a few miles north of Sundance in the Bear Lodge mountains, and gold bearing veins are being opened up there.

FOREIGN.

AFRICA.

Transvaal.

The Johannesburg Leader says the explosive works of De Beers Con. M. Co., Ltd., at Somerset West, have been in operation for six months. Employment is given to 500 Europeans and 1000 natives. The factory is turning out 12,000 cases (each containing fifty pounds) of blasting gelatine, gelignite, and American dynamite, a month, and the output will be doubled. The power plant is capable of developing 1300 H. P., and includes two dynamo turbines of the Parsons type. The grounds cover 3000 acres, buildings being scattered over an oblong about 2 miles in length and 3/4 mile in breadth.

General Manager G. E. Webber of the Rand Mines, Ltd., at Johannesburg, in his report for the year 1903, gives the following summary of operations of subsidiary companies for 1903:

Company.	Days.	Period of Milling.	Average Number of Stamps in Oper.	Tons Milled.	Gold Produced.	Value Per Ton Milled.	Cost Per Ton Milled.	Working Expense.
Glen Deep, Ltd.	367		80	143,310	54,628,727	12 s. 0.	4 s. 9.	9.5
Rose Deep, Ltd.	348		115	910,759	77,671,927	11 s. 0.	4 s. 17.	8.4
Gelduinus Deep, Ltd.	347		175	773,770	112,305,125	11 s. 0.	4 s. 17.	8.4
Numbers Deep, Ltd.	352		85	182,215	68,114,725	11 s. 0.	4 s. 17.	8.4
Porter Deep, Ltd.	354		55	102,205	67,688,888	11 s. 0.	4 s. 17.	8.4
Crown Deep, Ltd.	354		55	102,205	67,688,888	11 s. 0.	4 s. 17.	8.4
Langlaagte Deep, Ltd.	355		135	233,697	89,267,257	11 s. 0.	4 s. 17.	8.4
Durban Roadpoint Deep, Ltd.	335		55	138,291	54,356,059	11 s. 0.	4 s. 17.	8.4
Totals and averages:	880		880	1,543,542	628,747,801	11 s. 0.	4 s. 17.	8.4

Compared with the operations of the previous year, an increased working profit is shown of £448,829 7s 4d. Working costs have decreased 1s 3.15d per ton; working revenue has increased 4.746d per ton, and the working profit has increased 1s 7.896d per ton. These results, however, are still below what can be expected from the group when taking into account the fact that, in order to carry on the year's scale of operations, it has been necessary to break about 93% of the ore stopped, with machine drills, says Manager Webber, and limit the sorting operations to an average of about 7%, whereas, if working under conditions that would ensure the best economic results, probably not over 60% of the ore would be stopped by machine drills, while fully 20% to 25% of waste rock would be discarded. The companies are still restricted in their normal operations, and in several cases, although now earning profits, have not yet been able to reach or resume the payment of dividends, owing to liabilities incurred on capital account or expenditure and losses made during the war period. The present condition of most of the producing mines in which the company is interested is satisfactory, and the return to their normal output is only contingent on their obtaining the requisite amount of labor.

AUSTRALIA.

Queensland.

The gold production of Queensland for month of May is reported as follows:

	Tons Crushed.	Yield in Ounces.
Charters Towers	23,700	23,300
Croydon	5,700	1,300
Gympie	17,500	11,700
Mount Morgan	28,700	13,000
Ravenswood	2,000	3,000
Other Fields	5,300	3,100
Alluvial		1,000
Total Yield		60,300

BRITISH COLUMBIA.

Boundary District.

At the Granby smelter at Grand Forks, Manager Graves says they are taking custom ore in addition to ore from the company's mines, and are running to the full capacity of 2000 tons a day. As fast as the tonnage increases and the country warrants it the smelter will be enlarged. When they do enlarge the plant, he says it will be made a 3000 or 4000 ton smelter.

East Kootenay District.

Hydraulic mining is in full operation at Wild Horse creek, near Fort Steele, and the gold output promises to be large, says the Prospector.

The Gold River M. & P. Co., operating 16 miles south of Fort Steele, on Bull river, is increasing developments. Bull river was noted for its rich gravel, but owing to lack of means for controlling the water and the then available methods of mining, a large portion of the original rich gravel remained undisturbed, which is said to contain a workable percentage of gold. The Gold River Co. will dam Bull river, construct a flume capable of carrying all the water of the river at its normal stage. This will leave the original channel free of water, to be mined and gravel handled at a small expense. It is intended to put in a power plant to supply electricity for conversion into power and light in connection with mining operations, and other industries in the Kootenay valley.

Nelson District.

W. Moorhead and W. J. Marks, of Portland, Or., with D. Morrison, of Nelson, have bonded the Cliff mineral claim, on Toad Mountain near Nelson for \$20,000. The Cliff is 6 miles from Nelson and is a free-gold property with a 6-foot ledge, carrying ore which goes \$20 per ton. This ledge can be traced on the surface for 600 feet. It is said 100 tons have been shipped to the Hall mines' smelter which gave returns of \$24 per ton. It costs \$1 a ton to deliver the ore from the mine to the smelter.

Progress in development of Salmon river and Pend d'Oreille placers, near Waneta, is reported. While the number of prospectors operating individually is smaller this year than for several years past, the operations of the companies interested are reported assuming more substantial proportions. A company, composed of New York, N. Y., and Philadelphia, Pa., men, who have taken up the Rose leases on the Salmon river (represented on the ground by A. P. Rose), is increasing work. One of the company's projects is to divert the flow of the river into an ancient channel, thereby enabling the economical handling of gravel in the present river bed. An Oregon company is operating at the "big eddy" on the Pend d'Oreille, and expects to increase operations this summer. Much of the gold found at this point is very fine, and it has been found necessary to supplement the ordinary sluice boxes and rifles with



amalgamating plates. On various leases along the river two or three men are employed, principally for holding the ground.

#### Rossland District.

Foreclosure on the Iron Mask mine at Rossland has been completed by D. C. Corbin, of Spokane, Wash., as trustee for the various interests. He has final title.

Crushing is under way at the O. K. stamp mill at Rossland, under lease to Le Roi company for concentration experiments. The interior of the structure has been changed. For handling ore supplies economically a bin has been built at one end of the O. K. trestle on the Spokane Falls & Northern main line, and ore will be dumped there from the cars. Connecting the bottom of the ore bin with the head of the mill is a tramline operated by cable. The hoisting engine to operate the cars is on the ground. The ore will first be crushed at the top of the mill in a Blake crusher, and the initial recovery of values will be by jigging. The coarser material left after the initial extraction will be crushed again in rolls, with crushing in the stamp battery for the finer material. The Frue vanner is the next stage of the process, preceded by a classifier. On the conclusion of the other stages the tailings will be finally treated on slimes machines, or tanks.

#### Slocan District.

Work will be resumed on the Utica group between Kaslo and Sandon this month. It has been idle for the past four months. It is a silver and lead producer.

#### Yale District.

The Teague M. Co. expects to get out \$2,000,000 from its Siwash creek mines at Yale, says F. Richards of Vancouver, who holds concessions from the Government for 1½ mile of the creek adjoining the property of the two American companies known as the Mount Baker & Yale Co. and the International G. Co. The Teague property lies below the mouth of the creek, having a deposit which Manager Teague will wash with monitors. Free milling ore is being opened up, says Richards, averaging \$3 to the ton. The companies interested are putting in plants. The Mount Baker Co. is putting up a 10-stamp mill, to be increased to forty stamps; has built and equipped a sawmill, constructed a wagon road over the mountain and a cable bridge across the Fraser river at Yale. The International Co. is putting in a plant, including six stamps, with quadruple discharge. Siwash creek is within 2 miles of Hill's Bar, the discovery of which led to the Cariboo rush.

### CANADA.

#### Ontario.

Secretary R. J. Hall of the Gold Standard M. Co. of Morris, Minn., operating in the Manitou section, near Wabigoon, says operations will be increased and work resumed on the Gold Standard, the shaft of which was sunk 150 feet before mining was temporarily suspended on that location.—It is understood that the Manhattan G. M. Co. of Berlin, Ont., intends to resume mining operations on its location on the south shore of Eagle lake. Beyond surface work, little mining has been done by the company, although two veins have been exposed, says Manager Stanton of New York.—The Northern Development Co., operating the Paymaster mine, near the Big Master mine near Wabigoon, has re-elected J. E. Burns president and increased the board of directors from five to seven. Machinery for development of its mines has arrived on the ground.

### INDIA.

The output of the gold mines for month of May is reported at 51,242 ounces—an increase of 2614 ounces as compared with the corresponding month of 1903. The production in ounces since the beginning of the year has been as follows:

	1904
January.....	51,588
February.....	50,151
March.....	51,634
April.....	50,509
May.....	51,242
Total.....	255,224

In Kolar district, Mysore, the following reports for month of May are given: Champion Reef mine: Mill, tons, 15,320; mill, ounces, 15,339; tailings (cyanide) tons, 20,176; tailings, ounces, 2397; total ounces, 17,736.—Mysore: Mill, tons, 16,050; mill, ounces, 15,405; tailings (cyanide) tons, 13,106; tailings, ounces, 1473; total ounces, 16,878.—Ooregum: Mill, tons, 11,189; mill, ounces, 5371; tailings (cyanide) tons, 10,076; tailings, ounces, 873; total ounces, 6244.—Nundydroog: Mill, tons, 6400; mill, ounces, 5032; tailings (cyanide), tons, 5018; tailings, ounces, 564; total ounces, 5596.—Balaghat: Mill, tons, 2950; mill, ounces, 2297; tailings, tons, 2380; tailings, ounces, 246; total ounces, 2543.—Coromandel: Tons, 1070; ounces, 335.—Mysore West & My-

sore-Wynad: Mill, tons, 1904; total ounces, 1013.—Hutti (Nizam's): Tons, 1300; ounces, 797.

### MEXICO.

#### Durango.

A. T. Grove, of Chicago, Ill., secretary and treasurer of the American-Mexico M. Dev. Co. of Chicago, says that company has bought two tracts of land in Durango and contemplates expenditure of one mil-

lion dollars in gold on its properties at Velardena and Pedricena, in State of Durango, near Torreon. He has bought 300 hectares (about 800 acres) of land near Torreon at a cost of \$35,000 gold. On this Grove estate the company will build a smelter at a cost of more than \$300,000 gold and the ores from the principal mines of the company, in the Margarita group of claims, will be treated there. This group comprises La Roca and La Victoria mines, both of which are producers. The company, according to Grove, will also build a pyritic smelter of 200 tons capacity at Velardena, for treating its sulphide ores from the Margarita mine, and the Refugio property, at Reyes. Some sulphide ore also comes from one of the veins of the La Roca mine. In addition to the pyritic smelter at Velardena, a power plant will be erected for generating electricity by use of gasoline.

#### Guerrero.

Preparations are under way for a 200-ton smelter at La Dicha mines at La Dicha. E. D. Elson, manager, reports there is 20% copper ore showing. The plant will be equipped with a 200-ton water jacket blast furnace and two 50-ton reverberatory smelting furnaces. The company also has completed grading for 9 miles of narrow gauge road.

#### Jalisco.

At the Calabaza mine at Etzatlán they have begun work again, after a shut-down of two months.—W. M. Mathews is operating the San Pablo group on Cebolla mountain, between the Santo Domingo and Altamira mines. This group consists of the San Pablo, San Jose, Hecla, El Rincon and San Jose and Calabaza demasias (fractional claims). He has thirty-five men at work cleaning out the old works and taking out ore.—An English company, represented by J. Hopkins, has an option on El Refugio mine, which adjoins the Calabaza on the north.—T. H. Whitney and London people have a bond on El Mono, Santa Clara and Zopilote Annexes mines, nine hours' ride north of Etzatlán.

Ore has been struck in the Culebra mine, near Etzatlán, owned by T. C. and H. K. Myers. The strike was made in driving a tunnel 165 meters in length. The ore is said to run 80 kilograms of silver and 50 grams of gold per ton. The paystreak is 18 inches wide on the foot-wall. Between this streak and the hanging wall is 1½ meters of ore which runs 2 kilograms of silver and 6 grams of gold per ton. The Culebra is an "antigua" mine. T. C. Myers on buying the mine three years ago decided to drive a tunnel to cut the shaft, which has now been reached.

The Altamira M. Co. has men at work developing a group of sixty-three pertenencias of mining land near Ahualulco. Air compressors and drills are on the ground and will be set up. W. S. Matthews, of Etzatlán, is president and D. Ryan of St. Paul, Minn., managing director. They have doubled the number of men at work this week.

The Fortuna M. Co. is erecting a 10-ton mill at the Candelaria mine at Etzatlán. It is expected to have the mill in operation by August 1.—Carroll & Kratz have about completed the removal of their mill to its new location, and expect to start work in August.—The Amparo M. Co. is getting its machinery in place. Re-denouncement of the "antigua" Spanish mine in Guachinango district, near Ameca, known as La Reforma, has been made by F. C. Martinez. The mine recently reverted to the government because of default of taxes. The mine was formerly known as Las Bolas and also under the name Cuitascolco.

#### Lower California.

The Valle Perdido mine, near La Paz, which is owned by a Los Angeles, Cal., company, is again being worked under management of J. H. Mendoza, after an idleness of twenty years. Silver-copper ore was formerly produced. Recent development work, however, is said to have resulted in opening ore that contains gold values, and the company proposes to put in machinery, including a cyanide plant.

#### Michoacan.

At the Inguaran copper mines, in southern Michoacan, owned by Rothschilds Bros. of Paris, France, the electric power and light plant has been completed and will be put in operation this week. Water power from a fall near the mine is utilized

for development of electricity. Surveys are being made to connect the mines by railroad with the Urupan branch of the National railroad. Nothing has been done with the road surveyed from the mines to Zihuanabejo, on the Pacific coast.

#### Nuevo Leon.

The Monterey News says the National railroad will build a branch 23 kilometers long from its Monterey-Matamoros line, under construction, to the Cerralvo lead mining district. The ores of the Cerralvo district are said to be high-grade galena.

The H. C. Harrison smelter in this district has been in operation five years, although not on an extensive scale. The product of the smelter in bar bullion has been about 3200 bars a month, each bar representing 105 pounds. This was practically all lead.

#### Sonora.

It is reported a reduction plant will be built at the Sultana mine, owned by J. L. Giroux, of Los Angeles, Cal. The Sultana is at Copete, near the Copete mine. The main shaft is at a depth of 1050 feet, in ore all the way down. In going down levels, drifts and crosscuts have been run, and ores blocked out ready for stoping and hoisting. It is said that at the 1050-foot level the ore body, as shown by crosscuts, is 36 feet in width, and carries copper, gold and silver to value of \$60 gold per ton.

J. McHenry has an option on the San Juan mine near Navidad, near Mascota, and is preparing for operations.

#### Vera Cruz.

The Oil Fields of Mexico Co., developing oil lands 40 miles from Vera Cruz, is reported preparing to build an oil pipe line from its wells to the port of Vera Cruz. P. N. Furber of New York City, N. Y., is president of the company.

### Personal.

W. F. EDMONDS, a mine owner of Denver, Colo., is in San Francisco, Cal.

P. L. VERCOE, a mine manager of Fresno, Cal., is in San Francisco, Cal.

J. B. RACKLIFFE of Boston, Mass., is in San Francisco, Cal., on mining business.

W. P. LYNCH, interested in gold dredging operations at Oroville, Cal., is in San Francisco, Cal.

W. M. MCGREGOR has returned to Hill City, South Dakota, after several years' mining in Mexico.

M. F. CROSSETTE, interested in mines near Ameca, Jalisco, Mex., is visiting in Ithaca, New York.

W. G. SCOTT, superintendent of the Black Oak mine, at Soulsbyville, Cal., is in San Francisco, Cal.

J. R. PRICE of Stateline, Utah, has gone to Cananea, Sonora, Mexico, to make mine examinations.

C. C. JONES, consulting engineer of the Mountain Copper Co. properties in Shasta county, Cal., is in the East.

J. A. GROESBECK of Salt Lake City, Utah, has gone to Peru, South America, to make mine examinations.

Z. KENDALL of Tonopah, Nev., interested in Goldfield, Esmeralda county, mines, is in San Francisco, Cal.

WM. COOPER, manager of the Capital Prize mine, Georgetown, Colo., has returned there from St. Louis, Mo.

D. MCVICHIE of Salt Lake City, Utah, manager of the Bingham Con. Co., is in the East on company business.

H. W. EDWARDS has been appointed superintendent of the Comanche smelter now building at Silver City, N. M.

R. H. CHANNING of Salt Lake City, Utah, manager of the Utah Con. Co., returned last week from Colorado.

D. KENNEDY, manager of the Centennial G. M. Co., has returned to Georgetown, Colo., from an Eastern trip.

M. GRIER is superintending work on the Hearst estate, near Palermo, Cal., preliminary to dredging operations.

W. H. KINNOR, recently superintendent of the Majestic smelter at Milford, Utah, is in Mexico, starting up a plant.

W. H. HAMPTON, formerly of Grant's Pass, Ore., is now manager of the Jualpa Co., with headquarters at Juneau, Alaska.

D. T. PARKER of Denver, Colo., returned there last week from a trip to Boulder county on professional business.

W. W. WORTHING, superintendent of the Rhetta Con. mines, near Plymouth, Amador county, Cal., is in San Francisco, Cal.

C. S. PORTER, formerly with the Esperanza Co. of Cedros Island, Mexico, is operating a reduction plant at Vulcan, Colo.

G. B. WILSON has resigned as assistant superintendent of the Quartette M. Co. at Searchlight, Nev., and has gone to Boston, Mass.

G. CARLSON, of Idaho Springs, Colo., is making an extended trip through Europe and will return from there about September 1st.

C. E. JAMISON, formerly of Parker & Jamison, assayers, Denver, Colo., is now located at the Exposed Treasure mine, Mojave, Cal.

D. ROBINSON, formerly superintendent of the Allison Ranch mine, near Grass Valley, Cal., is at the Andes mine at Virginia City, Nev.

CHAS. COLCOCK JONES, late of the Mountain Copper Co. of Keswick, Cal., has established an engineering office in Salt Lake City, Utah.

S. H. BALL has charge of the work at Idaho Springs, Colo., for the U. S. Geological Survey. J. E. Spurr is expected there about July 10th.

C. C. JONES of Salt Lake City, Utah, recently consulting engineer for the Mountain C. Co. of Shasta county, Cal., is in San Francisco, Cal.

C. T. DURELL of Maiden, Mont., has returned from California, where he has been examining gold-dredging properties on the Sacramento river.

A. B. FOSTER, G. B. HOLDEN AND E. NOYCE have returned to Boston, Mass., from Empire, Colo., where they have been examining mining interests.

W. CHRISTOFFERSON is in Salt Lake City, Utah, from Norway, where he has been superintending development of nickel mines owned by Utah men.

JOHN T. JAMES, vice-president of the North American Prospecting & Mining Association of Denver, is in Chicago on business connected with his company.

C. K. TIBBETTS, manager of the Pfau G. M. & R. Co., operating at Cherry, Yavapai county, Ariz., has returned there from a business trip to Salt Lake City, Utah.

B. TREWEEK, formerly of Lead City, South Dakota, has returned to Bluefields, Nicaragua, where he is manager for a mining company, after a visit to Lead City.

PROF. E. L. KURTZ of Columbia University, New York, has charge of the students of the summer school at Silver Plume, Colo., in the absence of Prof. Munroe, who is in New York.

J. M. THOMAS of Bisbee, Ariz., recently with the company operating the Pittsburgh & Duluth mine, is in charge of the World's Fair mine in the Harshaw district, near Patagonia, Santa Cruz county, Ariz.

EPES RANDOLPH, president of the Gila Valley, Globe & Northern Railroad, has been elected president of the Maricopa & Phoenix Railroad. This places Col. Randolph at the head of all the Southern Pacific lines in Arizona.

V. H. METCALF, congressman from the Third Congressional district of California, has been appointed a member of the President's Cabinet, having charge of the Department of Commerce, which comprises the federal supervision of mining interests.

T. K. WILKINSON, formerly superintendent of the electrolytic copper refinery at Anaconda, Mont., has been appointed superintendent of a similar plant to be built at the Tacoma smelter at Tacoma, Wash., and has gone East on company business.

THOS. RICKARD, of the firm of Harron, Rickard & McCone, of San Francisco, Cal., whose residence is in Berkeley, Cal., is prominently mentioned as congressman from the Third California Congressional district to succeed V. H. Metcalf, who this week enters the President's Cabinet.

H. H. NICHOLSON, recently professor in the mining department, University of Nevada, at Reno, Nev., is consulting engineer for the Killen-Warner-Stewart Co., operating mines in Oregon, and will make his headquarters at Sumpter and assume charge of their mining operations.

WILLIAM C. POTTER of the firm of Dickman, Mackenzie & Potter of Chicago, Ill., has been offered, and has accepted, the position of superintending engineer of the Guggenheim Exploration Co. in the Republic of Mexico, with headquarters at Mexico City. Mr. Potter still retains membership in the firm of Dickman, Mackenzie & Potter, but will devote his entire attention to the business of the exploration company.



## Commercial Paragraphs.

NORMAN A. ROOT is now associated with H. V. Croll in the Haywards Building, San Francisco, Cal., representing the Allis-Chalmers Co.

THE Hydro-Carbon Paint Co. of Denver, Colo., report recent orders for their material and shipments from New York City, New Haven, Conn., St. Louis, Mo., and Chicago, Ill.

THE Little Wonder air hammer rock drill is on exhibition at the Nicholls Manufacturing Co.'s exhibit, Block 8—A, manufacturers' building, World's Exposition, St. Louis, Mo.

THE New Era Machinery Co. of Denver, Colo., report recent sales of Wallace stamp and grinding mills to the Etna G. M. Co. of Huitzo, Oaxaca, Mexico, and the Carrizal G. M. Co. of Carrizal, Michoacan, Mexico.

THE Stanley Electric Manufacturing Co. send a wall map of the "S. K. C. System of Long Distance Transmission in California," an interesting presentation of a great electric transmission system of the Pacific coast.

THE pneumatic tool department of the Ingersoll-Sergeant Drill Co. issues a pamphlet describing and illustrating the construction of the Haeseler axial valve hammers. Incidental reference is made to a recent Supreme Court decision regarding patented features of pneumatic hammer handles.

ERNEST GAYFORD AND F. P. CALLOW, respectively superintendent and consulting engineer of the Colossus G. M. Co. of Waxhaw, N. C., have resigned their positions and will open a consulting office in Charlotte, N. C., making a specialty of designing and erecting cyanide plants in the South and elsewhere.

THE Engineering Co. of Mexico has been organized with headquarters in the city of Mexico. Egbert Smit is consulting mining engineer, W. L. Holms consulting metallurgical engineer, Norman Rowe consulting electrical engineer, L. M. Green chemist and assayer, P. G. Holms assistant chemist and assayer.

THE Gardner Electric Drill & Machinery Co. has secured the exclusive right for the manufacture and sale of the new Adams electrically driven rock drills. Bulletin No. 1 graphically illustrates and describes the device. The company is now prepared to furnish this new machine. E. C. Means, the Western manager, 1515 Seventeenth street, Denver, Colo., can furnish all further necessary information relative thereto.

THE Rand Drill Co. has a contract for two compressors to be used in the Central air power plant 18 miles below Sault Ste. Marie. They will supply air to operate twenty-five little giant rock drills, four three-ton cableways and four large water pumps. Their combined capacity is 6600 cubic feet of free air per minute. The work in hand is for constructing and dredging a 2-mile channel in the Soo river wide and deep enough for the navigation of large vessels.

THE Crocker-Wheeler Co. of Ampere, N. J., write: "The equipment of factories with electric motors for individual and group drive of machine tools has become an extensive department of our business. We are now prepared to give our clients expert advice upon the latest ideas and results in shop practice, in addition to purely engineering advice upon the design and installation of electrical apparatus for shop equipment. We have retained the well-known firm of Dodge & Day, modernizing engineers of Philadelphia, Pa., and place the services of this firm at the disposal of our customers, giving them gratuitously the benefit of its wide experience and data. The experience of the electrical engineer alone does not fully cover the numerous factors that are met in these days in the dividend-making management of machine shops. While the economies that may be effected by electric drive are conceded by all, the actual savings accomplished depend entirely upon the intelligence with which the apparatus is selected, installed and used. The advice and recommendations about which our customers may consult this firm need not be confined to electrical details, but may include all problems of shop equipment and management."

## Books Received.

"An Engineering Student's Notes," is the title of a neat little volume by J. Richards. It consists of a series of chap-

ters on practical mechanics and machinery told in an interesting narrative style. The Industrial Publishing Co., San Francisco, Cal., price \$1.00.

## Trade Treatises.

"Magnesia Coverings" is the subject of a very handsome brochure from the Philip Carey Manufacturing Co. of Lockland, Ohio.

Catalogue "E" from the Great Lakes Engineering Works, Detroit, Mich., describes and illustrates in detail their vertical compound two-stage compressor.

Bulletin No. 350 on stationary and portable motor-driven air compressors for continuous and intermittent service, from the National Electric Co., Milwaukee, Wis., gives some practical points thereon that are worthy of observance.

"Prospecting for Coal, a Simple Digest," from the Edw. Christman Co., Massillon, Ohio, gives some practical points on drilling test holes for coal and other minerals, and is excellently arranged. There is an illustrated treatise on knots that is worth reading.

## Obituary.

WALLACE COLBY, a Leadville, Colo., mining man, died at Leadville, June 27th.

JACKSON TAYLOR, recently of Newburgh, N. Y., assayer at a mine at Alta, Salt Lake county, Utah, died at Alta, June 26th. Deceased was a graduate of the Columbia School of Mines, New York City.

G. STANDART, a pioneer miner and mine owner of Plumas county, Cal., died at Greenville, Cal., on June 18th. Deceased was a native of New York, aged 68 years. He was at one time superintendent of the Golden Stripe M. Co. and principal owner in the Standart & McGill group of mines in Plumas county.

H. C. WALTERS, a mine owner and manager of Seattle, Wash., died at Tacoma, Wash., on June 13th, after a two months' illness. He has been identified with the Providence mine of Greenwood, B. C., the Snow Shoe mine of Libby, Mont., the Britannia mine, near Vancouver, B. C., and in Rossland, B. C., and Oaxaca, Mexico, mines.

## Latest Market Reports.

SAN FRANCISCO, July 1, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 26d (standard ounce, 925 fine); New York, bar silver, 56½c, refined (1000 fine); San Francisco, 56½c; Mexican dollars, 46½c San Francisco, 46c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.75; Electrolytic, 1 to 3 casks, \$12.50; Casting, 1 to 3 casks, \$12.25; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £56 13s 9d spot per ton.

Copper shows no important change since last week's quotation. The general hesitation in promoting extensive new industrial enterprises, which is always a feature of the few months preceding presidential elections, is at the present time having a direct influence on the metal market—iron as well as copper.

LEAD.—New York, \$4.25; Salt Lake City, \$3.50; St. Louis, \$4.25 San Francisco, \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 10s 7d long ton.

SPELTER.—New York, \$4.90; St. Louis, \$5.00; London, £22 2s ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$25.50 @ 25.75; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, \$30 @ 32½c. London, £115 spot.

PLATINUM.—San Francisco, crude, \$18.50 ½ oz.; New York, ingot, \$19.00 ½ Troy oz. Platinum ware, 75 @ 82c ½ gram.

QUICKSILVER.—New York, \$44.50 @ 45.50, large lots; London, £8 San Francisco, local, \$43 @ 43.50 ½ flask of 75 lbs.; Denver, \$46.00. Export, \$43.00 @ 43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

NICKEL.—New York, 40@47c ½ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.85 @ 13.35; gray forge, \$12.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00 @ 23.00; open hearth billets, \$23.00 @ 23.00; San Francisco, bar, 7c to 12c ½ lb.

### CHICAGO CURRENT QUOTATIONS.

Bessemer	13 00@15 25
Poundry Northern 1	13 75@14 00
Northern 2	13 25@13 50
Northern 3	12 75@13 00
Southern 1	13 15@13 65
Southern 2	12 65@13 15
Southern 3	12 15@12 65
Forge	11 40@11 90
Charcoal	14 50@15 00
Billets, Bessemer	24 00@24 00
Bars, iron	1 30@ 1 40
Bars, steel	1 51@ 1 51
Rails, standard	28 00@30 00
Rails, light	24 00@26 00
Plates, boiler	1 91@ 2 01
Tank	1 76@ 1 81
Sheets, 27 store	2 26@ 2 41
Angles	1 76@
Beams	1 76@
Tees	1 81@
Zees	1 81@
Channels	1 76@
No. 1 railroad wrought	10 00@11 00
No. 1 cast, net ton	10 00@10 50
Iron rails	14 50@15 50
Car wheels	12 50@13 00
Cast borings	3 00@ 3 50
Turnings	6 00@ 6 50

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½ lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, ½ lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city ½ bbl.

CEMENT.—Imported, \$2.15 @ 2.65 ½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.45 ½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ½ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c ½ lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 ½ 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ½ lb.; Cal. s. soda, bbls., \$1.20 @ 1.40 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, \$2.00 @ 2.25; California refined, 1½@2c; sulphide of iron, 8c ½ lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50 @ 2.75; sulphuric acid, in carboys, 66% B, 1½@2c ½ lb.; nitric acid, carboys, 8c ½ lb.

OILS.—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c; Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naptha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 70c; Bleached, do., 80c; Whale Oil, cs., 52@57c.

COAL.—San Francisco, coast, 80c prices: Wellington, \$8.00; Seattle, \$6.50;

Coos Bay, \$5.00; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$11.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$11.50, long ton.

BONE ASH.—Extra No. 1, 5@6c ½ lb. No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, ½ lb., 7c; less than 500 lbs., 7½c. LITHARGE.—Pure, in 25-lb. bags, 8@9c ½ lb.

BORAX.—Concentrated, 6@7c ½ lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MOLYBDENUM.—Best, \$2.00 ½ lb.

CHROMIUM.—90% and over, ½ lb., \$1.00.

PHOSPHORUS.—American, ½ lb., 70c.

SILVER.—Chloride, ½ oz., 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride, ½ lb., 77c.

MANGANESE.—Pure, ½ lb., 60c.

SODIUM.—Metal, ½ lb., 50c.

BISMUTH.—Subnitrate, ½ lb., \$2.10.

ALUMINUM.—No. 1, 99%, small lots, 37c ½ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ½ lb., \$3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING JUNE 21, 1904.

- 763,141.—CHAIN BUCKET ELEVATOR—H. M. Barn-grove, San Jose, Cal.
- 763,009.—GAS GENERATOR—F. H. Bates, S. F.
- 763,245.—BOLT HOLDER—Bebler & Anderson, Los Angeles, Cal.
- 763,249.—CANT HOOK—N. Blanchet, Pendleton, Or.
- 763,146.—STAMP TAPPET—Brown & Hayes, Bishop, Cal.
- 763,045.—PAPER HOLDER—K. Cooper, East Highlands, Cal.
- 763,162.—FEED VALVE—J. L. Curran, Rocklin, Cal.
- 763,267.—ARTIFICIAL FUEL—J. T. Davis, S. F.
- 763,271.—GARMENT SUPPORTER—F. Ferguson, Santa Rosa, Cal.
- 763,276.—HORSE DETACHER—J. P. Gardner, S. F.
- 763,095.—AIR BRAKE—Graham & Potts, Seattle, Wash.
- 763,187.—VALVE—Kellar & Thomson, Covina, Cal.
- 763,324.—CULTIVATOR—G. W. Roberts, Lemoore, Cal.
- 763,072.—ADJUSTABLE BIT—W. H. de Roseau, Clifton, Ariz.
- 763,095.—KINETOSCOPE, ETC.—F. Schaefer, Seattle, Wash.
- 763,336.—ROTARY ENGINE—J. W. Swanson, Ballard, Wash.
- 763,030.—MINING APPARATUS—C. H. Thompson, Los Angeles, Cal.
- 762,905.—EXPLOSIVE ENGINE—L. F. Washburne, S. F.
- 762,969.—OIL BURNER—E. N. White, Oakland, Cal.
- 763,135.—PAYMENT MACHINE—G. R. Wilton, Los Angeles, Cal.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SELF ADJUSTING WAIST.—No. 762,581. June 14, 1904. Louise Fogus, San Francisco, Cal. This invention relates to a device for improving the set of blouse or shirt waists. It consists of a specially cut form having flexible bones extending substantially vertical within suitable casings and converging downwardly with relation to each other. There is a fullness to the lower part of the material within which the bones are fixed and the upper edge of the material is substantially non-extensible transversely. The effect of the whole arrangement is to cause the bones to curve outwardly so as to form a support for the exterior waist or covering.

CRUSHING AND GRINDING MILLS.—No. 762,580. June 14, 1904. J. M. Dyer, Douglas City, Cal. This invention relates to an apparatus designed for crushing and pulverizing ore bearing and other rock. It consists in the combination in an ore crushing and pulverizing apparatus, of a cone revolvable upon a vertical axis and having a spherically curved base flange; a cylinder of larger interior diameter than the cone and having a spherically curved base to fit the curvature of the cone flange. An annulus surrounds the top of the cylinder, said cylinder and annulus having their adjacent faces provided with a raceway containing balls, and said annulus having an outer curved surface. A plate is concaved to fit the annulus and is movable in a horizontal plane to tilt the upper end of the cylinder. A splash wall and screen surround the lower end of the cylinder and an annular trough surrounds the screen.

ELECTRICAL SPARKING IGNITER FOR EXPLOSIVE ENGINE.—No. 762,574. June 14, 1904. A. J. Bradley, Oakland, Cal. This invention relates to improvements in engines of the type employing an explosively hydrocarbon as a propelling medium. The device comprises fixed and rocking electrodes, a spring-pressed hammer arm carried by the rocking electrode and having a limited oscillating movement in relation thereto, a rigid anvil arm carried by said rocking electrode and disposed in the path of movement of said hammer arm and an oscillating part for operating said hammer arm slidable in adjustable resiliently supported guides disposed in the path of said arm.

WASH BOILER.—No. 762,576. June 14, 1904. Jas. L. Brobst and Jacob L. Brobst. This device consists essentially of a false bottom having a substantially fitting rim or flange around the interior of the boiler, a second flange of smaller diameter concentric with the outer and of slightly less depth, diaphragms or partitions extending longitudinally and trans-



versely at right angles from the inner to the outer rim, openings made near the ends of each of the compartments thus formed, pipes extending upwardly from said openings and adapted to discharge the boiling water upon the top of the clothes contained in the boiler, and an open screen in the top of the diaphragm communicating with the central chamber beneath.

**STAMP TAPPET AND SECURING MEANS THEREFOR.**—No. 763,146. June 21, 1904. Clarence Brown of Bishop, Cal., and Frank Hayes of Elmonte, Cal. This invention relates to improvements in tappets which are secured upon the stamp stems of ore-crushing mills and the like. The object of the invention is to provide a tappet which may be quickly removed in position upon a stem and quickly removed therefrom and which is prevented absolutely from slipping when once it has been secured on the stem.

**CHAIN BUCKET ELEVATOR.**—No. 763,141. June 21, 1904. H. M. Barngrover, San Jose, Cal. Assigned to Anderson, Barngrover Mfg. Co. of San Jose, a corporation. This invention relates to an apparatus for elevating substances such as prunes, dried fruit or any substance which can be transmitted by the use of such a device. The object of the apparatus is to conveniently transport prunes or similar dried fruits from a hopper or receiver into which they may be delivered, and to elevate them to floors above, where the final packing of the fruit may take place, and for similar or equivalent purposes.

#### DELINQUENT SALE NOTICE.

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Notice—There are delinquent upon the following described stock on account of assessment (No. 40) levied on the 10th day of May, 1904, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Brown, John.....	627	189	\$ 94½
Brown and McKinnon.....	641	100	50
Delsors, Victor.....	465	1,307	6 53½
Delsors, John.....	45	300	1 50
Delsors, John.....	60	300	1 50
Delsors, John.....	156	240	1 20
Delsors, John.....	232	140	70
Pinning, Bart.....	257	1,000	5 00
Kavanagh, Ed.....	285	300	1 50
Kavanagh, Ed.....	660	2,000	10 00
McAulay, Geo.....	69	200	1 00
Nelson, J. W.....	561	505	2 52½
Rogers and Kelly.....	690	189	94½
Smith, C. H.....	491	10,000	50 00

And in accordance with law and an order from the Board of Directors, made on the 10th day of May, 1904, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 3, No. 214 Pine street, San Francisco, California, on SATURDAY, the 16th day of July, 1904, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

Office—Room 3, No. 214 Pine street, San Francisco, California.

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**WANTED, POSITION AS SUPERINTENDENT** of mine and mill; amalgamation and concentration; competent assayer and analyst; good references. Address "Vanner," care of this office.

**WANTED—A POSITION AS ASSAYER OR TO** take charge of concentration or cyanide plant by experienced man, U. S. or Mexico. Address E., care of this office.

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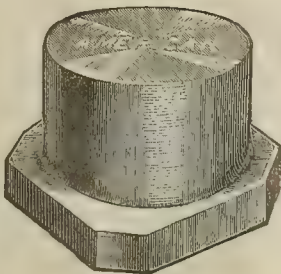
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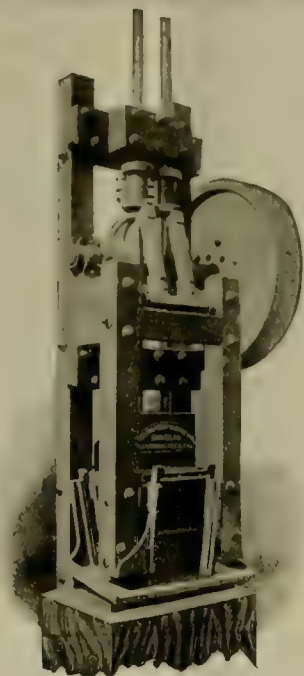
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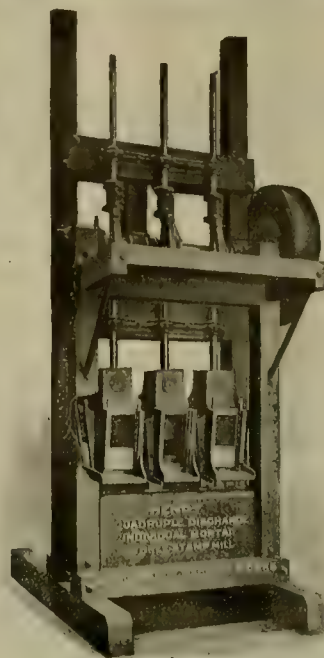
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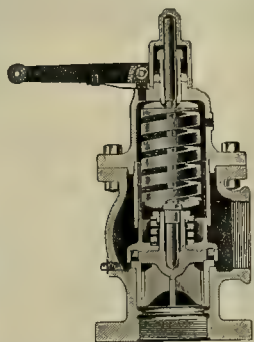
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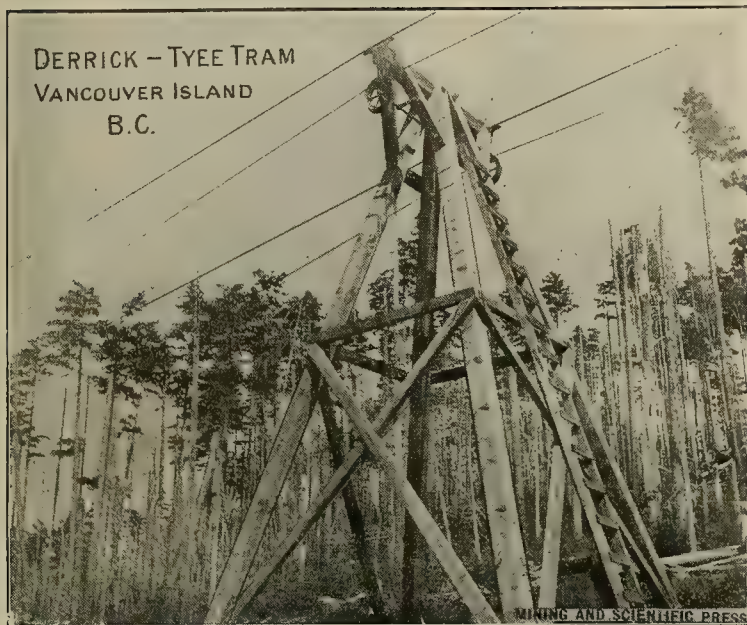
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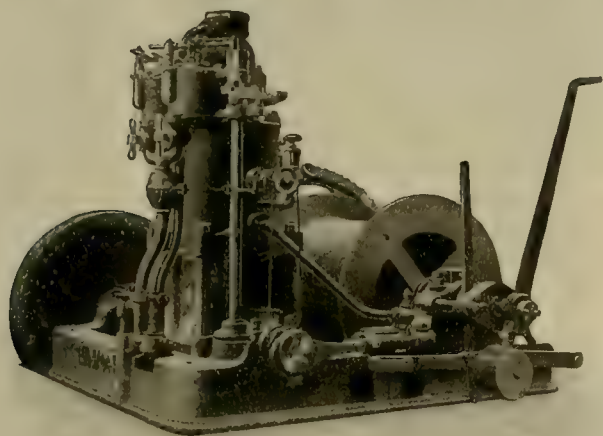
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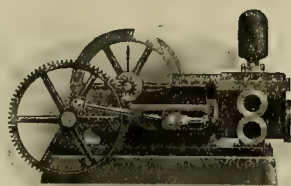
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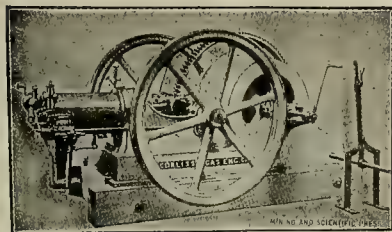


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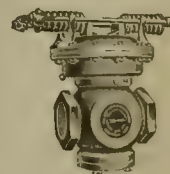
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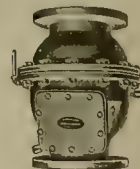
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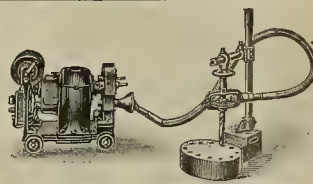
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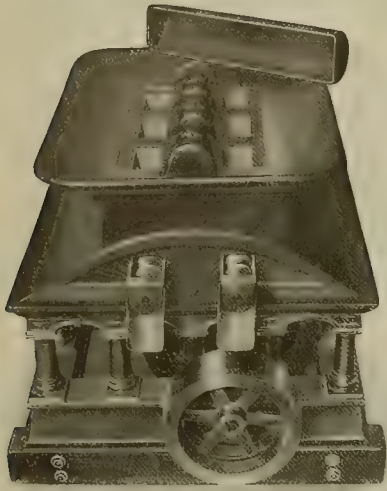
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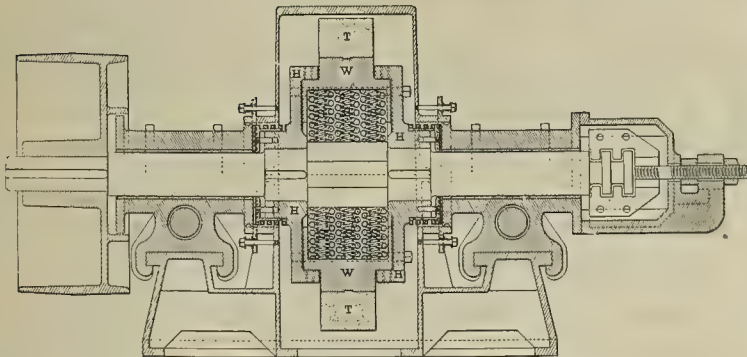
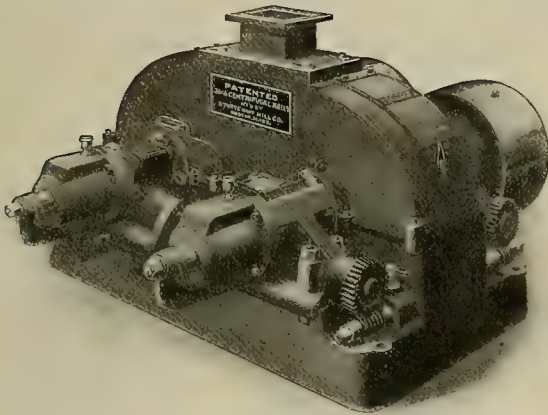
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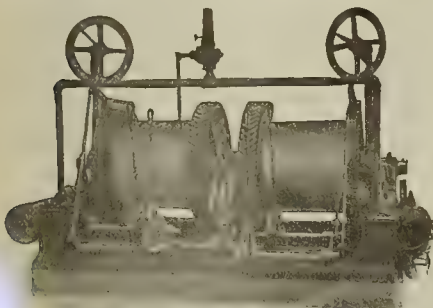
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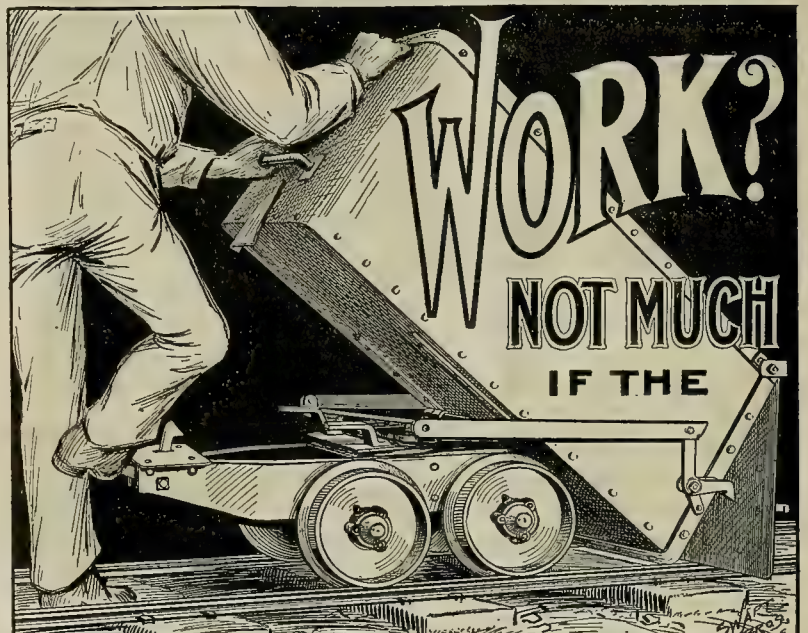
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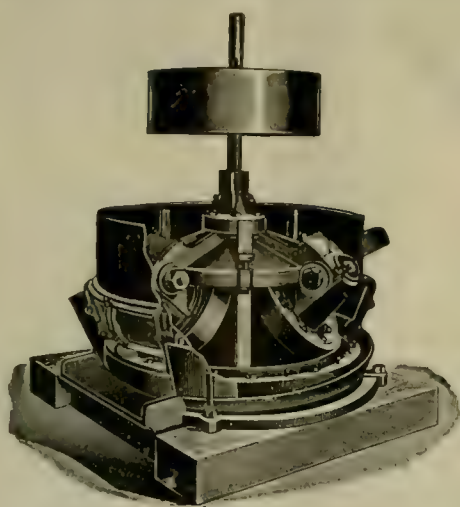
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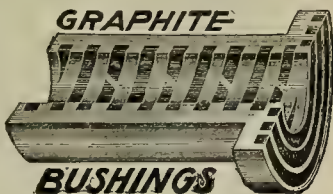


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San Francisco, March 25, 1904.

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The display advertisements of the firms mentioned under each heading can be found by reference to the Alphabetical Index on page 26.

### ADJUSTABLE STOCKS AND DIES.

Crane Co., Chicago.  
Harron, Rickard & McCone, San Francisco.  
Hart Mfg. Co., Cleveland, O.

### AIR COMPRESSORS.

Allis-Chalmers Co., Chicago.  
American Diamond Rock Drill Co., New York.  
American Well Works, Aurora, Ill.  
Columbus Machine Co., Columbus, O.  
Colorado Iron Works, Denver, Colo.  
Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works, Denver, Colo.  
Fairbanks, Morse & Co., Chicago.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Hendrie & Bolthoff Mfg. Co., Denver, Colo.  
Ingersoll-Sergeant Drill Co., New York.  
Leyner, J. Geo., Denver, Colo.  
Mietz, A., New York.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Rand Drill Co., New York.  
Rix Compressed Air & Drill Co., San Francisco.  
Sullivan Machinery Co., Chicago.  
Traylor, Samuel W., New York.

### AIR METERS.

Warren & Co., Denver, Colo.

### AMALGAM PLATES.

Allis-Chalmers Co., Chicago.  
Dennison, E. G., San Francisco.  
Denver Engineering Works, Denver, Colo.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Merle Co., A., San Francisco.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.

### ANTI-FRICTION METALS.

Globe Iron Works, Stockton, Cal.  
Harron, Rickard & McCone, San Francisco.  
Moore & Co., Chas. C., San Francisco.

### ASSAYERS.

Barnhart, A. D., Prescott, Ariz.  
Baverstock & Staples, Los Angeles, Cal.  
Bosqui, Francis, San Francisco.  
Browne, R. Stuart, San Francisco.  
Burlingame & Co., Denver, Colo.  
Burton, H. E., Leadville, Colo.  
Clark's Eng. & Assay Office, Bisbee, Ariz.  
Currie, J. W., Salt Lake City, Utah.  
Dickman, Mackenzie & Potter, Chicago.  
Falkenau Assaying Co., San Francisco.  
Fassett, Chas. M., Spokane, Wash.  
Frost, Oscar J., Denver, Colo.  
Fueller, C. M., Denver, Colo.  
Hanks, Abbott A., San Francisco.  
Harrigan, John, San Francisco.  
Hersey, Clarence, Leadville, Colo.  
Irving & Co., James, Los Angeles, Cal.  
Luckhardt Co., C. A., San Francisco.  
Manning, T. H., Boise, Idaho.  
Moreland, J. H., Kansas City, Mo.  
Ogden Assay Co., Denver, Colo.  
Parker & Jamison, Denver, Colo.  
Parmelee & Wolf, Denver, Colo.  
Pellegrin, A. L., Nogales, Ariz.  
Pellew, Harvey, Bryant & Gilman, Vancouver.  
Perez, R. A., Los Angeles, Cal.  
Richards, J. W., Denver, Colo.  
Rickard, Stephen, Denver, Colo.  
Seiby Smelting & Lead Co., San Francisco.  
Simonds, Ernest H., San Francisco.  
Taylor, Chas., Nogales, Arizona.  
Wade & Wade, Los Angeles, Cal.  
Werner Geo., Los Angeles, Cal.  
Wheeler, H. K., Co., Los Angeles, Cal.  
Wood & Co., Henry E., Denver, Colo.  
Young, J. D., Chicago.

### ASSAYERS' AND CHEMISTS' SUPPLIES.

Ainsworth & Sons, W., Denver, Colo.  
Braun Co., F. W., Los Angeles, Cal.  
Calkins Co., Los Angeles, Cal.  
Denver Fire Clay Co., Denver, Colo.  
Hoskins, W., Chicago.  
Mine & Smelter Supply Co., Denver, Colo.  
Roessler & Hasslacher Chemical Co., New York.  
Thompson, F. W., Denver, Colo.  
Western Chemical Co., Denver, Colo.

### ATTORNEYS (PATENT).

Dewey, Strong & Co., San Francisco.

### AXLES.

American Tool Works, San Francisco.  
Chrome Steel Works, Brooklyn, N. Y.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Globe Iron Works, Stockton, Cal.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.

### BEARING METAL.

Globe Iron Works, Stockton, Cal.  
Graphite Lubricating Co., Bound Brook, N. J.

### BELTING.

Goodyear Rubber Co., San Francisco.  
Gutta Percha Rubber & Mfg. Co., San Francisco.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Manufacturing Co., Columbus, O.  
Krogh Mfg. Co., San Francisco.  
Link Belt Machinery Co., Chicago.  
Main Belting Co., Philadelphia, Pa.  
Mine & Smelter Supply Co., Denver, Colo.  
Power Installation Co., Buffalo, N. Y.  
Robins Conveying Belt Co., New York.  
Stephens-Adamson Mfg. Co., Aurora, Ill.

### BLASTING BATTERIES, CAPS AND FUSE.

Harron, Rickard & McCone, San Francisco.  
Ingersoll-Sergeant Drill Co., New York.  
Rand Drill Co., New York.

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Harron, Rickard & McCone, San Francisco.

### BOILERS.

Allis-Chalmers Co., Chicago.  
Carlin's Sons Co., Thomas, Allegheny, Pa.  
Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works, Denver, Colo.  
Fairbanks, Morse & Co., Chicago.  
Harron, Rickard & McCone, San Francisco.  
Hendrie & Bolthoff Mfg. Co., Denver, Colo.  
Hendy Machine Works, Joshua, San Francisco.  
Krogh Mfg. Co., San Francisco.  
Leffel & Co., Jns., Springfield, O.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Ottumwa Iron Works, Ottumwa, Iowa.  
Power & Mining Machinery Co., Cudahy, Wis.  
Risdon Iron Works, San Francisco.  
Riverside Iron Works Co., Kansas City, Kansas.  
Rix Compressed Air & Drill Co., San Francisco.  
Union Iron Works, San Francisco.

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### BOILER FRONTS.

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Denver Engineering Works, Denver, Colo.  
Globe Iron Works, Stockton, Cal.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Lunkenheimer Co., Cincinnati, O.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Riverside Iron Works Co., Kansas City, Kansas.

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Harron, Rickard & McCone, San Francisco.  
Leschen & Sons Rope Co., A., St. Louis, Mo.  
Link Belt Machinery Co., Chicago.  
Mine & Smelter Supply Co., Denver, Colo.

### BOOKS.

Baird & Co., H. C., Philadelphia, Pa.

### BOOTS.

Putnam & Co., J. H., Minneapolis, Minn.

### BOX CAR LOADERS.

Christy Box Car Loader Co., Des Moines, Ia.

### BRASS GOODS (COCKS, VALVES, ETC.).

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Crosby Steam Gauge & Valve Co., Boston, Mass.  
Fairbanks, Morse & Co., Chicago.  
Lunkenheimer Co., Cincinnati, O.  
Michigan Lubricator Co., Detroit, Mich.  
Powell Co., Wm., Cincinnati, O.

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Tyler Co., W. S., Cleveland, O.

### BRICK MACHINERY.

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### BUCKETS (AUTOMATIC).

Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Manufacturing Co., Columbus, O.  
Krogh Mfg. Co., San Francisco.  
Link Belt Machinery Co., Chicago.  
Wellman-Seaver-Morgan Co., Cleveland, O.

### CABLEWAYS (SUSPENSION).

Allis-Chalmers Co., Chicago.  
Broderick & Bascom Rope Co., St. Louis, Mo.  
Flory, Mfg. Co., S., Bangor, Pa.  
Hallidie-Painter Tramway Co., St. Louis, Mo.  
Leschen & Sons Rope Co., St. Louis, Mo.  
Lidgerwood Mfg. Co., New York.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Riverside Iron Works Co., Kansas City, Kansas.  
Roebeling's Sons Co., J. A., N. Y. and S. F.  
Trenton Iron Works Co., Trenton, N. J.  
Vulcan Iron Works, San Francisco.

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Baszanger & Co., J., New York.

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Atlas Car & Mfg. Co., Cleveland, O.  
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Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Fairbanks, Morse & Co., Chicago.  
Globe Iron Works, Stockton, Cal.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Mfg. Co., Columbus, O.  
Kilbourne & Jacobs Mfg. Co., Columbus, O.  
Koppel, Arthur, New York.  
Krogh Mfg. Co., San Francisco.  
Link Belt Machinery Co., Chicago.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Ottumwa Iron Works, Ottumwa, Iowa.  
Power & Mining Machinery Co., Cudahy, Wis.  
Riverside Iron Works Co., Kansas City, Kansas.  
Wellman-Seaver-Morgan Co., Cleveland, O.

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Chrome Steel Works, Brooklyn, N. Y.  
Globe Iron Works, Stockton, Cal.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Manufacturing Co., Columbus, O.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Riverside Iron Works Co., Kansas City, Kansas.  
Smith Co., S., Morgan, York, Pa.  
Taylor Iron & Steel Co., High Bridge, N. J.  
Vulcan Iron Works Co., Toledo, O.  
Wellman-Seaver-Morgan Co., Cleveland, O.

### CEMENT MACHINERY.

Allis-Chalmers Co., Chicago.  
Bartlett & Snow Co., C. O., Cleveland, O.  
Bradley Pulverizer Co., Boston, Mass.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Manufacturing Co., Columbus, O.  
Link Belt Machinery Co., Chicago.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Smith & Co., F. L., New York.  
Sturtevant Mill Co., Boston, Mass.

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Ingersoll-Sergeant Drill Co., New York.  
Rand Drill Co., New York.  
Riverside Iron Works Co., Kansas City, Kansas.  
Sullivan Machinery Co., Chicago.

### CHECK VALVES.

Lunkenheimer Co., Cincinnati, O.  
Powell, Wm., Co., Cincinnati, O.

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Braun Co., F. W., Los Angeles, Cal.  
Denver Fire Clay Co., Denver, Colo.  
Grasselli Chemical Co., Cleveland, O.  
Mine & Smelter Supply Co., Denver, Colo.  
Roessler & Hasslacher Chemical Co., New York.  
Western Chemical Co., Denver, Colo.

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If the boss discovers the business  
don't pay,  
On the engineer the blame he  
throws,  
And you'll have to hear it day after  
day  
Unless you can PROVE you're a  
man who knows.

There's no use telling "the engine's  
wrong,"  
Unless you can show where the  
money goes;  
There's nothing but PROOF will  
stop his song—  
The boss can't kick at the man  
who knows.

## A Robertson-Thompson Indicator

The faults of the engine will soon  
expose;  
It'll make her confess them in  
black and white  
And PROVE you're a man who  
KNOWS he knows.

It's the best indicator on the mar-  
ket to-day,  
Sold at a price you're willing to  
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The name of the makers is ample  
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**DEPARTMENT OF THE INTERIOR, U. S.**  
Geological Survey, Washington, D. C., May 26,  
1904. Sealed proposals, in duplicate, will be  
received at the office of the United States Recla-  
mation Service, at Reno, Nevada, until 2 o'clock  
P. M. July 15, 1904, for the construction of about 37  
miles of main distributing canals, involving about  
1,500,000 cubic yards of earthwork, with diverting  
dam, regulating gates, spillways, falls, weirs, and  
bridges, for the diversion and conveyance of about  
1,800 cubic feet of water per second from Carson  
River at a point about 4 miles west of Lettville,  
Nevada, to irrigable lands in Carson Sink Valley.  
Bids will be received on (A) Excavation and em-  
bankment for one or more divisions or all the  
work. (B) Headworks. (C) Falls, spillways,  
weirs, lateral headgates, and pipe drains. (D)  
Highway bridges. Specifications, form of pro-  
posal and particulars may be obtained after  
May 26, 1904, by application to L. H. Taylor, Reno,  
Nevada, and to the Chief Engineer of the Recla-  
mation Service, Washington, D. C., at whose offices  
the plans may be inspected. Each bid must be  
accompanied by a certified check of \$1,000, payable  
to the Secretary of the Interior, as a guaranty that  
the bidders will, if successful, promptly execute a  
satisfactory contract and furnish bond in the sum  
of 20 per cent for the faithful performance of the  
work. The right is reserved to reject any or all  
bids, to waive technical defects, or to accept one  
part of a bid and reject the other, as the interest  
of the service may require. Proposals must be  
marked, "Proposals for Distributing Canals,  
Truckee-Carson Project, Nevada." Bidders are  
invited to be present. THOS. RYAN,  
Acting Secretary.

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Chicago and return.... 72.50  
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Boston and return.... 109.50  
And Other Points.

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Sell July 10, 11, 13 and 14.  
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Sell August 8, 9 and 10.

All tickets good 90 days and good  
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Go one way and back another if  
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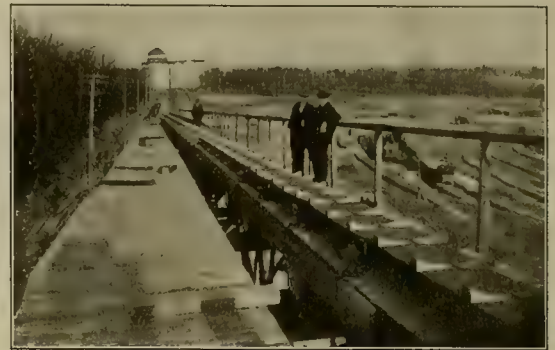
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Belts lighter, more flexible, more lasting. Runs without flexing. Negotiates steeper angles. Power required to overcome rolling friction only. Renewal cost one-half. Minimum power, wear and tear. Self-lubricating and dustproof throughout.

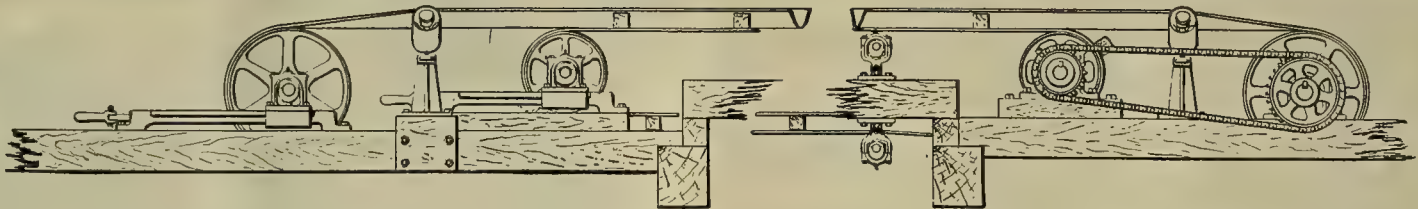


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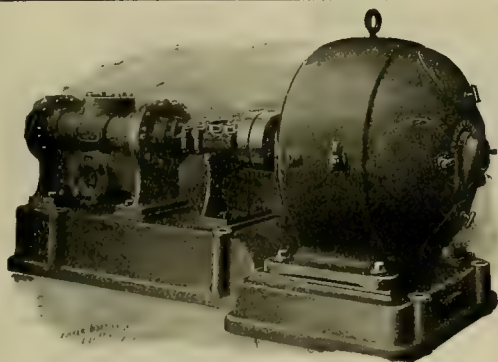


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**Motors**

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Duties in General.

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are Efficient, Economical  
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Los Angeles, Cal.: Douglas Building.

Denver Office: Kittredge Building.

Portland, Ore.: Worcester Building.



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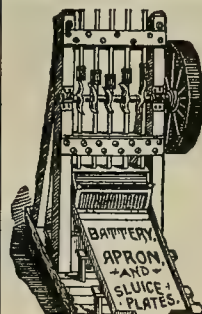
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GRAPHITE, Sulphur, Borax, Feldspar, Barytes, Fuller's Earth.  
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FOR MINING AND ORE DRESSING

**THE ROBERT AITCHISON PERFORATED METAL CO.**

305 DEARBORN ST. CHICAGO, ILL.



## BUYERS' CLASSIFIED DIRECTORY.

(CONTINUED FROM PAGE 30.)

## COAL.

Western Fuel Co., San Francisco.

## CONTRACTORS' SUPPLIES.

Atlantic Equipment Co., New York.  
Atlas Car & Mfg. Co., Cleveland, O.  
Carlin's Sons Co., Thomas, Allegheny, Pa.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Leschen & Sons Rope Co., A., St. Louis, Mo.

## COAL AND ORE HANDLING MACHINERY.

Allis-Chalmers Co., Chicago.  
Atlas Car & Mfg. Co., Cleveland, O.  
Bartlett & Snow Co., C. O., Cleveland, O.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Globe Iron Works, Stockton, Cal.  
Harron, Rickard & McCone, San Francisco.  
Hendy Machine Works, Joshua, San Francisco.  
Jeffrey Mfg. Co., Columbus, O.  
Leschen & Sons Rope Co., A., St. Louis, Mo.  
Link Belt Machinery Co., Chicago.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Ottumwa Iron Works, Ottumwa, Iowa.  
Power & Mining Machinery Co., Cudahy, Wis.  
Risdon Iron Works, San Francisco.  
Riverside Iron Works Co., Kansas City, Kansas.  
Robins Conveying Belt Co., New York.  
Union Iron Works, San Francisco.  
Vulcan Iron Works, San Francisco.  
Wellman-Seaver-Morgan Co., Cleveland, O.

## CONCENTRATORS.

Allis-Chalmers Co., Chicago.  
Atlas Car & Mfg. Co., Cleveland, O.  
American Concentrator Co., Joplin, Mo.  
Colorado Iron Works Co., Denver, Colo.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works, Denver, Colo.  
Frue Vanning Machine Co., San Francisco.  
Harron, Rickard & McCone, San Francisco.  
Hendrie & Bolthoff Mfg. Co., Denver, Colo.  
Hendy, Joshua, Machine Works, San Francisco.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Risdon Iron Works, San Francisco.  
Union Iron Works, San Francisco.  
Woodbury, Geo. E., San Francisco.

## CONVEYING MACHINERY.

Allis-Chalmers Co., Chicago.  
Bartlett & Snow Co., C. O., Cleveland, O.  
Broderick & Bascom Rope Co., St. Louis, Mo.  
Colorado Iron Works Co., Denver, Colo.  
Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works Co., Denver, Colo.  
Hallidie-Painter Tramway Co., San Francisco.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Mfg. Co., Columbus, O.  
Leschen & Sons Rope Co., A., St. Louis, Mo.  
Link Belt Machinery Co., Chicago.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Ottumwa Iron Works, Ottumwa, Iowa.  
Power & Mining Machinery Co., Cudahy, Wis.  
Power Installation Co., Buffalo, N. Y.  
Ridgway Belt Conveyor Co., New York.  
Riverside Iron Works Co., Kansas City, Kansas.  
Robins Conveying Belt Co., New York.  
Roebbing's Sons' Co., J. A., N. Y. and S. F.  
Stephens-Adamson Mfg. Co., Aurora, Ill.  
Trenton Iron Co., Trenton, N. J.  
Vulcan Iron Works, San Francisco.  
Wellman-Seaver-Morgan Co., Cleveland, O.

## CRANES.

Harron, Rickard & McCone, San Francisco.  
Marion Steam Shovel Co., Marion, O.  
Wellman-Seaver-Morgan Co., Cleveland, O.

## CRUSHING MACHINERY.

Allis-Chalmers Co., Chicago.  
American Concentrator Co., Joplin, Mo.  
American Eng. & Foundry Co., Los Angeles, Cal.  
Bradley Pulverizer Co., Boston, Mass.  
Braun Co., F. W., Los Angeles, Cal.  
Colorado Iron Works Co., Denver, Colo.  
Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works, Denver, Colo.  
Englebach Machinery Mfg. Co., Leavenworth, Colo.  
Fairbanks, Morse & Co., San Francisco.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Henshaw, Bulkley & Co., San Francisco.  
Jeffrey Manufacturing Co., Columbus, O.  
Kimpen Crusher & Pulverizer Co., Chicago.  
Kinkead Mill, San Francisco.  
Krogh Mfg. Co., San Francisco.  
Link Belt Machinery Co., Chicago.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Risdon Iron Works, San Francisco.  
Smith & Co., F. L., New York.  
Stroud & Co., E. H., Chicago.  
Sturtevant Mill Co., Boston, Mass.  
Sullivan Machinery Co., Chicago.  
Union Iron Works, San Francisco.  
Wellman-Seaver-Morgan Co., Cleveland, O.  
Woodbury, Geo. E., San Francisco.

## CRUCIBLES, GRAPHITE, ETC.

Braun Co., F. W., Los Angeles, Cal.  
Denver Fire Clay Co., Denver, Colo.  
Dixon, Crucible Co., Joseph, Jersey City, N. J.

## CUPEL MACHINES.

Braun Co., F. W., Los Angeles, Cal.  
Hoskins & Co., W., Chicago.

## CUTTING MACHINES.

Harron, Rickard & McCone, San Francisco.  
Hart Mfg. Co., Cleveland, O.

## CYANIDE.

Braun Co., F. W., Los Angeles, Cal.  
Roessler & Hasslacher Chemical Co., New York.

## CYANIDE PROCESSES.

Gold & Silver Ex. Co. of Am., Ltd., Denver, Colo.

## CYANIDE VAT EXCAVATORS, ETC.

Blaisdell Co., The, Los Angeles, Cal.

## DIAMOND DRILLS.

American Diamond Rock Drill Co., New York.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Standard Diamond Drill Co., Chicago.  
Sullivan Machinery Co., Chicago.

## DIAMOND DRILL CARBONS.

Baszanger & Co., J., New York.

## DRAFTING MATERIALS.

Buff & Buff Mfg. Co., Boston, Mass.  
Lallie Instrument Co., Denver, Colo.  
Leitz Co., A., San Francisco.

## DREDGING MACHINERY.

Bucyrus Co., South Milwaukee, Wis.  
Comstock & Co., H. G., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Globe Iron Works, Stockton, Cal.  
Jeffrey Manufacturing Co., Columbus, O.  
Krogh Mfg. Co., San Francisco.  
Leschen & Sons Rope Co., A., St. Louis, Mo.  
Link Belt Machinery Co., Chicago.  
Marion Steam Shovel Co., Marion, O.  
Risdon Iron Works, San Francisco.  
Riverside Iron Works Co., Kansas City, Kansas.  
Stockton Iron Works, Stockton, Cal.  
The Automatic Shovel Co., Lorain, O.  
Vulcan Iron Works Co., Toledo, O.

## DRIERS (MECHANICAL).

Bartlett & Snow Co., C. O., Cleveland, O.  
Colorado Iron Works, Denver, Colo.  
Denver Engineering Works, Denver, Colo.  
Harron, Rickard & McCone, San Francisco.  
Mine & Smelter Supply Co., Denver, Colo.  
Ruggles-Coles Eng. Co., New York and Chicago.

## DRILLS (CORE).

American Diamond Rock Drill Co., New York.  
American Well Works, Aurora, Ill.  
Davis Caryl Drill Co., New York.  
Harron, Rickard & McCone, San Francisco.  
Standard Diamond Drill Co., Chicago.  
Sullivan Machinery Co., Chicago.

## DRILLS (ROCK).

Allis-Chalmers Co., Chicago.  
American Well Works, Aurora, Ill.  
Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works, Denver, Colo.  
Gardner Electric Drill & Mach. Co., Cleveland.  
Jackson Electric Drill & Supply Co., Denver, Colo.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Ingersoll-Sergeant Co., New York.  
Jeffrey Mfg. Co., Columbus, O.  
Leyner, J. Geo., Denver, Colo.  
Marvin Electric Drill Co., Binghamton, N. Y.  
Mine & Smelter Supply Co., Denver, Colo.  
Rand Drill Co., New York.  
Redfield Drill Co., Denver, Colo.  
Rix Compressed Air & Drill Co., San Francisco.  
Shaw, C. H., Pneumatic Tool Co., Denver, Colo.  
Sullivan Machinery Co., Chicago.  
Traylor, Samuel W., New York.  
Wood Drill Works, Paterson, N. J.

## DRILLS (RATCHET).

Harron, Rickard & McCone, San Francisco.

## DRILL SHARPENERS.

Compressed Air Machinery Co., San Francisco.  
Harron, Rickard & McCone, San Francisco.

## DRILLING MACHINES.

American Well Works, Aurora, Ill.  
Columbia Driller Mfg. Co., New Kensington, Pa.  
Harron, Rickard & McCone, San Francisco.  
Keystone Driller Co., Beaver Falls, Pa.

## ELECTRO-DEPOSITING DYNAMOS.

Holtzer-Cabot Elect. Co., Boston, Mass.

## ENGINES (GAS AND GASOLINE).

Allis-Chalmers Co., Chicago.  
American Well Works, Aurora, Ill.  
Columbus Machine Co., Columbus, O.  
Corliss Gas Engine Co., Inc., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Economist Gas Engine Co., San Francisco.  
Fairbanks, Morse & Co., Chicago.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Hercules Gas Engine Works, San Francisco.  
Mietz, A., New York.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Union Gas Engine Co., San Francisco.  
Westinghouse Electric & Mfg. Co., Pittsburg, Pa.  
Wellman-Seaver-Morgan Co., Cleveland, O.

## ENGINES (HOISTING).

Allis-Chalmers Co., Chicago.  
Bartlett & Snow Co., C. O., Cleveland, O.  
Brown Corliss Engine Co., Corliss, Wis.  
Carlin's Sons Co., Thomas, Allegheny, Pa.  
Colorado Iron Works Co., Denver, Colo.  
Columbus Machine Co., Columbus, O.  
Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works Co., Denver, Colo.  
Fairbanks, Morse & Co., Chicago.  
Flory Mfg. Co., S., Bangor, Pa.  
Fulton Engine Works, Los Angeles, Cal.  
Fulton Iron Works, San Francisco.  
General Electric Co., Schenectady, N. Y.  
Globe Iron Works, Stockton, Cal.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Mfg. Co., Columbus, O.  
Krogh Mfg. Co., San Francisco.  
Leyner, J. Geo., Denver, Colo.  
Lidgerwood Mfg. Co., New York.  
Link Belt Machinery Co., Chicago.  
Mietz, A., New York.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Ottumwa Iron Works, Ottumwa, Iowa.  
Power & Mining Machinery Co., Cudahy, Wis.  
Risdon Iron Works, San Francisco.  
Riverside Iron Works Co., Kansas City, Kansas.  
Rix Compressed Air & Drill Co., San Francisco.  
Robins Conveying Belt Co., New York.  
Stockton Iron Works, Stockton, Cal.  
Union Gas Engine Co., San Francisco.  
Union Iron Works, San Francisco.  
Wellman-Seaver-Morgan Co., Cleveland, O.  
Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

## ENGINES (STATIONARY STEAM).

Allis-Chalmers Co., Chicago.  
Bartlett & Snow Co., C. O., Cleveland, O.  
Brown Corliss Engine Co., Corliss, Wis.  
Carlin's Sons Co., Thomas, Allegheny, Pa.  
Colorado Iron Works Co., Denver, Colo.  
Columbus Machine Co., Columbus, O.  
Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works Co., Denver, Colo.  
Fairbanks, Morse & Co., Chicago.  
General Electric Co., Schenectady, N. Y.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Mfg. Co., Columbus, O.  
Krogh Mfg. Co., San Francisco.  
Link Belt Machinery Co., Chicago.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Ohmen Engine Works, San Francisco.  
Ottumwa Iron Works, Ottumwa, Iowa.  
Risdon Iron Works, San Francisco.  
Rix Compressed Air & Drill Co., San Francisco.  
Robins Conveying Belt Co., New York.  
Sullivan Machinery Co., Chicago.  
Traylor, Samuel W., New York.  
Union Gas Engine Co., San Francisco.  
Union Iron Works, San Francisco.  
Wellman-Seaver-Morgan Co., Cleveland, O.  
Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

REMEMBER,  
Leviathan Belting

may be subjected to the most excessive conditions, be they heat, steam or moisture, without injury. NO PARTS TO SEPARATE.

WILL OUTWEAR TWO RUBBER BELTS.

MAIN BELTING COMPANY,

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Philadelphia, Boston, Buffalo.

CONVEYORS  
and  
ELEVATORS.

24 IN. INVERTED SYPHON.

Wheeler Patent  
Continuous  
Wooden Stave Pipe.

For any purpose for which  
Cast Iron is used.

For Mining Construction it is cheaper than high  
treble flumes, and many times as durable. No ex-  
pense for maintenance.

1 to 10 feet diameter. Pressure to 130 pounds  
per square inch.

Estimates Furnished. Catalogue on Request.

## National Wood Pipe Company,

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SAN FRANCISCO OFFICE, 301 Market Street.

**I** BELIEVE that in general the publisher is anxious that his paper shall pay the advertiser, because, otherwise he cannot expect to hold him. It is, therefore, of the utmost importance that the purchaser of space should know exactly what he may expect, and if there is the least suspicion that it will not pay, the publisher should be the first to point it out. He may lose an advertiser, but he will win a friend, which may sometimes be of equal value. In the scramble to secure business some publishers may lose sight of the fact that not to everyone can they be of value, and find, later, that reports are rife that their paper is not a payer. To go a step further, I do not know any reason why publishers should not pick out their customers same as the advertiser picks out his papers—by the showing in the way of returns.—F. A. SOUTHWICK.

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Furnace Products--

gold, silver and copper.

Best prices. Prompt settlements.

## National Metal Co.

120 Liberty Street, New York.

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## Tacoma Smelting Company,

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COPPER MATTE AND FURNACE PRODUCTS.

Tacoma, Washington.

**YOU  
SHOULD BE  
REGISTERED.**

**WHATEVER YOUR SPECIALTY,**  
Whether mining, hydraulic, mechanical, civil or electrical engineering; chemistry, assaying or metallurgy, we invite you to register with us that we may know your qualifications, location and terms. We need men to make investigations in all sections, and are also called upon to furnish reliable parties to fill permanent positions. W. U. Code used.

**ASSOCIATED SECURITY COMPANY,**  
BYRON S. COTES, President, 10 Wall St., New York.  
W. S. BLACKMER, Sec'y & Treas.

(CONTINUED ON PAGE 34.)



# LINK-BELT

**TROUGHING IDLERS  
ARE EQUIPPED WITH  
BALL BEARING ROLLS.  
The Belt Itself**

is the vital and costly part of a belt conveyor and even the most costly belt is quickly destroyed by frictional resistance from its supporting rolls.

**WE MAKE THE ONLY TROUGHING IDLERS EQUIPPED WITH BALL BEARINGS,**

which reduce this resistance to an insignificant factor.

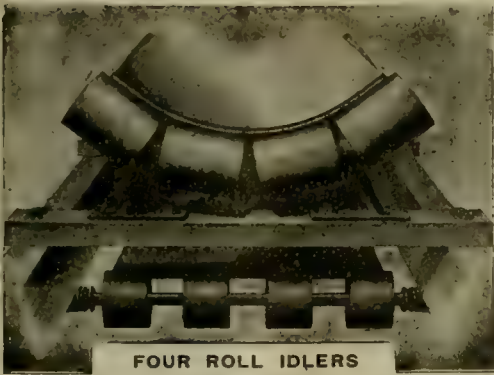
Consequently our belt conveyors consume less power and the belts last longer than when any other type of roll is employed.

**PERMIT US TO SUBMIT PLANS AND ESTIMATES COVERING YOUR WORK.**

**LINK-BELT MACHINERY CO.**

DENVER OFFICE: 922 17th St.  
A. E. Lindrooth, Mgr.

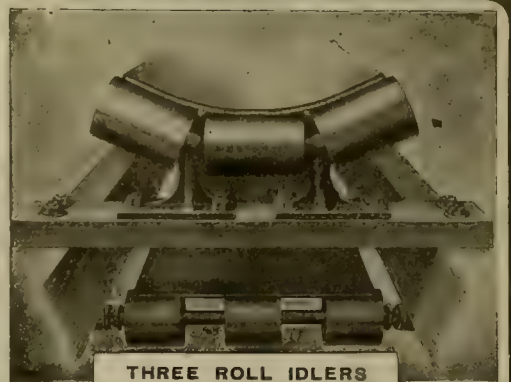
CHICAGO



**FOUR ROLL IDLERS**  
(For Wide Belts).

THE POSITIONS OF THE ROLLS CONFORM AS NEARLY AS POSSIBLE TO A NATURAL AND UNIFORM CURVE.

The fibre stress resulting from abrupt bends rapidly destroys the best belt.



**THREE ROLL IDLERS**  
(For Medium Belts).

BY DEEP TROUGHING, DURABILITY IS SACRIFICED TO CAPACITY.

**OUR SHALLOW TROUGH BELT CONVEYORS**

have no larger capacities than is consistent with sound economy.

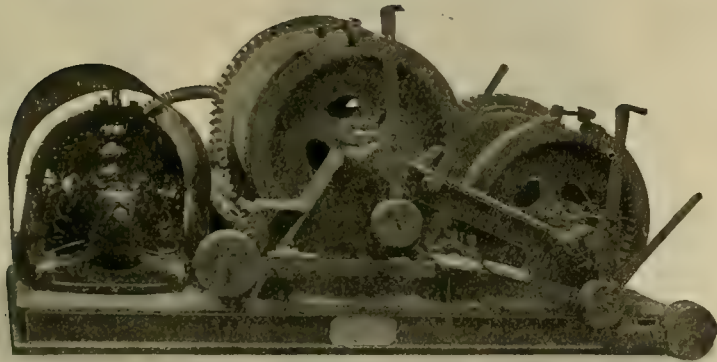
## FULTON ENGINE WORKS,

Cor. No. Main St. and Alhambra Ave.

**Los Angeles, Cal.**

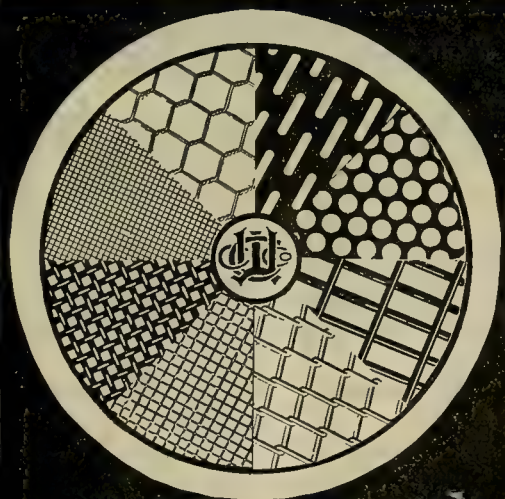
BUILDERS OF

**Steam Hoists,  
Electric Hoists,  
Belted Hoists,  
Horse Whims,  
Hand Winches.**



DOUBLE DRUM ELECTRIC HOIST.

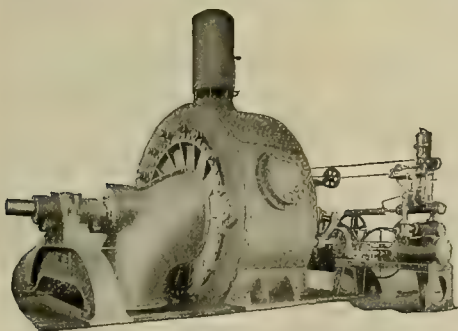
ALL STRICTLY MODERN DESIGNS.



SAN FRANCISCO, CHICAGO,  
NEW YORK, BOSTON, CLINTON MASS.

**Wire Cloth and Perforated Metal  
For Mining and All Other Purposes.**  
OUR "CLINTON" BRAND of STEEL, BRASS and COPPER MINING CLOTH is UNEXCELLED for DURABILITY, ACCURACY of MESH, DOUBLE CRIMP and RIGIDITY.— WE ALSO MANUFACTURE POULTRY NETTING, FENCING, WINDOW SCREEN CLOTH, ELECTRICALLY-WELDED WIRE FABRICS FOR CONCRETE CONSTRUCTION, WIRE LATH FOR FIRE PROOFING, GALVANIZED CLOTH, ETC.— WE GUARANTEE OUR GOODS, MAKE PROMPT SHIPMENTS, AND LOW PRICES.  
**CLINTON WIRE CLOTH COMPANY.**

## SAMSON TURBINE



The illustration shows the large NIAGARA design, HORIZONTAL SHAFT TURBINES recently installed by us for the TELLURIDE POWER TRANSMISSION CO. power station, Logan, Utah. Tests conducted by competent engineers developed as follows:

Head.	Gateage.	Speed.	H. P.	Generator Eff'cy.	Turbine Eff'cy.
211.5 ft. ....	1-2 .....	400 r. p. m. ....	1038 .....	.952% .....	.738% .....
209.7 ft. ....	3-4 .....	400 r. p. m. ....	1560 .....	.965% .....	.8359% .....
208.9 ft. ....	Full .....	400 r. p. m. ....	1677 .....	.967% .....	.8057% .....

These results have never been equaled by any turbine of the Horizontal Shaft Design, operating under equally HIGH HEADS. The test was made after turbines were installed in position, direct coupled to Generators. Francis' weirs and formulae for discharge were used. The original test reports on file at our offices. These turbines are all fitted with our SAMSON BALANCED GATES.

Write Dept. "AA" for catalog.

**JAMES LEFFEL & CO., SPRINGFIELD, OHIO, U. S. A.**

HARRON, RICKARD & McCONE, San Francisco, Cal., Sales Agents for California, Nevada and Arizona.

**DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.**



## BUYERS' CLASSIFIED DIRECTORY.

(CONTINUED FROM PAGE 32.)

## ENGINEERS' INSTRUMENTS.

Buff & Buff Mfg. Co., Boston, Mass.  
Lallie Instrument Co., Denver, Colo.  
Leitz Co., A., San Francisco.

## ELECTRICAL MACHINERY SUPPLIES.

Akron Electrical Mfg. Co., Akron, O.  
Crocker-Wheeler Co., Amper, N. J.  
General Electric Co., Schenectady, N. Y.  
Hendrie & Bolthoff Mfg. Co., Denver, Colo.  
Hendy, Joshua, Machine Works, San Francisco.  
Holtzer-Cabot Elec. Co., Boston, Mass.  
Jeffrey Mfg. Co., Columbus, O.  
Link Belt Machinery Co., Chicago.  
Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

## ELECTRICAL INSTRUMENTS.

Akron Electrical Mfg. Co., Akron, O.  
Weston Electrical Inst. Co., Newark, N. J.

## EXPLOSIVES.

Masurite Explosive Co., New York.

## EXCAVATORS.

Bucyrus Co., South Milwaukee, Wis.  
Hendy, Joshua, Machine Works, San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Jeffrey Mfg. Co., Columbus, O.  
Leschen & Sons, A., St. Louis, Mo.  
Marion Steam Shovel Co., Marion, O.  
Risdon Iron Works, San Francisco.  
Thew Automatic Shovel Co., Lorain, O.  
Vulcan Iron Works Co., Toledo, O.

## FANS (MINE VENTILATING).

Allis-Chalmers Co., Chicago.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Link Belt Machinery Co., Chicago.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Ottumwa Iron Works, Ottumwa, Iowa.  
Power & Mining Machinery Co., Cudahy, Wis.  
Riverside Iron Works Co., Kansas City, Kansas.  
Sullivan Machinery Co., Chicago.

## FEED WATER HEATERS.

Allis-Chalmers Co., Chicago.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Riverside Iron Works Co., Kansas City, Kansas.

## FILTER PRESSES.

Perrin & Co., Wm., Chicago.  
Harron, Rickard & McCone, San Francisco.

## FIRE BRICK AND CLAY.

Braun Co., F. W., Los Angeles, Cal.  
Denver Fire Clay Co., Denver, Colo.  
Mine & Smelter Supply Co., Denver, Colo.  
Western Fuel Co., San Francisco.

## FLEXIBLE SHAFTS.

Stow Flexible Shaft Co., Philadelphia, Pa.

## FURNACES (ROASTING).

Allis-Chalmers Co., Chicago.  
Colorado Iron Works Co., Denver, Colo.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works, Denver, Colo.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Riverside Iron Works Co., Kansas City, Kansas.  
Union Iron Works, San Francisco.

## FURNACES (SMELTING).

Allis-Chalmers Co., Chicago.  
Colorado Iron Works Co., Denver, Colo.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Denver Engineering Works Co., Denver, Colo.  
Dow Pumping Engine Co., G. E., San Francisco.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Power & Mining Machinery Co., Cudahy, Wis.  
Union Iron Works, San Francisco.

## GAS ENGINE IGNITERS.

Holtzer-Cabot Elec. Co., Boston, Mass.

## GEARINGS.

Chrome Steel Works, Brooklyn, N. Y.  
Pacific Gear & Tool Co., San Francisco.  
Riverside Iron Works Co., Kansas City, Kansas.

## GOVERNORS.

Replique Governor Works, Akron, O.  
Riverside Iron Works Co., Kansas City, Kansas.

## GRAB BUCKETS.

Jeffrey Mfg. Co., Columbus, O.  
Wellman-Seaver-Morgan Co., Cleveland, O.

## GREASE CUPS.

Crane Co., Chicago.  
Crosby Steam Gauge & Valve Co., Boston, Mass.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Lunkheimer Co., Cincinnati, O.  
Powell Co., Wm., Cincinnati, O.

## GRINDING MILL MACHINERY.

Allis-Chalmers Co., Chicago.  
American Concentrator Co., Joplin, Mo.  
Bradley Pulverizer Co., Boston, Mass.  
Carlin's Sons Co., Thomas, Allegheny, Pa.  
Compressed Air Machinery Co., San Francisco.  
Davis, F. M., Iron Works Co., Denver, Colo.  
Fairbanks, Morse & Co., Chicago.  
Harron, Rickard & McCone, San Francisco.  
Henshaw, Bulkeley & Co., San Francisco.  
Kinkhead Mill, San Francisco.  
Krogh Mfg. Co., San Francisco.  
Mine & Smelter Supply Co., Denver, Colo.  
Moore & Co., Chas. C., San Francisco.  
Smidth & Co., F. L. New York.  
Sturtevant Mill Co., Boston, Mass.

## HAULAGE MACHINERY.

Atlas Car & Mfg. Co., Cleveland, O.  
Colorado Iron Works Co., Denver, Colo.  
Hendy, Joshua, Machine Works, San Francisco.  
Jeffrey Mfg. Co., Columbus, O.  
Leschen & Sons Rope Co., A., St. Louis, Mo.  
Ottumwa Iron Works, Ottumwa, Iowa.  
Riverside Iron Works Co., Kansas City, Kansas.  
Roebling's Sons Co., J. A., New York.  
Trenton Iron Co., Trenton, N. J.  
Vulcan Iron Works, San Francisco.  
Wellman-Seaver-Morgan Co., Cleveland, O.

## HEAD PROTECTORS.

Vajen-Bader Co., Indianapolis, Ind.

## HAMMERS (POWER).

Beaudry & Co., Boston, Mass.  
Harron, Rickard & McCone, San Francisco.  
Howlett, J. C., Machine Works, San Francisco.

## HOISTS.

Mietz, A., New York.  
Yale & Towne, New York.

## HYDRAULIC ELEVATORS.

Bouse Co., The, San Francisco.  
Davis, H. W., East Auburn, Cal.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Risdon Iron Works, San Francisco.

## HYDRAULIC MINING MACHINERY.

Bouse Co., The, San Francisco.  
Bucyrus Co., South Milwaukee, Wis.  
Compressed Air Machinery Co., San Francisco.  
Harron, Rickard & McCone, San Francisco.  
Hendrie & Bolthoff Mfg. Co., Denver, Colo.  
Hendy, Joshua, Machine Works, San Francisco.  
Krogh Mfg. Co., San Francisco.  
Marion Steam Shovel Co., Marion, O.  
Peltion Water Wheel Co., San Francisco.  
Risdon Iron Works, San Francisco.  
Riverside Iron Works Co., Kansas City, Kansas.  
Union Iron Works, San Francisco.  
Vulcan Iron Works, San Francisco.

## ICE MACHINES.

Aultman Co., Canton, O.  
Riverside Iron Works Co., Kansas City, Kansas.  
Vulcan Iron Works, San Francisco.

## INDICATORS.

Harron, Rickard & McCone, San Francisco.  
Riverside Iron Works Co., Kansas City, Kansas.  
Robertson & Sons, Jas. L., New York.

## INJECTORS.

American Injector Co., Detroit, Mich.  
Crane Co., Chicago.  
Harron, Rickard & McCone, San Francisco.  
Hendy, Joshua, Machine Works, San Francisco.  
Lunkheimer Co., Cincinnati, O.  
Penberthy Injector Co., Detroit, Mich.  
Riverside Iron Works Co., Kansas City, Kansas.

## IRON CEMENT.

Western Repair & Supply Co., San Francisco.

## LAMPS (MINERS).

Anton, Geo., Monongahela City, Pa.  
Harron, Rickard & McCone, San Francisco.  
Ingersoll-Sergeant Drill Co., New York.

## LEAD (PIG).

Selby Smelting & Lead Co., San Francisco.

## LINK BELTING.

Brown, H. F., San Francisco.  
Jeffrey Mfg. Co., Columbus, O.  
Link Belt Machinery Co., Chicago.  
Riverside Iron Works Co., Kansas City, Kansas.

## LOADING MACHINES.

Christy Box Car Loader Co., Des Moines, Ia.  
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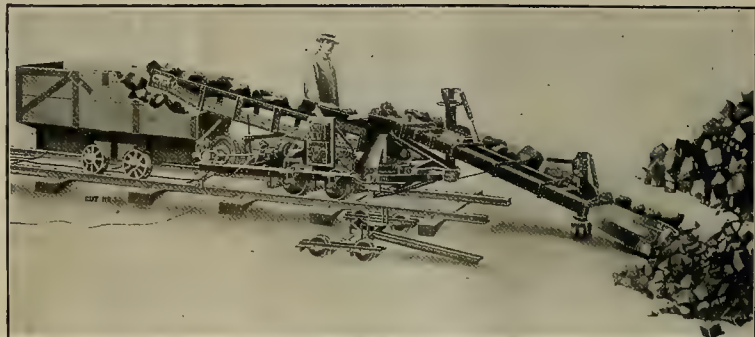
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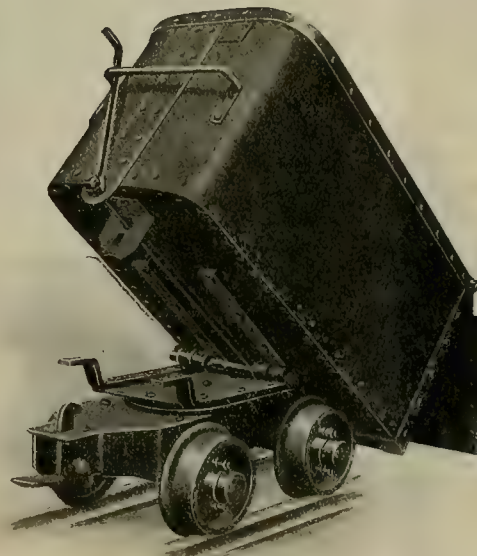
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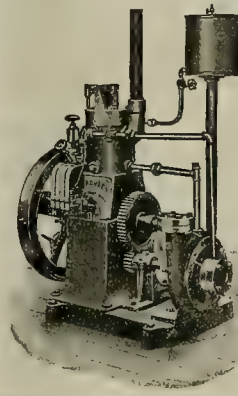
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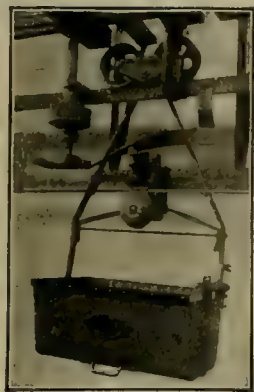
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(CONTINUED ON PAGE 36.)





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Any stock upon which this assessment shall remain unpaid on the 16th day of July, 1904, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of August, 1904, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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(CONTINUED FROM PAGE 34.)

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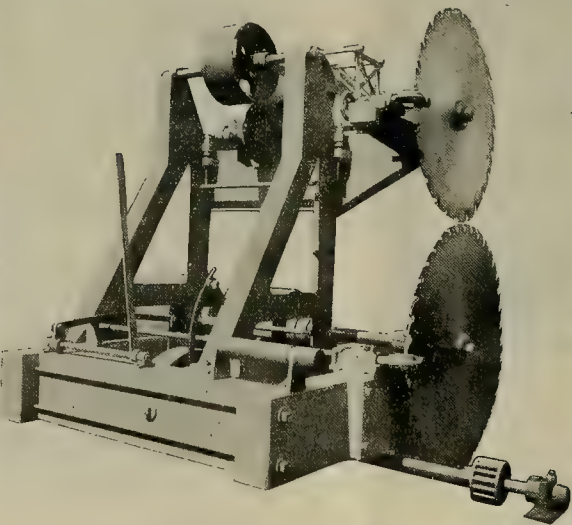
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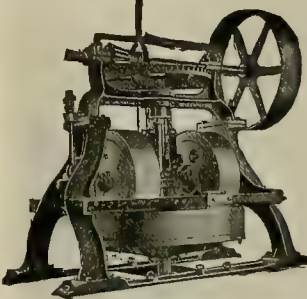
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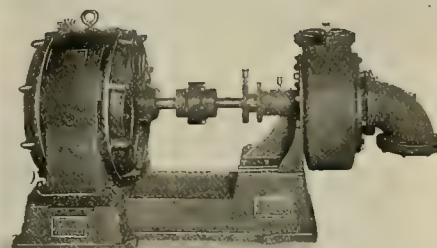
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(CONTINUED ON PAGE 38)



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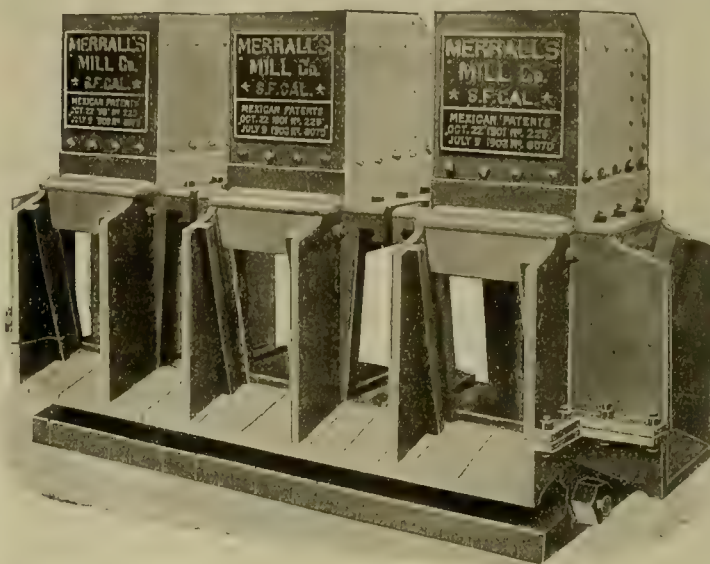
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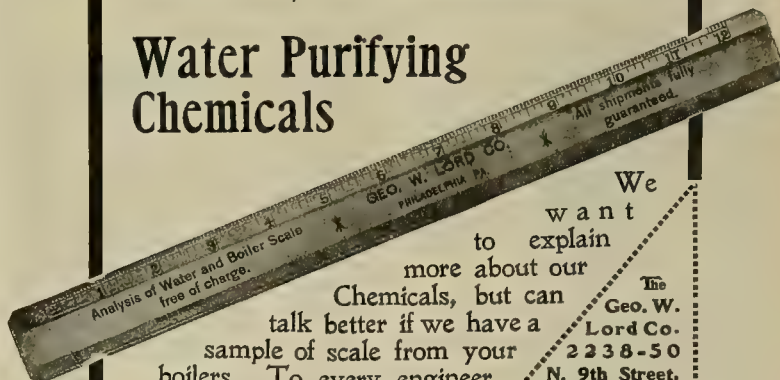
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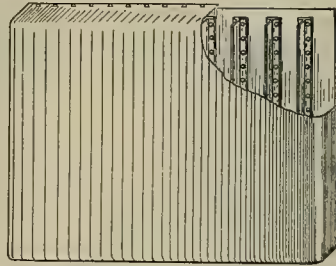
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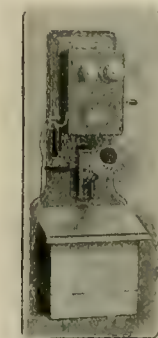


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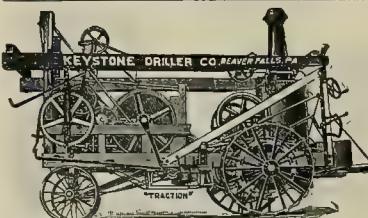
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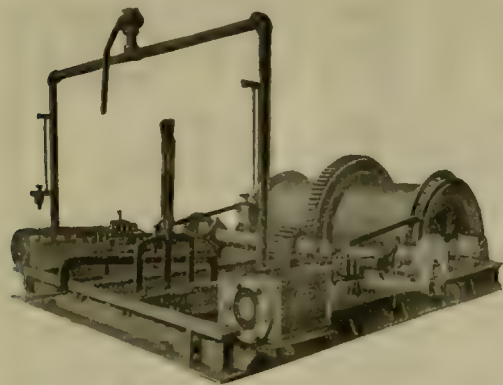
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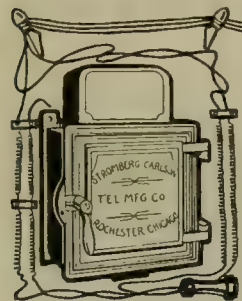


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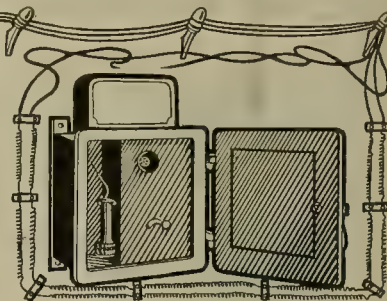
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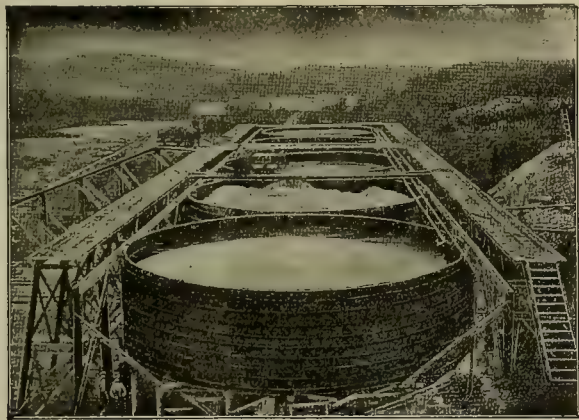
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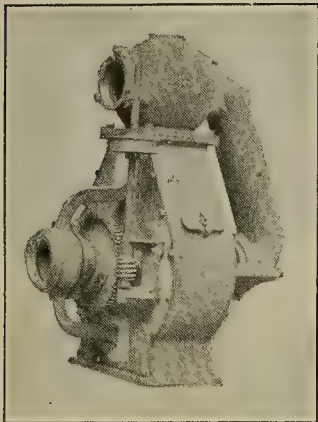
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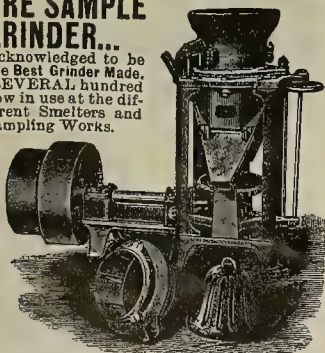
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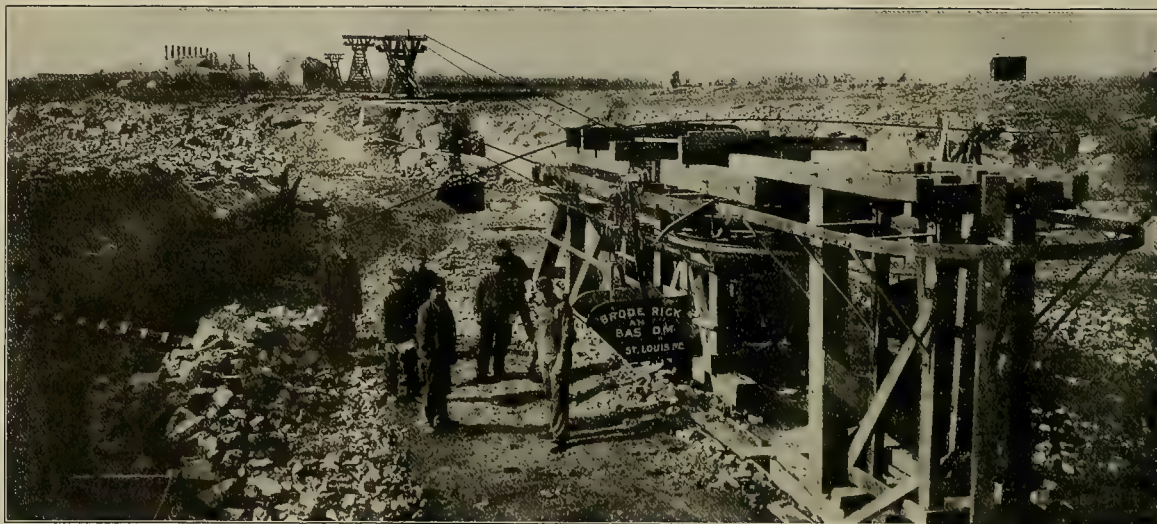
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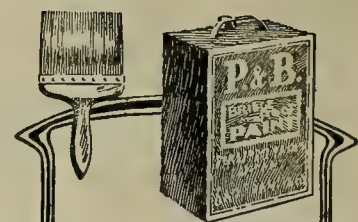
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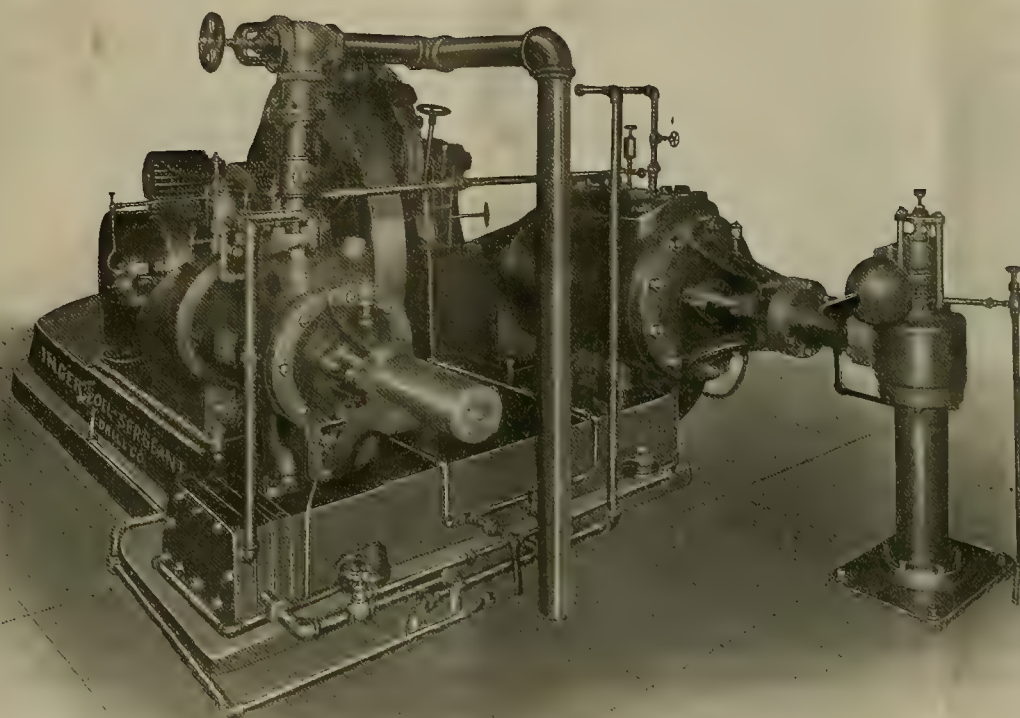
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## Mines That Do Not Go Down.

There is a strong prejudice in favor of fissure veins—those of illimitable depth, whose downward extent can never be bottomed by human ingenuity and persistent effort. The reason for this preference is not difficult to find, for some of the richest mines of the world are of this type. The Comstock lode of Virginia City, Nevada; the Ontario veins of Park City, Utah; the Silver King of Pinal county, Arizona; the Granite Mountain and Drum Lummon of Montana; the fissures of the gold mines of the central gold belt of California; the Smuggler-Union and Camp Bird mines of Colorado; the tin and copper producing veins of Cornwall, which have been continuously worked for centuries—these and many others are of distinct fissure type, and their output has formed a basis for the prejudice in their favor. But what of the blanket vein; the irregular deposit; the low lying vein, and the sheets of ore found at or near the contact of sedimentary beds and igneous intrusive rocks?

The mines of Leadville are mostly contact deposits in limestone; the ore bodies in the Cambrian formation in the Black Hills are nearly all flat sheets in sedimentary beds, often capping or lying near the summit of hills. The mines of the Missouri-Kansas lead-zinc field are irregular deposits in limestone, few of the mine workings being over 300 feet deep and

most of them less than 200 feet; the large and rich copper deposits of Bisbee and Globe, Arizona; the deposits of Cananea, Mexico; many of the mines in Salt Lake county, Utah, are similar to those of Leadville, Colorado. The noted Mount Morgan mine of Queensland, Australia, is not a fissure vein, but a great deposit occupying the upper portion of a hill and extending downward to what depth has not yet been determined. These flat and irregular deposits and veins have produced hundreds of millions of dollars in gold, silver, copper, lead and zinc, and they have, as a class, proven to be relatively more profitable when viewed from the standpoint of cost of equipment, development and operation than the deep fissure veins. Of course there are exceptions, among them being those veins so situated that they could be worked to great depth by means of adits. Veins thus fortunately situated may often be worked cheaper than flat veins, as gravity aids in reducing the cost of mining. The equipment of some deep fissure mines is elaborate and necessarily expensive where the mines are operated through shafts, for ventilation and drainage must be provided, and the hoisting engines are usually designed to raise heavy loads at high speed from a depth of 1000 to 4000 feet, and this requires expensive installation.

On the other hand the "mines which do not go down," but occur at or near the surface, require a minimum of expense in equipment, and are generally worked at a higher profit than the deep fissures going down thousands of feet below the surface.

The bedded veins and irregular deposits do not all occur at the surface, however, nor always outcrop, and in such instances they are as expensive to operate as the fissure or steeply inclined vein. There is little can be said against the bedded vein beyond the fact that it is usually of limited and known extent, but it possesses, as against this, the virtue of the capability of being worked out, and when the ore is exhausted the miner expends no money in what he knows must be a futile search for more ore.

**R**ARELY is a mill building constructed in mountainous regions where it is not necessary to do more or less grading before placing the machinery and proceeding with the construction of the building.

Various are the methods by which the grades are made. In some instances shovels, picks and wheel-

barrows are the principal tools employed; in others the magnitude of the operations justifies the employment of cars or wheeled scrapers. In a few instances, where the topography of the ground permitted it, and no buildings or other structures were near to be damaged by the operation, heavy blasts have been placed and thousands of cubic yards have been displaced and hurled down the slope at one time, thus saving much expense in shoveling and wheeling the earth and broken rock. The most inexpensive way to grade for buildings of this character, however, where conditions admit of it, is by piping the earth and loose rock away, as in hydraulic mining. One of the engravings on this page shows this work in progress at the Fairview mill, Trinity county, California, preparatory to extending the building and increasing the capacity of the mill by placing additional stamps. The stream of water, under heavy pressure, tears away the earth rapidly and carries it down the hill, out of the way, laying bare the underlying rocks, which may then be removed by blasting, if necessary, with the creation of a minimum amount of fines, and the rock broken used to advantage in forming a level space beyond the mill, the larger and more suitable pieces being reserved for walls.



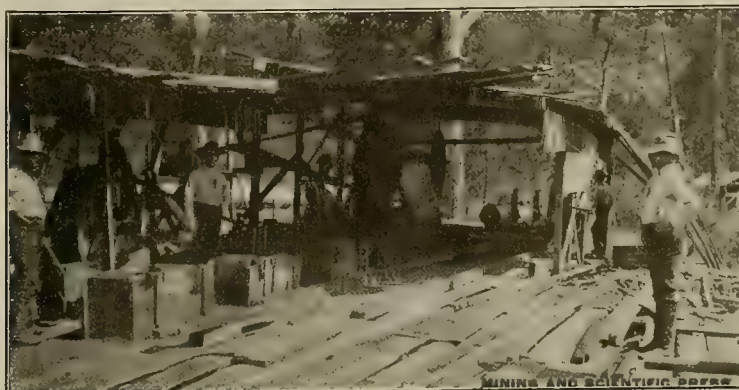
Fairview Mill, Trinity County, Cal.—(See Page 21.)



Grading by Hydraulic Process, Fairview Mill, Trinity County, Cal.



Entrance to Tunnel, Fairview Mine, Trinity County, Cal.—(See Page 21.)



Sawmill at the Fairview Mine, Trinity County, Cal.—(See Page 21.)



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THE mining districts of Mexico are complaining of a scarcity of native labor. This is something new for Mexico, and is an indication of the rapid development of her mineral districts under the new condition of things. The scarcity of labor in the mining districts is partly accounted for by the statement that the ranchers of the valleys are offering a higher wage rate than ever before for men to work on the haciendas, and as the majority of men prefer this sort of outdoor work to labor underground they desert the mountains for the valleys, despite the fact that the radical change in climate and altitude is in so many cases fatal to the lower class of Mexicans, for they cannot readily accommodate themselves to the climate of the "hot country." The cities teem with laborers who eke out a slender existence on the uncertain employments and low wages that such communities afford, but who will not willingly exchange city for country life under any circumstances.

RECENTLY some very interesting and possibly important experiments have been made in electro-metallurgy. Among these is the manufacture of steel direct from carbon-pig iron and scrap in an electric furnace of the induction type. This has not only been accomplished, but has been adopted as a satisfactory process and an economic success in Sweden. The process is described as being analogous to the crucible steel process, though possessing an advantage over the latter by reason of all deleterious gases being excluded from the melted charge. In France steel is made by electric process from scrap. Another innovation in electro-metallurgy is the estimation of gold in solutions containing it. By electric process, also, the manufacture of large amounts of silicon are now possible. As yet we are only in the experimental stage in electro-metallurgy. What the next decade may bring forth it is scarcely possible to anticipate, so great seem the possibilities of the future in the field of electricity.

## Evolution of Mining in Colorado.

In certain portions of Colorado many of the mines are shipping less ore than formerly to smelters, and this has led some to think that the mines were being exhausted and that the future of mining in Colorado would, in consequence, be limited to a few years, and then would practically cease altogether. How erroneous this conception of the mineral resources of Colorado is, is best appreciated by those most familiar with the resources of that State. There are still many districts in Colorado practically in their infancy, as yet developed to a comparatively slight degree, and it is assuming something improbable to say that no new districts remain to be discovered. With the extension of railways and the further construction of good roads and trails, many new districts remain to be discovered, and some other sections, long known to be mineral bearing, will be opened up. There are known to be large mineral veins in Eagle county, in the Holy Cross region, but nothing has been done with them for years. The region about Leadville still contains mineral resources not yet touched, and what is true of Lake and Eagle counties is true of almost every other mineral county in the State. Colorado has grown up out of a most fortunate condition as to the distribution and value of its surface ores—they were rich—and for years Colorado was known as the "poor man's country." This for two reasons: First, the ores were outcropping on the surface of the hills and mountains, and they were rich—often very rich. Second, the poor prospector, with no capital other than his tools and grub, and a determination to succeed, could dispose of a single sack of ore at the nearest smelter, and return to his prospect for another sack, increasing his shipments as his capital grew from ore sold.

This fortunate combination of circumstances—rich ore and custom smelters, which would buy ore in any amount—made Colorado what it is to-day, one of the greatest mining regions in the world. As years came and went the industry grew greater year by year and the smelters were enlarged to keep pace with the output of the mines, and while it is true that many mines no longer send the large amounts of ore to the smelter that they did formerly, the greatly increased number of shippers is accountable for the fact that the smelters are to-day handling more ore than ever before in their history. The reason for decrease in ore shipments from some of the mines to the smelters is due, not to failure of the mines, but to the fact that many of the larger mines are working at a greater depth, and though they still have abundant ore, it is of lower grade than formerly, and much of it is being treated in plants built at the mines. The development of a high class of concentrating machinery, making it possible to handle large tonnage at low cost, has made a great change in the destinies of many mines, where they are handling a far larger tonnage than formerly, but are concentrating five and ten into one, and only the concentrates are shipped. The introduction of the cyanide process, and its successful application to the treatment of base and low grade ores, has been another factor in diverting ore from the smelters to the plant of the company, or to local custom plants. Every mine manager strives to maintain the output of his property, while endeavoring at the same time to decrease cost, and where possible, this is being done by concentrating, cyaniding and otherwise treating the ore in works owned by the mines, instead of shipping, as formerly, to the smelters. But so long as no labor troubles interfere with the steady production of the mines, the smelters still have abundance of ore and will doubtless have for years to come.

A GREAT DEAL has been said in regard to the operation of dredgers in the valleys of California rivers, some claiming that the tailings (silt), a natural result of their work, is filling the channels and slowly rendering the navigation of the streams impossible. As a matter of fact the dredgers are working in interior ponds, not connected directly with the rivers. Others complain that the land over which the dredger has operated is ruined for all time, viewed from an agricultural standpoint. This latter assertion is doubtless true if no steps be taken to rejuvenate the land, but it seems an easy proposition to turn the river upon the lands which have been

dredged, and the sediment contained in the waters, as a natural result of mountain erosion, would settle over the barren cobbles and boulders and in a few years the valley would again become a prolific agricultural tract.

## How Some Mines Are Promoted.

One of the most serious drawbacks to the floating of new mining enterprises is the high valuation placed on a property of intrinsically small relative value. A prospect may be opened and developed until it becomes a mine having an actual net valuation of, say, \$100,000, with a prospective value of double that amount. The mine is bonded for, possibly, \$250,000 on the deferred payment plan, and then the proposition is incorporated and capitalized for, perhaps, \$5,000,000, with a million shares at \$5 each. The promoters take about 300,000 of these shares for their trouble and 400,000 shares are offered to the public at the low price of \$1 per share, the remaining 300,000 shares being placed in the treasury to be sold later, if necessary, to carry on development or to provide equipment, or to be absorbed by the promoters if the venture proves successful. Under the impression that stock offered at 20% of its face value must be a good investment, the public pays \$400,000 for a two-fifths interest in a mine having a doubtful though possible total value of \$200,000. The natural outcome of this method of procedure is numerous failures. Even if the property proves a success, viewed from the basis of its true valuation at the time of incorporation and promotion, it still may fall far short of realizing the expectations of the investors. The property may pay \$500,000 net profit, which would entitle it to be included among good mines; but the public who bought in on a basis of \$1,000,000 only receive 50 cents on the dollar on their investment, and, as far as they are concerned, the proposition is a failure. This is but a single instance of mine promotion, and with little change may represent any one of a large number of flotations. If mines were generally promoted on a more conservative basis, there would be more successes recorded, and the investing public would seek mining investments in preference to other stocks. In contrast to the above described method of mine promotion, some of the greatest producing and most profitable mines in the world are capitalized for amounts far below the dividends they have already paid. Of course, any mine making a good showing at the beginning may prove to be one of the bonanza mines, but in its early history this is usually only a possibility. Moreover, it is really not so much the capitalization of the proposition as the price at which investors buy into the enterprise that is to them the true measure of success or failure.

THE mill of the Tinton Company, at Tinton, in the Nigger Hill section of western Lawrence county, South Dakota, has the distinction of being the only concern in America at present crushing and concentrating tin ore. The ore occurs in large dikes of coarse granite (pegmatite) and is similar to that occurring in the Harney Peak region, 65 miles to the southeastward, and where a large amount of exploratory work has been done in similar dikes. Several mills have also been built in past years to treat this ore by concentration, but none of them continued in operation long after construction. At Tinton, however, it is stated that 100 tons of tin-bearing greisen are daily crushed and concentrated, the cassiterite to be shipped to Eastern works for reduction. The mill has been in continuous operation for several months, and is said to be a success. Thus far tin mining in the United States has not been a success. Whatever may have been the cause for cessation of operations in the southern Black Hills, in southern California, at the San Jacinto estate, it was undoubtedly partly due to insufficient development of the tin-bearing veins. Possibly if these latter mines were properly developed they might be made a profitable operation. At one time during the brief career of this company there were over 120 men on the payroll and but four men employed in the mine. The amount of ore in sight and accessible would not have kept a 5-stamp mill employed, and still an elaborate plant was built to treat ore not known to exist. It is enterprises conducted on this extravagant manner that make failures damaging to mining.



## CONCENTRATES.

CYANIDE PLANTS are operating in California in San Diego, Riverside, San Bernardino, Kern, Mariposa, Tuolumne, Calaveras, El Dorado, Placer, Nevada and Shasta counties, and possibly elsewhere not reported.

THE Land Commissioner decided some time since that forest reserves may be entered for the purpose of prospecting for mineral deposits therein, but the National parks, Yosemite and Yellowstone, and military reservations, are not included in this order.

THE length of belt in a coil may be estimated approximately by adding the diameter in feet of the hole in the center of the coil to the diameter in feet of the whole coil, multiplying this sum by the number of coils, and this product by 0.1309, which will give the number of feet in the coil.

THE average velocity of water in an ordinary ditch or flume is estimated to be about 80% to 84% of its maximum velocity. The average velocity is greater or less according to the character of the bottom and banks or sides of the ditch or flume and to the number and sharpness of the curves.

THE cheapest hydraulic mining reported in California was at a claim near Iowa Hill, Placer county, where gravel containing 3 cents per cubic yard is said to have yielded a profit. The gravel was easy washing, and with abundance of water a large amount was moved daily at minimum cost.

THE cost of a ditch varies with its size, and principally with the character of the material through which it is dug. The cost for large ditches carrying 2000 to 3000 miners' inches has ranged in California between \$5000 and \$8000 per mile. Where extensive fluming is included the cost will reach the higher figure.

IT is estimated that in a pipe line 4000 feet long with 4 inch diameter, delivering 26.6 miner's inches of water under a head of 140 feet, the friction is about equal to the head, and that to get power from such a line the pipe must be larger, which will admit of the same flow of water at decreased velocity and consequently less friction.

THE details of a tunnel flume 6 feet wide, 12 feet long and 32 inches deep is as follows: Eight posts 4x6 inches by 3 feet 2 inches long; four sills 4x6 inches by 8 feet long; six bottom planks 2x12 inches, 12 feet long; four side planks 1 1/2 inch by 16 inches, 12 feet long; two top rails 2x8 inches, 12 feet long; sixteen side braces 2x4 inches, 2 feet long.

THE displacement of rock formations by faults is not always at right angles to their strike. There is nearly always more or less lateral displacement as well, and this fact may deceive miners who are in search of the continuation of a faulted vein. Reverse faults are as common as normal faults. On the mother lode of California both normal and thrust faults occur, as well as faults at right angles to the strike of the veins.

WHEN the right of a claim owner to follow his vein on its dip beyond the side lines of his claim and under the surface territory of another is challenged, the claim owner must be able to show the apex of the vein within the surface boundaries of his claim to the extent necessary to cover the disputed segment of the vein; also to be able to establish the identity and continuity of the vein from its apex or outcrop to the point of dispute.

THE first Bessemer patent to make steel from iron by pneumatic process (bessemerizing) was issued in 1856, but the process did not come into practical use until years after. From 1866 to 1871 several attempts were made at bessemerizing copper mattes, but it was not before 1878 that the process of converting copper matte became a success, when it was accomplished by John Holloway at the Cammell Steel Works at Penistone, England.

CORUNDUM is an aluminous oxide and is next to the diamond in hardness. It is used chiefly as an abrasive in the form of emery, either powdered, in pressed blocks or in wheels. It is being largely displaced by the manufactured mineral called carborundum, which has a superior hardness and is more regular in composition, being free from foreign admixtures. Fine colored, transparent corundum is known as sapphire, oriental ruby, oriental topaz, etc.

MERCURY unites chemically and mechanically with many other elements. In the former combination they are known as chemical compounds, such as mercuric chloride (corrosive sublimate). The mechanical combinations of mercury with other elements are known as amalgams. Thus mercury combines with gold and silver forming amalgams. There are numerous other elements with which mercury amalgamates, thus there are sodium and potassium and zinc and tin amalgams.

TWO PER CENT cyanide solutions are rarely used in treating ores. It is more common to find the solutions

with a strength of 0.25% or 0.20%. The 2% solution is sometimes made and kept in stock and used to strengthen weak solutions to aid precipitation in the zinc boxes. The use of sodium cyanide is becoming more common. It is less expensive to manufacture than potassium cyanide and contains a larger amount of cyanogen. Most potassium cyanide contains more or less sodium cyanide.

THE various elements known to chemistry differ in their power to hold in combination other elements. Atoms of every element have the power of holding in combination atoms of one or more elements. This property is known as valence, and the valence of an atom is its capacity to hold in combination other atoms or groups of atoms. Thus water is composed of hydrogen 2 atoms and oxygen 1 atom. Oxygen is then said to have a valence of 2, as it requires 2 atoms of H. to balance 1 of O. By the use of this method all chemical symbols and formulae may be expressed and written.

SO FAR as known to "Concentrates," all attempts made to treat auriferous tailings from chlorination plants by cyanide process or by any other wet process, has thus far met with only moderate success, and in no case has a financial success been made. Such tailings consist largely of iron oxide and, if briquetted, would make suitable material for smelting, but these tailings are usually not located where they can be sent to a smelter and treated at a profit. A great deal of experimenting has been done on this class of material and many thousands of dollars spent in the effort to find a satisfactory solution of the problem of their treatment.

WIRE ROPES must not be coiled and uncoiled like hemp rope. When uncoiling a new rope not wound on a reel it should be rolled like a wheel along the ground, one end being first made fast. This will obviate the kinking of the rope. The same precaution should be observed when coiling up an old rope, if it is intended to use it again. Old hoisting ropes are often valuable for guys, power transmission and other uses. Wire rope which is to be placed under water or in a wet place should be treated with a compound made of one bushel of fresh slacked lime to one barrel of mineral or pine tar. Boil and apply hot.

By abandonment of a claim is meant intentional desertion of it. Forfeiture operates from failure to comply with the law. If a claim is abandoned by a locator, it is supposed to be immediately open to relocation, but to insure against future legal complications, in the event of the claim becoming valuable, it would be wise to get a bill of sale from the original locator, or wait until his right expires under the forfeiture law. Otherwise, in the event of the newcomer making valuable developments, the original proprietor may undertake to reassert his rights and be able to "prove" that he had no intention of abandoning the claim, and that it was not subject to relocation.

FOR convenience in the determination of minerals a scale of fusibility has been arranged as follows: 1. Stibnite (antimony sulphide), fusible in candle flame in coarse splinters. 2. Natrolite (a sodium aluminum silicate), fusible in a candle flame in fine splinters; easily fused before the blowpipe in coarse fragments. 3. Almandite (iron alumina garnet), infusible in candle flame, but fusible before the blowpipe in coarse fragments. 4. Actinolite (variety of amphibole), less fusible than almandite; fusible before the blowpipe in coarse splinters. 5. Orthoclase (potash feldspar), fusible before blowpipe in fine splinters. 6. Bronzite (rhombic pyroxene), only rounded on the edges in very fine splinters.

WHEN a diamond drill hole is started horizontally it invariably drifts upward, though its alignment may be straight. The amount of departure from a horizontal line varies with the character of the rock somewhat, and also to some extent with its dip. A hole started horizontally, at a distance of 440 feet from the point of beginning had drifted upward 16 feet, and at 540 feet was 24 feet above the datum line. The line of drift of the cutting bit moves in curve, having a constantly changing radius. These radii are of constantly decreasing length as the hole progresses, though what it would ultimately become if it were not for the binding of the pipe line in the drill hole has never been determined.

WHEN gold bearing zinc precipitates are to be smelted the following are said by an authority to make satisfactory charges: For clean precipitates (auro-cyanides): Precipitate 15 parts; bi-carbonate soda 7.5 parts; borax (fused) 4 parts; sand 2.5 parts. For precipitates containing much zinc: Precipitate 15 parts; bi-carbonate soda 7.5 parts; borax 6 parts; sand 2.5 parts. For sandy precipitates: Precipitate 15 parts; bi-carbonate soda 10 parts; borax 5 parts; fluor spar 1 part. The melting is done in black lead crucibles. Furnaces in which large charges of zinc precipitates are melted should have specially constructed flues leading to condensing chambers, as the volatile metals carry off considerable gold during the melting process.

IT is said to be the intention of the Government to convert the Grand canyon of the Colorado river in Arizona and the surrounding territory into a national park to prevent vandalism and to prohibit any person or corporation from assuming exclusive rights and privileges. There are some mineral deposits in the canyon in the

neighborhood of Cataract canyon, but it is doubtful if they are sufficiently valuable to be operated under the existing conditions, as they are nearly 5000 feet below the rim of the canyon and only accessible by narrow, steep and tortuous trails. Power might be derived from the river, but the cost of installation is almost prohibitive and not justified by the extent and value of the mineral deposits.

IT has never been satisfactorily explained why, when an explosion of nitroglycerine or powder occurs at the plants where they are manufactured, and the explosive is scattered about in several warehouses, tanks, etc., in the various stages of its manufacture, and these repositories often separated by several hundred feet, the entire amount is not at once exploded as a result of the shock, but repeated experience has shown at several powder works that when the initial explosion occurs, whether in the mixing house, in a warehouse, or elsewhere, there is usually a series of explosions, separated by an interval of several seconds, sometimes of sufficient duration to allow workmen to escape injury by running immediately after the first explosion.

A "WIND SAIL" for mine ventilation will be of little value unless made of a liberal size. Less than 40 square feet of surface seldom accomplishes the desired results, and, unless the velocity of the wind be more than 15 miles per hour, a larger sail is recommended. The pipe leading into the mine should not be less than 6 inches in diameter. The pipe may be made of drilling, held open by rings sewed either on the outside or inside of the pipe. Where continuous or daily winds can not be depended upon, a furnace may be connected with the ventilating pipe and the air drawn from the surface by this means. These ventilating furnaces are useful in proportion to their size and the completeness of the pipe system. This device operates by drawing the foul air from the mine. The water-blast is often employed to advantage in ventilation. Its operation is the reverse of the furnace, as the fresh air is driven into the mine, diluting and forcing the foul air out.

IN gold milling practice too much water may be used, as well as too little. In either case the best results cannot be obtained on the amalgamating plates. If too little water, the pulp will not be readily discharged from the battery, and on the plates the particles will not be as free to sink to the amalgamating surface. If too much water, the tendency is to scour the plates. On concentrators of the Frue type a lack of water is more easily remedied than a surplus, as clear water is always added at the head of the machine—a surplus of water will carry values over the foot of the machine. Where a surplus of water is necessary in the battery, owing to the character of the ore, and the amount floods the concentrators, a portion of the water may be cut out by passing the pulp from the plates into hydraulic separators (pointed boxes), running the overflow either to special machines or to a canvas plant, and the coarser material from the bottom may then go direct to the concentrator.

PLACER gold is rarely pure, nearly always occurring as an alloy. Its value per ounce is influenced by the character of the gold in the vein or deposit from which it was derived. Some Montana gold is worth but \$12 to \$14 per ounce. In other districts it is higher grade. The Black Hills, S. Dak., placer gold seldom is worth less than \$18.50 per ounce, and sometimes more. The placer gold found at Virginia City was worth but \$11 to \$12 per ounce, the gold being alloyed with silver. The further the gold is found from its source the higher grade it usually is, and when gold has been redeposited several times it seems to go through a sort of refining process. The bullion of the Homestake veins at Lead, S. D., is worth about \$17 per ounce. The placer gold in the ancient shore gravels at the base of the Cambrian, near Lead and Central City, is worth about \$18 per ounce, and that in the recent gulches which derived their gold from the conglomerate is worth about \$18.50 per ounce. The placer gold in the Juarez district in the northern part of Lower California is almost pure, and sells for \$20 per ounce.

VISIBLE GOLD often is found with pyrite, more commonly with arsenical pyrite, and sometimes with galena, zincblende and copper pyrites. Gold has also been observed with native copper, in sulphur, in marble, in garnet, in hornblende, in mica, in feldspar, in baryta, in jasper or flint, in black oxide of manganese, in sandstone, in various lavas (andesites, etc.) where occurring in veins and deposits. In Colusa county, Cal., were discovered a number of pieces of siliceous rock, apparently sinter, the outer portion of which was sprinkled with gold. (A specimen of this rock may be seen at the museum of the California State Mining Bureau in San Francisco.) Gold also occurs in visible grains in dikes of diorite, felsite, quartz-porphry, granite, and in many other rocks, both intrusive and metamorphic. It is also associated with cinnabar, but more commonly with iron and silica than with any other minerals. In view of the wide distribution of gold and its many associations, prospectors should carefully investigate every reef and outcrop, regardless of theory or previous experience. Those who go prospecting in search of a vein of definite size, appearance and character are more likely to be disappointed than they who have no prejudice, and this is one reason why "tenderfeet" have found some of the most noted mines.



## The Fairview Mine, Trinity County, Cal.

Written for the MINING AND SCIENTIFIC PRESS by  
SAMUEL C. WIEL.

The last report of the State Mineralogist (1896) gives a list of about eighty quartz mines and just 100 stamps dropping in Trinity county. Two years later, in 1898, the State Mineralogist's Register showed 160 quartz mines. This great increase has not ceased in Trinity county, and the Fairview, near Minersville, is an example of it and of the rapidity with which mines are opened in this State.

The Fairview was taken up by the present company and the work of opening it up was begun only three years ago. This property was first examined by Joseph H. Porter, then in charge of the Altoona quicksilver mines at Cinnabar. It is located on the Trinity river, almost  $1\frac{1}{2}$  mile below Minersville. There the river is about 250 feet wide and runs in a broad canyon whose sides, heavily wooded, rise 1000 feet on the east and west. The situation is typical of California scenery, as shown in the engraving, page 17. There is the snow-tipped Salmon range in the distance, the heavy forests, the rapid streams emptying from the gulches into the Trinity river, and the river itself winding away in the distance. The muddy water of the river evidences extensive placer mining above.

The vein has large outcrops on the east side of the canyon, about 600 feet up. From the river banks to these outcrops there is a steady showing of gold in the pan, and in this way the ledge is traceable also beyond the outcrops for a great distance. When the company took hold of the property the only developments consisted of two prospect shafts, about 50 feet deep, and an inclined winze, about 100 feet long, all sunk where the vein cropped out on the surface. The company proceeded to drive a tunnel 100 feet below these workings. Ore was reached within 25 feet, and was followed continuously as far as the tunnel went, now in 370 feet, with the breast in good ore, and in a vein 30 feet wide. Below No. 1, about 83 feet, was run another tunnel 700 feet long, showing the ore shoot about 600 feet in length. Raises between the two proved that this was the same vein and shoot, and some stoping that has since been done shows the width of the vein as exposed at the end of No. 1 to continue downward, in some places reaching 50 feet in thickness.

On this showing a 10-stamp mill was erected in 1902, there being enough ore in sight to run it for several years, and to date nearly \$80,000 have been recovered from the ten stamps, but new developments have indicated the need of more stamps. These new developments consist in a third level, about 130 feet below the second, which is now in 1000 feet, with ore for the last 600 feet. At its end the richest ore in the mine has been struck. Raises and winzes between Nos. 2 and 3 prove the third level to be on the same shoot as the second. Below the third it is expected in the future to drive at least two more levels, the fourth having been already started. To handle the ore now in sight between the third and the surface, twenty stamps are being added to the mill, making thirty in all.

The conditions are favorable for working a low-grade proposition. The ore is taken out entirely in tunnels, without the need of hoisting any place in the mine. Drainage through the tunnels carries off all the water, making pumping or the use of skips unnecessary. Covering the hills is a forest of timber that furnishes caps and posts 20 inches in diameter, the largest put in the mine. Larger timbers are readily obtained among the rest, when desired, being floated down the Trinity river to the sawmill (see illustration, page 17), with little expense. In getting the ore to the mill it is sent in chutes down to the third level, and from there in cars along the hillside to a self-acting tramway, which lowers it on a brake to the mill, near the river (see engraving, page 17). The only cost in delivering ore to the mill is for the man who pushes the car and the man who tends the tram.

Water power under a head of 200 feet from Papoose creek runs the mill, and additional water is now being brought in a ditch about 3 miles long from Stuart's fork to run the additional stamps. Stuart's fork is on the west side of the Trinity river, whereas the mill is on the east bank. To cross the river it was first intended to drop the water on the opposite bank and deliver the power to the mill by cable. The complications of machines and the length of cable necessary caused this idea to be given up, and arrangements have been made to cross the river with a pipe line 800 feet long to the same bank with the mill. Probably the wheel will be connected with the line shaft of the mill by belting and not directly connected thereto, in order to have the wheel at the lowest point possible, in which case the drop will be about 85 feet. Two Hendy wheels will be installed, under the direction of Mr. Firth of the Joshua Hendy Iron Works.

With this increased power the mine will have a thorough equipment. A dynamo will furnish current with about 3000 feet of wiring for electric lights. Lamps, and to a great extent candles, will be done away with and incandescent lights substituted under-

ground. The mill and the whole camp will be lighted. A set of electric moter cars will replace the ordinary hand cars, bringing the cost of delivering ore to the mill, it is estimated, one-half lower than at present. An air compressor will likewise be installed, and it is expected that there will be power enough to add an electrical equipment for a timber-framing machine.

In treating the ore the Fairview is likely to suggest some addition to the present methods of treating gold ores. The ore is soft and requires little crushing, between three and four tons per stamp a day being the duty of the mill, but the tailings formerly carried off \$1.50 per ton of the values. It was found that this was due to the presence of manganese in the ore, coating the gold and preventing amalgamation. The plates were increased, so that now the area of the plates is unusually large. Caustic soda was added before crushing, partly to brighten the mercury and partly to react upon the manganese. With this treatment the tailings have been brought down below \$1. Cyaniding the tailings has been tried, but so far has not been encouraging, and it is expected that some new method will be found to bring the tailings lower still.

The camp is a nucleus about which a future town is not unlikely to develop. The company runs its own store. A stage line will shortly connect Fairview directly with French Gulch, and through that, with Redding, on the railway. This, with the telephonic connections with Lewiston, will bring this part of Trinity county into close connection with the rest of the State. The Fairview is only one example of the new activity in Siskiyou and Trinity counties.

### Ditch Construction.

An important factor in mining is ditch construction. In every mining region where water is available the ditch system is more or less elaborate, but in no mining State are ditches longer, larger or more numerous than in California. In some districts four or five ditches may be seen along the mountain side, one above another, extending for miles. In the early history of mining in that State one of the first essentials to successful placer mining on an extensive scale was the construction of ditches. As the property of some of the companies was very extensive and valuable, justifying large expense in construction, the business of ditch making became to be a science. In California ditches are built wherever they may be required with little regard to the character of the country through which the ditch must

to cut and float the lumber down the ditch and flume to the point of construction. This makes the building of the flumes much less expensive than they would otherwise be. It is customary to clear the ditch line of brush and trees before beginning the excavation of the ditch. The accompanying engraving shows the early stage of work in the construction of a large ditch in Trinity county, California. In a mountainous region it has been found that narrow ditches with steep grades are preferable to broad ditches having less grades. The cost of the former is considerably less, and also the cost of repairs. Through the rocky strata the ditches having steep grades do not, as might be expected, cut their banks to any great extent. Large ditches having grades up to 20 feet per mile and carrying 3000 miner's inches are in successful operation. In the valleys where the soil is soft and more ashy such grades are not usually permissible.

It is the custom to excavate the inner slope—next the hillside—at an angle of 60° and that on the lower or outer side at 65°. Loose rocks and debris will not rest at these angles, and when the work of excavation is in progress the engineer in charge must suit the degree of slope to the character of material through which the ditch passes. A ditch having a width of 4 feet on the bottom, 3.5 feet deep, and 8 feet wide on the top, and having a grade of 19 feet per mile, will carry about 2500 miner's inches of water.

Often in the construction of a ditch a substantial retaining wall is necessary on the lower side. Generally speaking it is bad practice to grade out a hillside for the purpose of laying a flume upon the ground. Winter rains are likely to do much damage to a flume so constructed, unless the flume be covered with earth, which in time will cause the lumber forming the upper portion of the flume to rot. In some districts and under certain circumstances flumes are preferred to ditches, as in the case of very hard rock which would render excavation expensive, or in loose rock where much water would be lost by absorption. In some instances steel pipe lines have been considered more satisfactory than either ditch or flume, but these instances are comparatively rare. They may be justified where the amount of water available is limited and little or no leakage or evaporation is permissible.

### Iron Mines in Utah.

At last a large slice of the rich iron land in Iron county, Utah, has passed into the hands of outsiders, the deal having been closed recently when the entire \$90,000 required to effect the transfer of the ownership of the property was paid over to the vendors, says the American Manufacturer. The Colorado Fuel & Iron Co. and the Taylor estate were the parties to the transaction, the former being the purchaser. The consideration seems small, especially when compared with the figure the owners have heretofore asked for the property. The option obtained about a year ago by the Kimberly-Buhl-Jones syndicate called for the payment of \$250,000, and \$50,000 was paid for the privilege of the option. The Colorado Fuel & Iron Co. was already a large owner of Iron county land, and this last acquisition gives it control of more than half of the best property in the district. However, there is no cause for congratulation on this account. Everyone in Utah has hoped for years that some company would take hold of these valuable deposits and build iron works there, thus opening up a new industry in the State. A second Pittsburg could be founded in Iron county if the right parties became interested there. But there is no hope that the Colorado Fuel & Iron Co. will do this. It owns one of the large-



The Preliminary in Ditch Building.

est plants in the country at Pueblo, and it is not likely that it will erect another in southern Utah. It will probably have a railroad run to its mines and ship the ore to its Colorado works whenever it requires more than its other properties can supply. This may be in the immediate future and it may not be for years. It is more than likely that the purchasing company acted as much in self-defense as anything else in buying these properties. It saw the probability of a dangerous rival springing up in Utah and it took the necessary steps to prevent it. It was a brilliant move on its part, but it is not likely to be very beneficial to the State.

pass. If there are obstacles in the way, such as rocky, precipitous bluffs, deep canyons, and heavy timber, means and methods of surmounting these difficulties must be found by the engineer, as the water must be delivered at a certain point in order to secure the necessary head for hydraulic operations or for power. Such being the case, the business of ditch construction, including flume building and the laying of pipe lines, has developed some interesting features. The first thing to be done in contemplating a ditch line is a preliminary survey. This is done usually by means of aneroid barometers and hand levels. These give approximate data, and in a ditch 30 or 40 miles long this may require several different routes to be surveyed before location is undertaken. The survey must contemplate the crossing of canyons, the tunneling of ridges, the passage of rocky slides, loose steep hillsides, and many other drawbacks to an easy and inexpensive construction. When the line has finally been located and the grade and size of ditch and flume determined the work of construction begins. It is not uncommon to begin at the upper end, and where large amounts of lumber are to be consumed in flume building to locate a saw mill at some convenient point along the ditch line in a suitable body of timber, and

GREENSTONE is a general term for several basic rocks—diabase, diorite, etc.—and is employed in field geology to indicate in a general way the character of such rocks, it often being impossible to distinguish between diorite and diabase in the field. All diorites and diabases are not green. Some diorites are light gray in color and some are black, except usually in thin section, when they appear green. The green color of greenstone is due to the discoloration of the feldspars by chloritic mineral, resulting from the decomposition of the hornblende of the diorite or the augite of the diabase, which first alters to uraltite.



### The Measurement of Ore in Dumps.

It is often necessary to estimate the amount of ore or rock contained in a dump or a series of them on a mine, and it is a process usually requiring care, and more or less calculation. The amount can only be determined approximately at best, still it is close enough for most purposes if the measurements and calculations be carefully made. The measurement of earth in railroad and similar embankments is readily arrived at by the employment of prismoidal formulae, as these embankments are usually more or less regular as to form and size, but with mine dumps it is more difficult to make the measurements, owing to uneven surface of the ground—usually a hillside, often with slopes in two or more directions. If there be a level space at the top it will probably not conform with the outline of the dump at the base. There

on the surface on each point measured. These forms may also be measured by prismoidal formula.

The method of approximating the contents of an average dump is by taking the measurement of the side of one of the blocks A to B (Fig. 1) and multiplying by the vertical height of the block "D to E" (Fig. 2), and dividing by 2. This will give the area of the triangle A B E. Multiply this by the length of the block along the dump C to A, which will give approximately the cubic contents of the block in cubic feet, which, divided by 20, will give the tonnage of the block.

The several blocks must be figured separately and the results added to ascertain the total amount. As a matter of course, the operation can result at best in giving only approximate results, owing to the irregular form of most dumps, still it will afford results which will be near enough for most practical purposes. The measurements are all readily made with the exception of that giving the vertical height D E.

graphitic quartz schist, crystalline blue limestone and streaks of greenstone. The schists on the divides between Anvil and Glacier and Glacier and Rock creeks are in many places cut through with wide and strong belts of quartz stringers and gash veins, extending west of Rock creek to Snake river. Fissure veins are not yet satisfactorily proved to exist. The minerals so far found in development work done at different places on these belts are principally sulphide of antimony, petzite, arsenopyrites, pyrite, galena and visible gold. Scheelite, a heavy, soft, brownish-white mineral with glassy luster, is a common thing in the sluice boxes, especially in Glacier creek, but has not yet been found in other places.

As these belts form the bedrock and contain the same material as the gravels of the richest placer ground worked, it is at least suggestive that systematic quartz mining should be highly remunerative. The presence of petzite (silver-gold telluride), discovered by the writer, is considered a very important



Typical Appearance of Dumps, at Cripple Creek, Colo.

are many irregularities of shape difficult to describe, but with which the mining man is familiar. The accompanying engraving illustrates the appearance of the average mine dump in mountainous regions.

In order to estimate the cubic contents of the dump careful measurements must be made to ascertain the length, width and height of each separate dump, and to do this it is best to divide the dump into blocks or sections. Generally the back portion,

This may be ascertained by sighting with any leveling instrument (a common spirit level will do) from the level or top of the dump at B to an upright staff or pole held at E. The distance on the staff at D may then be read from the foot marks on it. If the dump is too high for the measuring pole, the measurements may be made in a series of steps. If the outline of the dumps be very irregular, like those in the accompanying engraving, the result of the operation will be more accurate, as the cross-sections measured are more numerous.

### Possibilities of Quartz Mining in Nome District, Alaska.

Written for the MINING AND SCIENTIFIC PRESS by F. LUNDSTROM.

The most important rocks of the Nome district in Alaska have been shown to be mica schists, graphitic quartz schists, crystalline blue limestone and streaks of greenstone. The distribution of gold throughout the district has been great, and it is impossible to estimate the amount remaining for human enterprise to recover. The principal creeks worked are Anvil, Glacier, Rock and Dexter, with the gulches leading into them.

In all these creeks, it has, without exception, been proved that the so-called pay streaks never go in the direction of the creek beds, or in any methodical way, and thus indicating, even to the most experienced old hand, where to look for rich pay. The nuggets found are never rounded or flattened like those in the Yukon district. One found on the Pioneer Mining Co.'s ground last season, on a so-called bench claim, contained of 182 ounces gross weight, 43 ounces of quartz, and did not show any sign of attrition to speak of, such as is characteristic of placer gold. The pay streaks are not confined to the lower parts of the creeks. High above the channels are situated the bench claims, which have been shown to contain just as valuable gold-bearing gravel, and on account of the depth, in many places over 100 feet, of great importance. This is evidence that the gold in the pay streaks in the gravel beds of the channels has not migrated many miles.

As mentioned before, the hills between which the rich placer beds are situated consist of mica schists,

factor in showing that quartz mining ought to be successful in Nome district. Petzite contains tellurium, silver and gold, its color is blackish, its fracture conchoidal and it is sometimes tarnished. It seems in Nome to be richer in gold than in silver. As an associated metal, here is always found native gold. That native gold still exists in the mineralized belts of rock in situ, cannot be doubted. A heavy, often very rich, black sand is found in the sluice boxes with the gold, and mercury has to be used for the saving of the gold. In the opinion of the writer, this black sand had its origin in the rocks producing petzite, and it also is rich in gold.

The only thing needed for success in quartz mining in Nome district is skillful and experienced management, and no geological prejudice in regard to the formation on account of its being soft and "nothing in place," the surface rocks being much fractured and disturbed. The bedrock in Anvil and Glacier creeks is chloritic and mica schist, showing principally the same formation 600 to 800 feet below the hill tops. The United States Geological Survey estimates the Nome series to have a thickness of from 5000 to 6000 feet.

Assays of ores show very different results. Quartz with red oxide of iron shows often visible gold, the other part being practically barren. Petzite is, so far, found in a kind of conglomerate or brecciated schist and arsenopyrite when it is very rich, and assays from \$60 to \$300 per ton. Quantities of this mineral of some importance have been shown in prospecting tunnels on the west side of Glacier creek. Stringers of the conglomerate are mixed with what is called ribbon quartz, which is white quartz like ribbons in a layer of schist. The writer has found float of ore containing petzite. The minerals in the float were arsenopyrites, blue limestone and mica schist, besides the petzite. It assayed \$65 per ton, and when panned showed extremely fine free gold. The locality of the find was on the slope of Mount Brynteson, where the Pioneer Mining Co. owns a large quartz mine, discovered and staked last year.

The economic conditions at Nome should not deter anyone. In quartz mining, where work could be carried on the year around, the miners would be satisfied with wages very little higher than paid elsewhere. Timber can easily be floated from the mouth

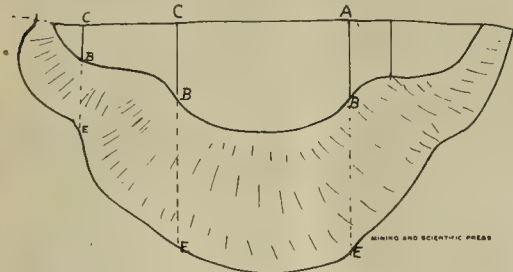


Fig. 1.—Plan of Dump

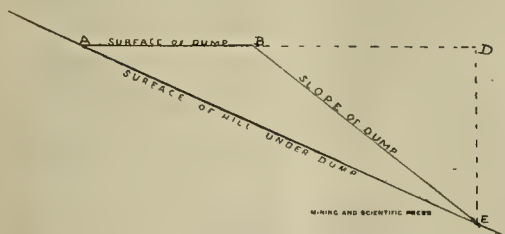


Fig. 2.—Section of Dump.

that adjacent to the slope of the hill at the top, is straight or sufficiently so for the purpose for some distance. The front or slope of the dump usually presents an angle with the horizontal approximating 35°. It will also be necessary to ascertain as closely as possible the slope angle of the hillside covered by the dump, and to measure the vertical height from the base of the dump at the front, as well as its width



of the Yukon or St. Michael. It is only a question of time when the landing facilities of Nome will be satisfactorily arranged.

Reference has been made herein to the immediate vicinity of Nome, but I hope to have in some degree shown the possibilities of that particular part, leaving to the reader to draw conclusions of what is to be found in the great area of known gold-bearing ground still as good as virgin throughout this particular district.

## The Young Quartz Miner.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by  
MATT. W. ALDERSON.

### PART II.—USING THE TOOLS AND DOING ONE'S WORK TO ADVANTAGE.

The first thing needed by the young man who seeks to become a quartz miner is a recognition of the importance of the work and confidence in its future. Whatever may be said against the love of money, there has been no civilization without it. The North American Indian, living for centuries in a country rich in agricultural, pastoral and mineral resources, promises to become extinct, leaving behind him almost no evidence of his existence except in the records of another race, eager to appropriate that for which the Indian did not care till he had lost it. So far as we are able to trace, civilization had its beginning on the banks of the Euphrates and the Nile. And the evidences we have of the life of the people of those early days are due to the appreciation and use of mineral wealth. They built cities, temples and pyramids that time has been unable wholly to efface. They had money not only to erect structures unparalleled in the history of man, but to inlay their chariots with gold, and in some instances to put bridle-bits made of precious metal in the mouths of their horses.

Almost at the very beginning of sacred history we are told that "Abram was very rich in cattle, in silver and in gold," (Gen. xiii:2), and that at a time of famine he went into Egypt, where, presumably, he used some of his wealth to secure the necessities of life.

In time the great Chaldean, Babylonian and Egyptian powers suffered a decline, which can be traced largely to a decline in the production of the precious metals.

Coming down to our own times, we see the most rapid development of the country where there has been due appreciation and utilization of its mineral resources. It would seem that no one can fail to recognize the importance of the industry; but how about its permanence? It is part of the history of peoples that mines left as worked out at one age of the world have been reopened with profit at later times. The copper mines of Pharaoh, at Mt. Sinai, worked before the time of Moses, after having remained idle for thousands of years are producing today. In Korea, where it is believed by some Solomon secured a large part of the many millions that were put into his temple at Jerusalem, one company now employs 5000 men in mines left as worked out thousands of years ago, and the production now exceeds two and a half millions a year. Throughout the West are hundreds of properties which have been mined to depths of less than 100 feet and abandoned as worked out. The young man who believes that there is no promising future to these properties; that mining is a lottery; that the future of the industry will never equal its past, should continue to drive a delivery wagon for a grocery store or go to work on some farm. People will, beyond question, need groceries and breadstuffs while he may live.

Having faith in the future of the industry, the young quartz miner will feel justified in taking time to do his work well. In sinking a shaft, or driving a tunnel, realizing that the opening may be used for hundreds of years, he will do his work so it will be permanent and not makeshift in character. One of the most annoying features in giving employment to unskilled men in a mine is caused by their impatience. A man is put on as a mucker, and in a few weeks, before he has learned to do this branch of the work to advantage, before he has even learned to swing a pick so it will do good execution, he thinks he should be put to mining at full wages.

The first work that will be given the novice in a quartz mine will be with pick and shovel. He will think any one knows how to use these tools, and, so long as he thinks thus, he will fall far short of doing full duty. He will need to learn to use these tools with either hand forward; for this will be to his advantage, not only in mucking, but especially when working in narrow stopes. Many use a pick with the hand near the pick-eye rigid. This hand, on the contrary, should be free and should grasp the pick handle lightly, coming back towards the end of the handle as the pick descends. Otherwise the blow of the pick will lack in force and the hand receive a jar. The pick is a wedge with a handle to serve to drive the wedge in and act as a lever, and it is used for loosening closely compacted ground, or rock partly broken up. One must not use it as a crowbar, thus running

the danger of breaking it, nor as a sledge for pounding solid rock.

When the young quartz miner drills his first holes he is apt to be surprised that they do not go in straight, and that he can not get the hole in very far because the drill binds. This comes from the drill not being held straight and having the usual "wabby" motion of a person attempting movements to which he is not accustomed. When one gets so he can make the sides of his hole straight, he will be surprised that they will persist in curving upward, describing part of a large circle. This is caused by the pulp, as made, falling to the lower side of the hole and forcing the point of the drill upwards. It is overcome by holding the drill slightly over the center of the hole as it is being struck. The drill is held in one hand and struck with the hammer by the other. It is then moved slightly, so that the edge of the drill will cut new ground close to the previous cut. In practice the driller learns to turn his drill about one-sixth or one-eighth of its circumference with each blow of the hammer. Occasionally one sees a miner who gives his drill a quarter turn. This is too much for most rock. Observation will show that this man will not do so good work, the tendency being to break the rock in coarser particles than it is advisable to make, as they interfere with the turning and steady progress of the drill. One should learn to give a full, square blow at each strike. He may know if he is doing this by the appearance of the head of his drill. If he strikes other than a fair blow, the face of the steel which he has struck will show an indentation, such as one would make if he sought to broaden the head for a rivet. There is a vast difference in the movements of different men when striking. One grasps the handle of his hammer about half way between the head and the end of the handle and rains sharp blows in quick succession on his drill. A better way is to grasp the handle near its end and give a powerful blow. Only occasionally is the ground of such a character that a man must hit the drill lightly. The learner should not be in a great hurry, but take time to go through the motions without strain. In time one will get a motion that will be easy and powerful. Then he will need to keep under steady motion. The best workman is one with a kind of plow-horse gait—a steady, even, continuous movement to the end of the furrow.

There are three kinds of holes it will be necessary to learn to drive—a "down hole," a "back hole" and an "upper." It will be comparatively easy to learn to drive the first two, for one uses the regular stroke he would make in driving anything with a hammer. In driving an "upper," however, one must use a different swing of the arm, and the strike is so awkward to a man till he becomes accustomed to it—that is, he is apt to put off learning it altogether, if possible. It is true that in many places a back hole may be so placed as to do, instead of an upper; yet the fact remains that an "upper" is one of the most advantageous holes that can be driven for two reasons: 1. It is the only hole one can drive where the pulp falls away from the end of the drill as it is made; so one has to give little attention to cleaning the hole and is therefore enabled to make better speed. 2. One does the work with less expenditure of muscular force. The hammer swings lightly from the arm, hanging down its full length, the palm of the hand forward. It is an easy, powerful movement once one gets a little accustomed to it. The young miner should learn to strike the upper, for it is often necessary to drill short upper holes for pipe supports, marks for surveying, etc.

The placing of the holes calls for the use of intelligence and discretion. Many people seem to think that the object of education is to enable one to get along without using his hands, and many laboring men seem to think it out of their province to use their brains. This is a grievous mistake. The workman should learn to use his head to save his hands. An intelligent carpenter, called upon to take a box apart, would first notice the way in which it had been put together. So in a mine, the man who does good work is the one who places his holes so as to take advantage of the lay of the ground. This must be learned by experience, but to become experienced the miner must remember the result of a former experiment.

As a general rule, it pays to put in holes of good depth—from 2 to 3 feet. Short holes are necessary often in squaring up the face, but otherwise one should plan for as deep holes as will break to advantage. A beginner naturally wishes to know how much is expected of a good man with a drill. No one can tell; it depends entirely on the kind of ground he is working in, and that may change any second. I remember working hard one half day putting in a hole 8 inches in depth. I dulled twenty-two drills in the work. A few days later, in the same crosscut, I dulled but one drill and made over 6 feet of holes in half a day.

It is poor policy to pick out soft places in which to drill. As a general rule, one should drill in the hardest rock. Breaking that, one has no difficulty with the other. One has splendid ground in which to drill where he can drill 5 or 6 inches with one drill and then have it sufficiently sharp to be used again. He is in very hard ground where he dulls twenty-five or thirty drills putting in a hole 20 inches in depth.

(TO BE CONTINUED.)

## Power Transmission.

TO THE EDITOR:—I note that under heading of "Concentrates," in your issue of May 14th, you state that "under no circumstances can an electric dynamo be placed between an engine and machinery it is desired to run without loss of power." The article goes on to recommend the drive of mill by line shafting belted directly from the engine, in preference to the installation of a motor drive.

I am rather surprised at this statement, as it is at variance with the result of my experience in plant equipment, and I am inclined to doubt the advisability of the recommendation for the following reasons:

In a plant operated by shafting and belting driven direct from the engine, the loss of power in belts and shafting is considerable. In most published tests of such equipment the loss will average at least 40% of the developed horse power, and in some cases as high as 55% to 60%. Naturally the extent of this loss is governed by the alignment and care exercised in laying out and maintaining the shafting system.

Assuming the average loss to be 40%, this shows no economy over the installation of electric power transmission, since the dynamo, line and motor losses will not be in excess of 30% in a fairly well equipped plant. This, of course, is based upon an installation of direct connected motor driven machinery throughout, which, in the present state of the art, is not practical in mill work.

Nevertheless, the comparison holds true and there is no question that the economy in transmission is very great where motors are employed in the place of long belts and main shafting, to drive short jack shafts, etc.

Again, the loss in shafting and belting is practically constant; that is, assuming that the generated horse power is 100, the loss of power in belting and shafting would be 40 H. P. This loss of 40 H. P. would remain constant under all conditions of load, the loss being still 40 H. P. whether the developed horse power at the engine is 100 or 50 H. P.

The electric losses will be a constant percentage of the developed horse power.

While it is true that electric machinery shows a slight loss in efficiency on loads less than full load, for all practical purposes it can be assumed that the 30% mentioned above will always be 30% of the developed horse power; thus, in a 100 H. P. plant operating at full load the transmission losses would be 30 H. P., while if the plant were operating at one-half load the transmission losses would be 15 H. P.

Another point in favor of the electric transmission is its convenience, which in most plants represents a practical cash asset.

The mill does not have to be laid out to follow the set lines made necessary by use of shafting and belting, but the machinery, conveyors, etc., may be arranged in a position wherein they will handle the materials involved to the best advantage. Portions of the plant can be readily shut down, and the operation of the motors may be controlled at any reasonable distance; that is, a motor operating a mine pump can be controlled from the surface just as well as at the pump itself.

There are many cases where the first cost is such an important factor that the use of electrical machinery is not advisable, but when it comes to the question of economy in the power transmission and advisability from a purely engineering standpoint, there is little question that electric power transmission shows a decided advantage over any other method.

L. P. HAMMOND,  
Manager Denver Branch Crocker-Wheeler Co.  
Denver, Colo., June 30.

The "Concentrate" above referred to appeared in the issue of May 14th, and like most other "Concentrates" was an answer to a direct question. The inquiry was from Topeka, Kans., and was as follows:

I am confronted with a power problem which I cannot solve to my satisfaction. The power required is about 100 H. P., which leaves a surplus. I have one hoist, two pumps, and a small mill of twenty-five tons capacity. The cost of fuel (good coal) is about \$14.50 per ton. Can I install electricity, direct connected dynamo to the engine, and save in the consumption of fuel?

Understanding the question to contemplate placing a dynamo between the engine and the machinery to be operated, "Concentrates" replied as follows:

Under no circumstances can an electric dynamo be placed between an engine and machinery it is desired to run without loss of power. If the dynamo could be run at a distance by water power, or at some point where fuel were cheaper than where the engine and mine are located, it might be more economical to install the electric plant and transmit the electricity to motors in the mine and mill, but if the power must be originated by the engine apply it direct by means of shafting and belts in the usual way. The mine pumps may be run by steam conducted into the mine by pipe (these should be carefully covered to prevent condensation as far as possible), or a Cornish pump could be put in which is actuated at the surface. A third expedient is the driving of a dynamo by the engine to supply electric power to the pumps in the mine alone, running the surface plant by steam. If this latter suggestion is not found to require too much of the 100 H. P. of the engine it may be found



more economical than any other way to handle the water. Bailing by skips may obviate the necessity of pumping if conditions are such that this method can be employed.

The reply to the above question was correct. There is practically no substantial difference between the two statements.

### The Geology of Bisbee, Arizona.

"The Geology and Ore Deposits of the Bisbee, Arizona, District," by F. L. Ransome, has been issued by the United States Geological Survey, and is one of the most interesting and valuable of this series of papers, as it deals with a district of great

### A Practical Example of the Drift of a Diamond Drill Hole.

Written for the MINING AND SCIENTIFIC PRESS by  
LOYD A. WOMBLE.

The value of the record furnished by a diamond drill divides itself into two parts—the value of the record that is furnished by the core, and the amount of dependence that can be placed upon the apparent location of any spot in the diamond drill hole. Due to the drift of bore holes of great depth, the exact location of points is hard to determine, and what have been assumed at the time of boring to have been correct have often been proven on subsequent devel-

line. The real position of the reef or banket at a depth of 751 feet, as shown in the hanging wall of the dike, which occupies the plane of a reverse fault, is the upthrown portion of the reef and is not shown beyond the intersection of the bore hole and reef. The reef, however, at this point continues on its upward course until cut out by the dike, and on its downward course for an unknown depth. The west shaft is not shown in the drawing, being west and north of the collar of the bore hole. This shaft cuts the north or normal portion of the reef at the eleventh level, having a vertical depth from collar to intersection of 1527 feet.

At the time of the sinking of the west shaft this bore hole was sunk to determine the depth which the shaft must go before intersecting the reef. From the data the supposed course of the bore hole was plotted showing the upthrown portion of the reef to be at a vertical depth of 751 feet and the normal portion at a depth of 1340 feet. When the shaft had attained the depth of 1340 feet the reef was not encountered and considerable anxiety was aroused. The shaft was, however, continued on the assumption that the bore hole had drifted, which upon subsequent data proved correct. A month ago in stopping ground on the ninth level the end of the bore hole was discovered, and from the true location of this point, and the position of the dike and faulted portion of this reef, located accurately by crosscuts run south in course of development, a section of the bore hole supposed and true has been drawn. It will be noticed from the drawing that the supposed course of bore hole gave an exaggerated thickness of dike and also of the position of the reef.

The greatest lateral displacement on drift of bore hole is 450 feet, the drift being at right angles to strike of reef and against dip. The ground drilled through was shale, sandstone and quartzite, the dike being diabase.

### Geology of the Goldfields District, Nevada.\*

NUMBER II.—CONCLUDED.

Written by J. E. SPURR.

SILVER PEAK DISTRICT.—The Silver Peak district contains abandoned silver mines and gold mines which have been considerably worked but are still regarded as promising. The silver prospects were discovered in 1864, but were shortly left idle, and in 1867 they were opened up again and worked till 1869. A 10-stamp mill was finished in 1866. A lixiviation process was used, the ores being leached with salt. They have not been worked since.

The principal properties thus far developed, both silver and gold, belong to D. C. Blair, of New York. A 30-stamp mill for working the gold ores of the Blair mine was finished at Silver Peak in 1867, and was worked for two years. The mine was then idle till the early eighties, when it was leased for two or three years. Another long period of idleness ensued, and in 1893 another lease was given for one year. Immediately after this the mine became involved in litigation, which has only very recently been settled. Mining and milling in a small and intermittent way, meanwhile, has been conducted on a number of the veins, generally of minor importance, outside of the Blair properties.

It is estimated by persons who have been familiar with the history of the mining here that the silver mines have produced a gross value of \$200,000, most of which came from the Pocatello and the Vanderbilt, while the Blair gold mine is estimated to have produced \$1,080,000.

The Drinkwater group of mines, which is the most important part of the Blair gold properties, and which has produced practically all of the \$1,000,000 worth of ore, as above stated, may be taken as typical of the gold veins which, though widespread and numerous, show a wonderful similarity of character. On the surface two adjacent veins outcrop, the Crowning Glory and the Drinkwater, the former the larger, the latter containing the greater quantity of good ore. The quality of the ore still left standing (only the richer portions having been removed for milling) has been determined to assay \$5 per ton. Considerable new development work has been done recently.

Geologically, the veins of the Blair mines are interesting. Properly speaking, they are hardly veins, but flattened lenses of quartz occurring in a definite zone 100 feet or more in thickness. The lenses wedge out and disappear both horizontally and vertically, and their place is taken by overlapping lenses. The wall rock is schist, derived chiefly from the metamorphism of an original limy shale or limestone. Frequently, also, the wall rock is a very siliceous granitic rock (alaskite) made up essentially of quartz and feldspar. This alaskite occurs in the schist in lenses similar to the quartz. There is, moreover, every transition between the alaskite and the quartz, and the schist has been, so to speak, saturated with this siliceous material, which forms seams and tiny lenses in it. The auriferous quartz lenses in the mine in many places run laterally into quartz-feldspar rock (alaskite). As a rule the values grow insignificant

\*Bull. 225 U. S. G. S.

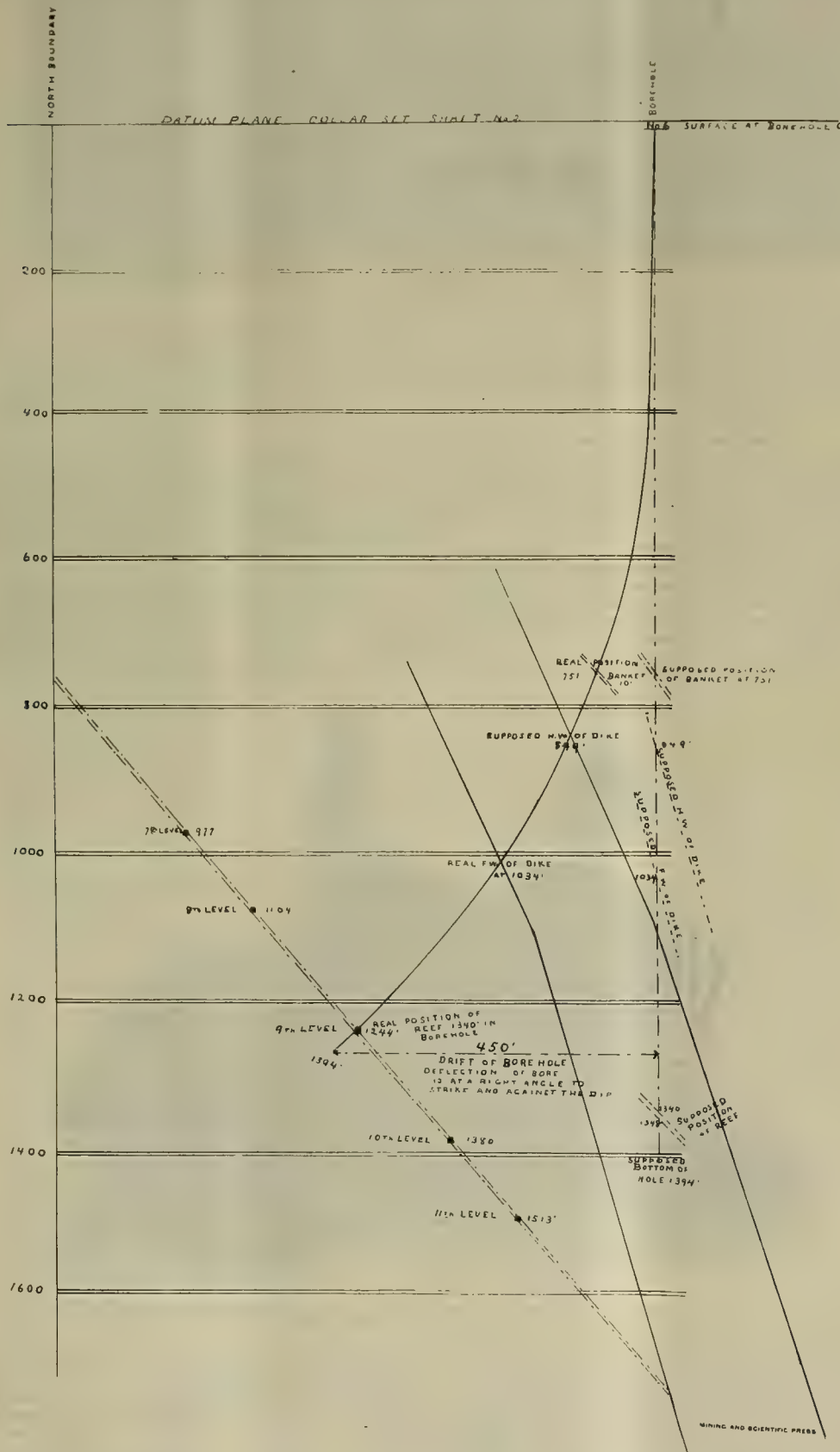


Diagram Showing Drift of Diamond Drill Hole on the Rand, South Africa.

economic importance. The volume contains many illustrations, maps and diagrams illustrative of the subject. The genesis of the somewhat erratic ore deposits is discussed at length and throws much light on this interesting class of phenomena. One of the novel features of the work is a plan map showing the irregular distribution of the known ore deposits in the Copper Queen mine, and affords much food for study by geologists and mining engineers.

opment of the property to have been erroneous. This point is well illustrated in the case of a bore hole put down at the Witwatersrand Deep, Ltd., Transvaal, South Africa.

In the drawing illustrating this article the supposed or vertical course of the bore hole is shown by the broken line, and also the apparent location of the reef and dike with their vertical depths. The true trend of the bore hole is shown by the heavy solid



with the coming in of the feldspar, but occasionally high values may still be found.

The general conclusion is that here a series of fissile shales and thin-bedded limestones has been invaded by a very siliceous granitic intrusion which has metamorphosed the sediments to schists. The quartz has plainly the same origin and nature as the alaskite, both being siliceous phases of a granitic magma.

yields stains of copper carbonate, iron oxide and silver chloride.

**WINDYPAH DISTRICT.**—This district, which has only recently been opened up, lies in the Silver Peak range, east of Piper's ranch. An abandoned mine or prospect—the Good Hope—has existed for many years a number of miles northeast of the district, in the same geological position, but the camp mentioned

large granitic intrusion just south of this place. The ore occurs as quartz replacing and penetrating limestone on the under side of an alaskite dike. The limestone near the alaskite shows contact metamorphism, becoming altered to garnet, epidote, etc.

**AURIFEROUS SAND DUNES.**—A conspicuous bunch of large sand dunes appears in the southern portion of the quadrangle in the middle of Clayton valley.



Loading Shipping Ore at the Tonopah-Belcher Mine, Lone Mountain, Esmeralda County, Nevada.

The gold in the quartz is usually free, sometimes associated with scattered galena. Diorite dikes cut the veins or follow along them, but are of later age. Along the dikes there has been water circulation, resulting sometimes in impoverishment, sometimes in relative concentration, of the original values.

This zone of veins outcrops for a mile along the mountain side. At one point, some distance below the vein zone, free gold in fresh alaskite-pegmatite country rock was found.

In the main the other gold mines or prospects of the district have exactly the same geological relations.

**LONE MOUNTAIN DISTRICT.**—The ore deposits of this region are situated within a moderate distance of two masses of intrusive granitic rock, one of which makes up Lone Mountain peak proper, while the other lies in the lower mountains to the south. The quartz veins occur in Cambrian limestone and slate. They are generally, but not always, parallel with the stratification. They follow crushed zones or selvages formed by movement in the limestones, possibly attendant upon faulting. The ore in the veins consists of small amounts of rich silver-copper sulphides, with some galena, pyrite and secondary minerals such as chrysocolla, limonite and probably chloro-bromides of silver.

The Alpine mine is near the contact of the Lone Mountain granite with a series of metamorphic marbles and some interbedded schists. In the marbles are seams of ore parallel with the stratification. Small quartz seams containing galena are low-grade silver ores. These lead into bodies of mixed galena and argentiferous lead carbonate, which widen out into irregular pockets and constitute the ore that is mined. The ore bodies follow a certain horizon around a hill, with lesser seams above and below. Diorite sheets and crosscutting dikes are frequent, but are not in any way associated with the ore.

The area of intrusive granite above noted as lying south of the Lone Mountain granite is marked by considerable contact metamorphism in the limestone and shale into which it is intrusive. On its eastern side this contact metamorphism has been accompanied by some mineral deposition. There was here noted, interstratified with schistose slates and crystalline limestones, a metamorphosed belt about 60 feet wide and traceable for a long distance. This zone is characterized by epidote, garnet, chalcopryrite, calcite, magnetite, specular iron, pyrite and galena, with certain secondary minerals—chrysocolla, limonite, and others. Some of the material gives fair assays for silver, some shows gold. Some silver ore from this zone was milled at Columbus twenty-five years ago.

**DISTRICT NEAR DYERS.**—On the west side of the Silver Peak range, near Fish Lake valley, and 1 mile east of Dyers, is a mineral district where some prospecting has been done, although at present it is deserted. In 1885 to 1887 this district was located and was the scene of a short-lived excitement, but was afterwards abandoned. Following the Tonopah discovery it was relocated, but no new work was done. One of the mines was relocated under the name of the West Tonopah. It is about 50 miles from Tonopah as the crow flies. Nearly all the ores here are bedding-plane deposits, of the same type as many of those near Lone Mountain. They occur in the Silurian limestone, within a moderate distance of a small body of intrusive granite. Along the stratification occur bunches of quartz, which are discontinuous both in horizontal and vertical extent, fading out to absolutely nothing. The quartz contains black copper-silver sulphide which, when oxidized,

was discovered in the winter of 1903 by J. G. Fesler. A great deal of prospecting has been done, but no actual mining. There is here a large body of granitic rock, intrusive into Silurian limestones, and the ores occur in both formations. The veins may be divided into three distinct classes:

1. Segregations in alaskite, which is here locally intrusive into the granitic rock. These show good gold values in segregated bunches of quartz and in the adjacent siliceous alaskite. The quartz lenses are limited in size and have not been proved to have any regular connection.

2. Quartz veins in granite: These have formed along crushed or sheared zones. The amount of quartz is variable and the walls are ill defined. The mineralogical character is like the first class of deposits. The gold values are locally good, but all workings up to the present have been near the surface.

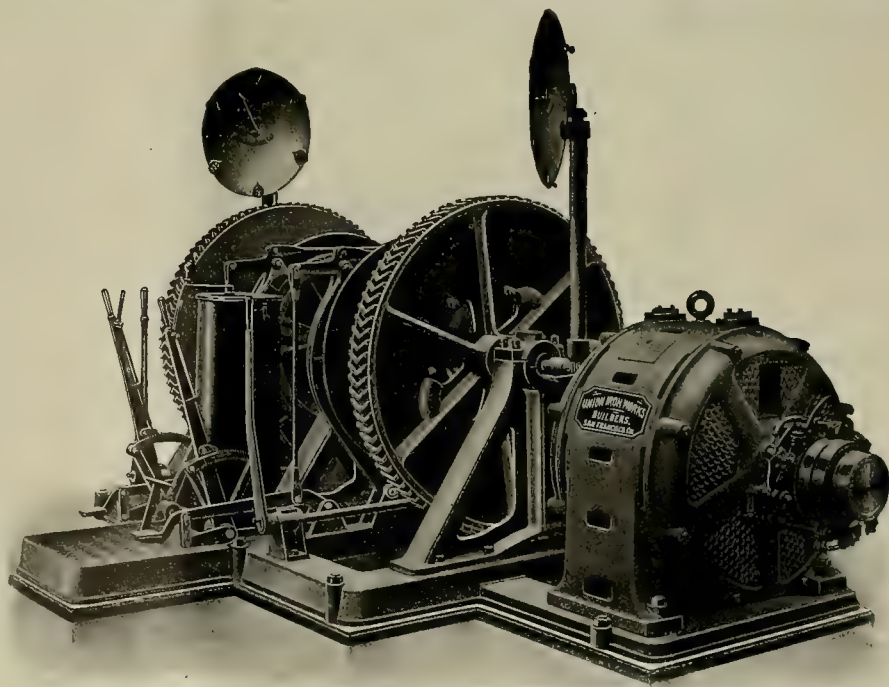
3. Veins near the contact of granite and lime-

These have been sampled for gold and some relatively good assays have been obtained.

### Alternating Current Electric Motor Hoist.

Considerable interest has been aroused concerning the use of the alternating-current motor as applied to mine hoists. Variations in speed and load, such as occur in all hoisting work, have until recently proved to be serious obstacles to the application of an alternating current for such duty except where first converted to direct current.

The accompanying engraving shows the hoist of the Nashville mine at Nashville, El Dorado county, Cal. It is designed for a depth of 1000 feet, 6000 pounds load,  $\frac{1}{2}$ -inch rope, hoisting at 400 feet per minute. As shown in the picture, the drums are geared to a Westinghouse Type F induction motor,



Alternating Current Electric Motor Hoist.

stone: Quartz veins containing rich black sulphide, carrying copper, silver and gold. These veins are persistent, following the contact for miles, though different parts may not always be perfectly connected. Where noted, they follow the contact of alaskite dikes, which are probably border phases of the granitic inclusions. They do not have well-defined walls and are to be regarded as replacements of the limestone along the dike contacts. Frequently a dike has such a vein on both sides, though more or less intermittently.

**PALMETTO DISTRICT.**—The principal mine is the old MacNamara, located in 1880. Although assessment work has been done upon these claims, they have not produced any shipping ore. The vein is near the contact of limestone with a large intrusive body of alaskite which itself is probably a border phase of a

with variable speed, size 106, E.M.F. 2000, 72,000 alternations, three phase.

The three-phase alternating current is received at 40,000 volts and reduced to 2000 volts by three 100 K.W. transformers, whence it is carried to the motor.

The hoist was installed by the Union Iron Works of San Francisco, Cal., three months ago, and since that time has given satisfaction. The engineer states that he has perfect control over starting and stopping the load. Six speeds are obtained by means of throwing in or out the resistances, by means of a controller similar to that in use for direct-current hoists.

The 14 $\frac{1}{2}$  x 18 Ingersoll-Sergeant compressor and the twenty stamps and Frue vanners of the mill are belted to 50 H. P. induction motors. The Cornish



pumps are geared to a similar motor, and a 10 H. P. motor furnishes power for an 8x12 Blake crusher.

It is claimed that the first stamp mill in California was installed at the Nashville mine, formerly known as the Havilah. The still existing wooden stems and cast iron shoes and dies of the old mill afford a marked contrast to the present advanced equipment.

The shaft is down 875 feet on the incline. The mill is working part of the time on rock produced in development work, no extensive ore bodies being worked at present. O. R. Allen is superintendent at the mine.

## Geology of the Shafter Silver District, Texas.\*

Written by J. A. UDDEN.

The average altitude of the Shafter Mine district, in Presidio county, Texas, is about 4500 feet above sea level. The highest point on the Chinati mountains rises to 7730 feet and the elevation of the nearest point on the Rio Grande is about 2575 feet. Thus the extreme amount of relief in the district is nearly 5155 feet.

The Chinati mountains occupy an area which is elliptical in outline, with the long axis extending from northwest to southeast, a distance of about 14 miles. They continue beyond the boundaries of the district by an extension to the north of some lower peaks and ridges. The north end of the main mountain is highest and is separated from the south end by a sag in the crest caused by an eastward encroachment of the San Antonio canyon. This part of the mountain forms a dissected dome about 5 miles in diameter. The south end has the greater areal extent, being about 8 miles long and 5 miles wide. It is, strictly speaking, a terraced and dissected mesa, which rises about 2500 feet above the surrounding country. It is built up of several superimposed flows of igneous rock, and all around the mountain these form successive steps of vertical cliffs separated by intervening talus slopes. The relief of the mesa is still more diversified by incisions of canyons from all directions. On the north side these canyons are narrow and short, seldom extending more than 1 mile back from the periphery. On the south side the drainage comes down chiefly through three wide canyons, which might rather be described as irregular amphitheatres. These reach back to nearly three-fourths of the distance across the mountain.

The shaft of the Presidio mine is perfectly dry 300 feet below the bottom of Cibolo creek. This underground drainage no doubt follows some of the many joints, faults and disintegrated dikes that traverse the sedimentary rocks in the district.

**STRATIGRAPHY.**—Sedimentary rocks underlie the greater part of the entire district. The oldest of these belong to the Paleozoic group and comprise a single great sedimentary cycle. They are overlaid by sediments of the lower Cretaceous age, which again are partly covered by the land drift. The total greatest thickness of all the sediments approximates 7500 feet.

The sediments have been displaced and uplifted by deep intrusives, which lie under them, and which have caused the exposure of their tilted edges around the uplifts. On top of all this we find a series of extrusive volcanics which have concealed most of the sediments and probably also much of the deep intrusives.

**THE IGNEOUS ROCKS.**—The igneous rocks of the Shafter area cover about one-third of its entire surface. As to their mode of occurrence, they present all the three forms in which igneous rocks appear: 1. Lava flows and tuffs. 2. Dikes and intrusive sheets. 3. Laccolithic bosses.

**LACCOLITIC BOSSES.**—Laccolithic intrusions probably underlie the later lava flows in the Chinati mountains, occupying the region which is central to the crescent that marks the outcrops of the sedimentary rocks, but they are now mostly concealed by the later extrusives and by the land drift. To all appearances they were submitted to extensive erosion, and cut down to the same general level as the sediments, before the land was covered by the last great lava flows. We find them exposed now principally only in two places.

In the San Antonio canyon, and in the pass which separates the Chinati peak from the south Chinati mountains, a dark gray diorite forms the lowermost terrane. This is of a moderately coarse texture and is frequently traversed by some segregation veins measuring from 1 inch to several feet in width. These consist of a red granite rock, which is more acidic than the diabase and also somewhat more resistant to the disintegrating agencies. It frequently forms dike-like ridges on the surface of the country rock, and these ridges have an east and west trend.

To the north and east of Ojo Bonito there is an area underlain by a red, coarsely crystalline granite, possibly also of a laccolithic nature. It extends for a distance of about 3 miles from northwest to south-

east. It has a width of about a mile at the north and tapers almost to a point at its southern end. It weathers into small rounded knobs that appear like huge boulders or small hills rising above the land drift.

The Cienega mountains consist of a laccolithic dome of a highly acidic intrusive of light color, but its real relations in the field are not known to the writer.

Dikes and intrusive sheets frequently appear in the sedimentary rocks running in a variety of directions. One of these dikes is seen on a ridge about a quarter of a mile west-northwest from the Presidio Mining Co.'s mill. It is 15 feet wide and trends N. 86° E. Another, which is about 12 feet wide and bears N. 26° W., cuts the Shafter beds about 500 feet north of the town of Shafter on the north side of Cibolo creek. About a half mile to the west-northwest of the new shaft of the Presidio mill a dike 4 feet wide trends E. 18° N. In the basin of Morita creek, 3 miles south-east of Shafter, another dike cuts one of the remnants of the lava flows which have been carved into buttes in that direction. In most of these instances the rock is of a dark basic kind, which easily disintegrates and seldom appears on the surface. In the Presidio mine two of these dikes have been encountered, and even 400 feet below the surface they have been found to be thoroughly disintegrated and changed into a yellow clay. The miners call them "clay dikes."

Intrusive sheets, which follow the bedding planes of the sedimentary rocks, are hardly less frequent. One comes into view at the base of the east bluff near the junction of the Cibolo and the Sierra Alta creek, and several lie intercalated with the Carboniferous and the Cretaceous strata on the south and the south-east side of the Chinati mountains. Some of these are of a dark-gray andesite and are usually quite fresh and unaltered at the surface. Some consist of a light-gray rhyolite. One of the latter, which outcrops in an arroyo about 2 miles northwest from the shaft of the Presidio Mining Co., has a rough columnar structure.

As we approach the Chinati mountains from the east, the dikes and the intrusive sheets become more and more frequent and at the same time heavier. Occasionally they thicken into true laccolites. On the south side some of the ridges in the area of the outcrops of the Carboniferous limestone consist of heavy volcanic intrusive sheets, which lie in the same position as the stratified rocks, and next to the mountain the sedimentary rocks and the intrusives are intermingled almost promiscuously. Evidently the source of these intrusives lies in that direction.

**LAVAS AND TUFFS.**—Fully one-half of the land is yet covered by lava flows, which no doubt have extended over most, if not all, of its surface at an earlier date. They have since been carried away by erosion. We thus find them mostly absent along the principal drainage lines, as in the direction toward the Rio Grande and along Cibolo creek. But they are invariably present on all high peaks and mesas. These have been carved out usually from several superimposed flows, whose upper surfaces are apt to form stair-like terraces on their sides. The most extensive remnants of lava flows are those which form the body of the Chinati mountains and whose combined thickness approaches 4000 feet. In all probability the lavas in the hills east of Shafter are remnants of the same flows that form the Chinati mountains and which once were continuous across the Cibolo valley. In texture the lavas vary from coarse and fine porphyries to vesicular and almost glassy lavas. In the mesa known as Sierra Alta, which is about 6 miles north of Shafter, the lava sheet which forms the cap is underlain by several strata of tuffs or volcanic sand, some of a yellow and gray and some of an almost pure white color. The latter kind appears on the south-east side and shows a thickness of some 40 feet.

The vents from which these lavas came are to be found in the Chinati mountains.

**THE CHINATI UPLIFT.**—The controlling structural feature is an eastern half of the base of a great dome, whose west side lies concealed under the Rio Grande drift and whose north side extends beyond the limits of this district. The diameter of this uplift approaches 15 miles, judging from the curve of the strike of the tilted sediments. Its center lies on the north side of the south half of the Chinati mountains. The sedimentary rocks dip away from this point in all directions, with more or less regularity. The amount of the uplift equals at least the entire thickness of all the sediments exposed, which is about 7000 feet, so that if these had not been removed they would now form an elevation 7000 feet high, extending for 12 miles east and west and north and south. But the work of erosion has long ago cut down the base of this dome and reduced it to the general level of the surrounding country. This has exposed the edges of the sediments, which lie in a crescent on the east side. Within this crescent, which probably forms a continuous ring now partly concealed by igneous flows and by drift, the erosive forces have probably also cut down the central core of the igneous rocks that caused the uplift. But to what extent this central igneous mass rose above the general level of the land, as it now stands, and to what extent the mass itself may have been cut down, it is not possible to say. It may have had a considerable elevation. The diorite in the San Antonio canyon and

the granite near the Ojo Bonito is all which at present comes up to our view.

**MINERAL DEPOSITS.**—The mineral deposits in this district are limited to the older sediments and to the deep intrusives. The Cretaceous rocks and the latest extrusives have suffered comparatively little change from the mineralizing processes. They sometimes exhibit fissures filled with calcite and occasionally the igneous flows have been altered to a soft, green chloritic rock or are otherwise decomposed, but they are not known to contain any mineral deposits of importance. Such deposits occur here in five forms, viz., as lodes resembling fillings in ancient caverns, as impregnations in small fissures of irregular form, as contact deposits, as fissure veins, as fault fissures and as fissure zones.

**LODES.**—To the first one of these categories belong the ores of the Presidio mine. It lies in irregular pockets or lodes from a few feet to nearly 100 feet in length. These are connected by more narrow leads, where the ore body is often more sharply marked off from the unaltered ledges of the country rock. The body of the ore is mostly a yellow, somewhat porous rock-like mass of siliceous material in which crystals of calcite and galena are seen. In the average run, there is only about 3% of carbonate of lime and from 45% to 50% of silica. The percentage of calcareous material increases toward the wall of the ore bodies and it usually also increases with the amount of galena which is present. The bulk of the silver is in the form of a chloride dispersed through the body of the ore. But there are also pockets of galena rich in silver. This is sometimes altered to cerussite. Sphalerite, quartz and malachite are sometimes found with the other minerals. While the Presidio mine is the principal instance of this kind of ore deposits, other lodes of a similar nature have been found in the same limestone to the west. The lodes occur only in the most pure strata of the Cibolo limestone, and in the Presidio mine they reach lower and lower levels in this formation as they are followed to the east, descending more rapidly than the actual dip of the sediments.

**CHIMNEYS.**—The lodes in the Presidio mine are undoubtedly genetically related to the siliceous impregnations which frequently appear on the outcrops of the Carboniferous rocks and which are a result of the activity of the ground water at an earlier period. None of the chimneys have as yet proved to be rich enough to be profitably worked, and they probably mark some less open passage ways of the solutions which deposited the ore in the Chinati mine. Even some of these are clearly fillings in the old caverns, whose etched walls are plainly exposed in some prospect holes. Galena, calcite and hematite occur in the siliceous mass which now fills them.

**CONTACTS.**—At the contact of the granite with the Cieneguita beds, near Ojo Bonito, masses of hematite and limonite lie against the side of the intrusive, in some places near the exposure of the marble previously described. Farther north some pieces of float of crystalline magnetite were taken, and it is reported that larger bodies of this mineral lie along the same contact beyond the limits of this district. To the same class of deposits we must also refer the hematite and the magnetite masses which have been explored on the south side of the Chinati mountains at the diggings known as the Iron Works. These ore bodies are perhaps primarily the result of fusion by contact with the molten mass of the intrusives at each place, but no doubt they have later been altered and affected by solvent agencies following the zone of contact.

About 1 mile south of Spencer's spring, on the south side of the mountains, two explorations have been made on another contact of igneous intrusives. The uppermost part of one of these shows a cavern wall which is covered with a stalactitic calcareous deposit. Rusty cavern "box work," such as is seen in the Great Wind cave in the Black Hills, covers another wall. Limonite, galena and cerussite were the principal minerals in this location, and the latter occurs in a vein in the bed of an arroyo near by to the south.

**FISSURES.**—The main explorations of the Chinati mine, which is located about 2 miles west of the Presidio mine, have been made on a fissure vein bearing E. 10° N. This fissure is in the Cibolo limestone and its hade is about 37° to the north. It shows on the surface as a slight sag, running several hundred feet. About 100 feet to the south another fissure runs on a parallel course and this has also been found to contain some ore. Near the surface the upper vein, where excavated, shows several cavernous expansions, but farther down it is a well-defined fissure with stringers of galena and calcite, mostly next to the hanging wall. It has been followed for about 500 feet horizontally at three levels 100 feet apart.

In the hills of the same limestone, from 1 to 2 miles southwest of Humphrey's location, and about ½ mile west of the Iron Works mine, are three fissure veins which run north and south. These carry carbonates and silicates of copper in the form of chrysocolla, azurite and malachite. In some small excavations which have been made these veins show a thickness of only a few inches. One hade to the east and the other to the west at an angle exceeding 45° from the vertical. The limestone near the two veins which

\*Bulletin No. 8, University of Texas.



are farthest to the west has been changed to a marble.

**FAULT FISSURES.**—In the Humphrey mine 400 feet of tunneling has been done on a fault vein which follows the north side of a wedge of Cibolo limestone that has been let down several hundred feet as already described. The ore which has been brought up is limonitic and siliceous and has been found to contain lead (galena and cerussite) as well as silver. The quality of the ore is believed to warrant more extensive exploration. The ore lode has in one place been followed into a cavernous extension in the limestone block on its south side.

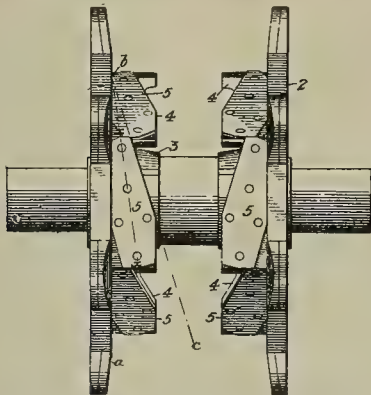
**FISSED ZONES.**—The Ellsworth mine in the San Antonio canyon is in what appears to be a fissured zone which cuts the diorite already described, and also the overlying lavas. Some rich pockets of native silver are reported from this claim and galena ore is also found. The trend of the fissuring is somewhat south of east.

## Mining and Metallurgical Patents.

PATENTS ISSUED JUNE 23, 1904.

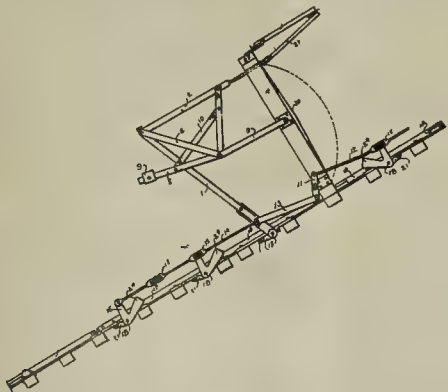
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

**TUMBLER FOR GOLD DREDGING MACHINES.**—No. 763,869; W. Ferris, South Milwaukee, Wis.



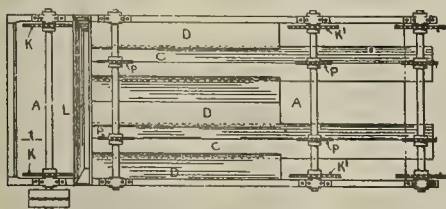
Tumbler for dredging machines and like, provided with non-rectangular tumbler faces, and interchangeable symmetrically formed wearing plates applied to faces, axes of symmetry of plates being bisectors of angles between two bounding edges of tumbler faces.

**MINE TRAP DOOR.**—No. 763,703; J. Wack, Canton, Ohio.



In mine trap door, frame consisting of two sections hinged together, upper section hinged at upper edge and lower section hinged to bottom of upper section, door posts having oppositely inclined faces upon their door sides, and mechanism adapted to open and close door.

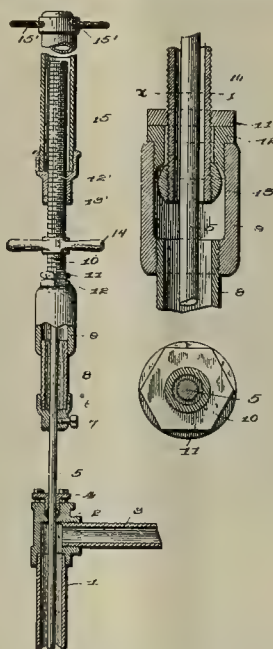
**PROCESS OF EFFECTING THE SEPARATION OF MINERALS.**—No. 763,749; G. A. Goyder and E. Laugh-ton, Adelaide, South Australia, Australia.



Method of separating minerals and extracting some of them as concentrates, steps of moving ore in finely divided state in solution which by production of

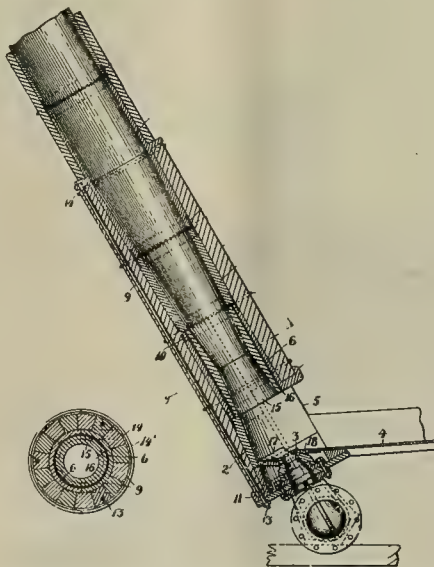
gas causes certain of minerals contained in ore to rise; and deflecting and guiding them as they rise.

**ADJUSTING DEVICE FOR OIL WELL PUMPING APPARATUS.**—No. 763,621; F. P. Myers, Trailrun, O.



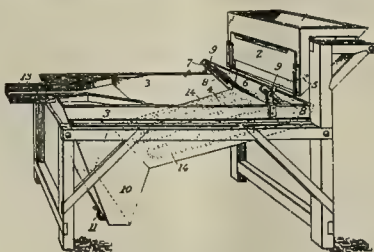
Device for oil well, consisting of combination of polish rod 5, grip 6 and means for attaching same to polish rod, threaded socket formed in grip, short section of tubing 8 engaging with socket, sleeve 9 attached to tube, threaded gland 12 placed in top of sleeve, gland adapted to confine section of tubing 10 therein, tube being provided with enlargement end 13 and loosely connected, jam nut 11 to prevent tube from turning, handle bar 14 attached to tube 10, threaded socket 12' and jam nut 13' operating along length of tube 10, outer tube 15 engaged with socket 12', and means 15' to attach device to walking beam, all arranged and combined for service.

**HYDRAULIC LIFT.**—No. 763,720; R. H. Campbell, San Francisco, Cal.



Hydraulic elevator, combination of series of loosely arranged aligned metal sections provided with peripheral annular grooves adjacent to their ends, packing bands in grooves and not projecting beyond surface of sections, exterior sectional wood casing for wood sections, certain of sections provided with annular peripheral flanges and tie rods extending between flanges to bind parts together.

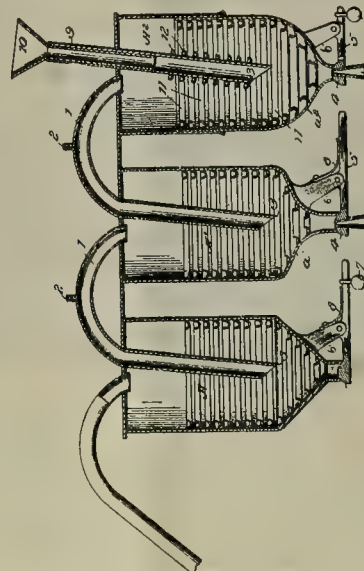
**APPARATUS FOR USE IN CERTAIN PROCESSES OF EXTRACTING SULPHIDES FROM ORES.**—No. 763,662; G. D. Delprat, Broken Hill, New South Wales, Australia.



In ore concentrating apparatus in which concen-

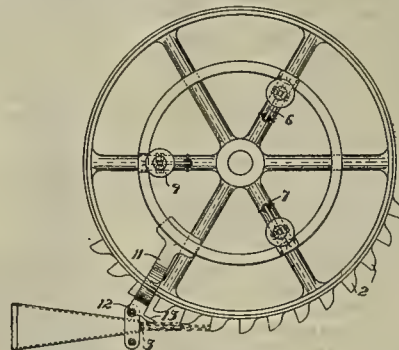
trates are floated to top of body of liquid, pan having inclined imperforate bottom down which ore slides, means to feed liquid to pan, sump at lower edge of bottom for tailings, discharge for concentrates at liquid level of pan, baffle plate between sump and pan extending from discharge to near lower edge of inclined bottom to maintain quiescent body of liquid in sump and at same time maintain flow of liquid from pan through discharge.

**ORE SEPARATOR AND CONCENTRATOR.**—No. 763,444; C. Van Hoesen, New York, N. Y.



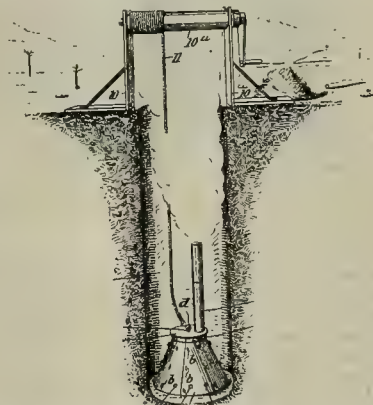
In ore concentrator and separator, combination of vessel provided in lower portion with outlet, valve closing upward with reference to outlet and provided with discharge to admit of continuous escape metal, and means holding valve seated under normal conditions, but adapted to permit valve to automatically open when metal accumulates in vessel and exerts excessive downward pressure on valve.

**WATER WHEEL GOVERNOR.**—No. 763,572; D. W. Starrett, Oakland, Cal.



Combination with water wheel having peripheral buckets, of governor comprising deflector movable in relation to discharge nozzle and adapted to impinge upon surface of impelling column, clutch mechanism carried by wheel, and actuating means in connection with deflector extending into path of clutch mechanism.

**PORTABLE APPARATUS FOR THAWING FROZEN GROUND.**—No. 763,612; C. W. Joynt, Seattle, Wash.



Thawing apparatus, comprising cylindrical fire chamber, lower portion being perforate, removable lid for fire chamber, hood cylindrical in upper portion and flaring in lower portion, hood being formed of detachable sections having draft openings in flaring walls near lower edges thereof, means to detachably secure hood sections together, and means to detachably secure cylindrical portion of hood upon upper portion of fire chamber.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

Work is progressing at the Humboldt mine, in Silverbow basin, near Juneau. The mill is dropping its ten stamps regularly.

It is reported that peat taken from a bog extending for 5 miles along Nome river will be placed on the market at Nome by the Nome Tundra Fuel Co., of which L. Walton is manager. Manager Walton owns a number of tin claims at Cape York.

## ARIZONA.

### Cochise County.

The Black Diamond mine and smelter, 7 miles from Pearce, owned principally by N. O. Baggage of Los Angeles, Cal., are running full capacity. About 150 tons of ore are being treated daily and about five tons of 60% copper matte is the daily output. From 100 to 125 men are on the payroll.

### Cocconino County.

(Special Correspondence).—The Anita C. Co. copper property at Anita, 15 miles from the Grand Canyon, has been put in shape for deep sinking by Manager T. C. Woodworth. A gallows frame, 40 feet high, has been built, a 10x14 geared double cylinder steam hoist, an 8-drill straight line air compressor, and two 50 H. P. boilers with condensers (water is scarce) have been put in. The shaft is 300 feet deep. They have started sinking it eventually to reach total depth of over 2000 feet to cut the red sandstone and marbled lime underlying the upper limestone which caps the section for 800 feet of depth. Manager Woodworth is working 30 men.

Williams, July 3.

### Maricopa County.

(Special Correspondence).—The Electra M. & S. Co., 11 miles east of Wickenburg, in Black Rock district, owned by Nickerson & Wilson, is doing work at the bottom of its 280-foot incline shaft. There are 320 feet of drifting from the shaft and some high-grade ore is on the dump. Heavier machinery is needed for further development work. The group consists of three claims, covering the vein, which is a fissure in granite.—Near the Electra is the Blue Lead with three claims on the same lead owned by G. Margaritch, who has a 200-foot tunnel and two shafts, 60 feet and 75 feet. The ore of the two properties is similar, being high grade copper, bearing gold.

Two miles northwest of the Electra on the Hassayampa river the White G. M. Co. is operating on a promising prospect. There are two parallel ledges 2½ to 8 feet wide cutting through a ridge formed by a sharp bend in the river and the entrance of Slim Jim gulch above. The ledges are 60 feet apart and tunnels on each of them are connected by crosscuts. From one tunnel a raise 116 feet has been made and a gasoline hoist will be placed above it and a shaft sunk 200 feet from the tunnel level above. When this is completed and the character of the ore determined a mill will be built. The tunnel will give backs of 600 feet. The ore is largely free milling and assays from \$4.50 to \$20. Country rock is granite. There are sixteen men at work and the owner, L. L. White, expects to increase production.—Two miles down the river is the Grijalva group, owned by Kingdon, Hirschfeld & Goldberg Bros. They have driven a 250-foot tunnel tapping the old workings, and plan increased development, but at present no work is being done.—Four miles below this (6 miles from Wickenburg) is the Oro Grande M. Co., which is starting a 20-stamp mill after two years of development work. It has 5000 feet of workings, and Manager Upton states that ore is blocked out on three sides to a depth of 300 feet. It is in an altered porphyry dike, the ore being a talcose schist and crystallized quartz with highest values carried in the red and black oxides. A 4-inch pipe line 1½ miles long has been completed with a pumping plant on the river near the lower end of the canyon.

On Slim Jim gulch, 2 miles from the Hassayampa and 15 from Wickenburg, is the Black Rock M. Co., A. D. Bellinger president and general manager. It consists of nine claims and covers two parallel fissure veins, averaging 3 feet in width and 3000 feet long. The ore is a free milling quartz and surface samples show average value of \$20 per ton. A shaft 135 feet has been sunk and at that depth iron sulphides and galena were found with a pay streak of 36 inches. In addition to the quartz veins there are on the property two mineralized porphyry dikes carrying values of free gold in oxides. They

dip toward the south while the veins dip toward them (north). Work is temporarily stopped. Machinery is on the ground for a 50-ton plant. Water for all purposes is supplied by a spring and flows to camp by gravity.—Two miles north of the Black Rock is the O'Brien or Homestake mine, recently incorporated as the Interior M. & Trust Co. The main shaft is down 320 feet, 4x8-foot manway, and has a hoist. At present depth of shaft sulphides are replacing the oxidized ores and Manager O'Brien is arranging for a reduction plant. It is expected a 40-stamp and concentrating plant will be put up. Last week the shaft house and hoist were destroyed by fire so that development work is suspended temporarily. The camp is supplied with spring water, and the Hassayampa river, 1 mile distant, will supply water for milling purposes.

Other properties in the district, now idle, are the Burson, Middleton, Keystone, Hamlin and Golden Rule. The latter is owned by a company with S. A. Hutchinson president.—Near it is the Amethyst group of eight claims owned by J. T. Cochran et al., on which 600 feet of development work has been done. Negotiations are pending for sale of the group.—East of these G. W. Morgan is developing a copper and gold group for the A. & C. M. Co. About 700 feet of tunneling has been done since December. The Whipsaw, 5 miles east of Morgan's Camp, is temporarily closed down. Between the two camps is a deposit of niter banded by Manager Foster and being banded by Los Angeles, Cal. men.

In center of Black Rock district, 12 miles from Wickenburg, is the Eagle C. G. M. Co., with five claims. Development work shows values in gold, silver and copper and the ledge at bottom of a 50-foot shaft is 15 feet wide. The company has been tied up by litigation, but they are now adjusted and Superintendent Jennings is resuming operations.—O. H. Perry is operating the Arizona G. M. Co. mine adjoining.—C. Goddard is doing development work on his claims 2 miles east of Wickenburg, with satisfactory prospects.

The Vulture property, 16 miles southeast of Wickenburg, was recently jumped by Sanders, manager of the Angel mine, who is doing location work, though the company has an injunction against anything further than that. The case will come up for trial at the fall term of court.

Wickenburg, July 2.

### Mohave County.

It is reported the Minnesota Con. M. Co., near Acme, has bought the water of the Lucky Boy mine and will convey it to their mill to increase the failing water supply at that point.—The Cedar Valley mill has started up on ores from the Queen and other mines owned by that company.

The Samoan M. Co., near Kingman, is building a railroad from the Roger Boy mine to the Samoan and Fourth of March mines. As soon as this work is finished the company will put in a hoisting plant and begin sinking to a depth of several hundred feet. Ore is being taken from the lowest tunnel level.

Manager W. A. Mensch says he is putting men to work on the Enterprise mine, in the Hualapai mountain, southeast of Kingman. A steam hoisting plant will be set up on the property and the shaft sunk to 300 feet. Levels will be opened at the 200 and 300-foot points and stopes started. It is purposed to heap-roast the ore and ship to the company's Needles, Cal., smelter at the rate of twenty tons daily. Owing to water produced by the mine, a sinking pump will be put in. By roasting the ore at the mine, where wood is plentiful, a saving can be made, says Manager Mensch.

### Pinal County.

The Batail M. Co., whose property is 2 miles from Kelvin, has disincorporated by judicial decree and all its rights, privileges and property transferred to the Gila-Pinal M. Co., which has assumed all the debts, liabilities and responsibilities of the old company, says the Florence Blade.

### Santa Cruz County.

H. Barnett of Patagonia, manager of Happy Jack M. Co., the property of which is near Patagonia, says for some time past the mines have been tied up on account of legal trouble among the stockholders, but arrangements are being made to resume. High-grade ore has been shipped to the El Paso smelter.

### Yavapai County.

At Santa Maria C. O. Carbaugh, J. H. Powers, T. W. Baker and C. Holmquist of Rockland, Ill., for the Jeannette-Arizona G. M. Co., have bought the Little Girl group of mines on the Santa Maria river, 5 miles southwest of the Golden Link Co.'s Sultan mine. There are four claims in the group. They will put men

to work this week and increase the number later.

The Oro Grande mine's pipe line north of Wickenburg has been finished and a pumping station put up on the Hassayampa river, 1½ miles from the mine. The supply of water is ample to meet all demands. The 10-stamp mill is running and thirty men are at work. The deepest shaft is down 300 feet. Test runs have been favorable and a 100-stamp mill will be put in next year, says G. B. Upton, manager.

## CALIFORNIA.

### Butte County.

At the Cherokee mine, near Oroville, owned by T. L. Vinton, a drift is being run. Three shifts of two men each are at work. The mine has plenty of water for hydraulic mining and expects to have until August 1st.

### El Dorado County.

(Special Correspondence).—The Crystal mine, near Shingle, is sinking, preparatory to increased development. The shaft is down 250 feet. Eight men are employed by S. G. Boorman, superintendent.

Shingle, July 3.

(Special Correspondence).—Ten stamps of the 20-stamp mill of the Gopher and Boulder M. Co. have been crushing ore taken from the east ledge since June 25th. J. Sipp is superintendent.

The new vertical shaft of the Lady Emma mine of the Karolyi G. M. Co. is being sunk to 200 feet, being down 100 feet. B. T. Peters is superintendent.

The shaft of the Union mine, near El Dorado, is down 1600 feet. This property has been extensively developed, all money for such development having been taken from the mine. The 20-stamp mill at the north shaft will be moved to the 20-stamp mill at the main shaft, giving a 40-stamp equipment. There are forty-five men at work. A. Harpending is superintendent and owner.

Kelsey (Slatington P. O.), July 4.

(Special Correspondence).—The 240-foot shaft of the Eureka mine, near Georgetown, is being unwatered by hoisting and pumping, preparatory to survey and sampling to be made of the underground workings. The temporary gallows-frame and hoist have been in use since June 25. Last winter a new vertical three-compartment (4 feet 4 inches by 4 feet 4 inches) shaft was sunk 181 feet. This will be continued, upon the installation of heavier machinery, to a depth of 650 feet, where it is expected it will strike the main vein, dipping 70° to the east. This work is preparatory to opening up the entire property of the El Dorado C. M. Co., including the Woodside, Eureka, Van, Modoc and Madrone mines, all of which were formerly rich in placer production. Two men are sluicing on the extension of the Eureka. W. E. Everson is superintendent.

At the Alpine mine no work is being done beyond running the pump to keep the mine dry. S. Collins is in charge.—At Georgia Slide, Flynn Bros. and G. C. Rare are working the Blue Rock mine by sluicing. The Beattie & Parson is drifting and sinking a shaft. All gravel removed in this work is washed. Four men are at work. C. Beattie has charge. Four men are at work at the Pacific, under the direction of W. Barklage.

Georgetown, July 5.

(Special Correspondence).—At the Water Lily mine, 3 miles from Georgetown, Superintendent E. Hart has finished installation of machinery for hoisting and pumping. A 40 H. P. boiler and engine run the friction hoist and a 7 H. P. equipment runs the rock breaker. A Dow pump with 6-inch suction and 5-inch discharge has also been put in to handle the water. The shaft is down 50 feet and 60 feet of tunnel have been run. Fourteen men are at work. The Water Lily is on an extension of the Clipper mine.

Georgetown, July 5.

The machinery for the Demetre mine, 2 miles above Georgetown, is on the ground.—J. M. Nougues, Jr., of San Francisco, manager of the Josephine mine at Josephine, says operations will be resumed at the mine.

W. T. Shurtleff et al. of San Francisco have bonded the Robles Grande mine near the South Fork of the American river, 3 miles below Coloma. The mine is a copper-gold proposition. Men are sinking a double-compartment shaft on the ledge. A 24 H. P. steam hoist is being set up.

### Kern County.

Los Angeles has been connected with the electrical generating and distributing plant at Kern river. From Kern river, near Bakersfield, over a transmission line 128 miles long, run three wires carrying 45,000 volts of electricity, and as soon as an additional power station is completed there, which will be by August 1st, it is said the voltage will be increased to 65,000, sufficient to generate 20,000 H. P.

The line has been completed by the Kern River Light & Power Co., H. E. Huntington manager, from the power station at Borel, on the Kern river, where the current is generated by means of turbines under pressure of water taken from the river 12 miles farther up stream. The wires are hung on the poles by 24,000 insulators, which weigh fourteen pounds each. These insulators are made of porcelain in four pieces. The power will be used by the electric railway systems in Los Angeles, Pasadena, Pomona, Riverside, San Bernardino and other places, and a number of manufacturing plants will also be supplied.

Near Randsburg a well-defined ledge is reported being developed in the Belmont and 1900 claims.—Development work on the Wells Fargo claim shows a 1-foot ledge of \$10 ore.—Development work continues on the Excelsior mine, owned by Fifeild, Barton & Tomson.—The Merced M. Co., operating in the Stringer district, have let a contract to sink an additional 80 feet in the main shaft, it being down 180 feet.

At the Butte Lode mine, near Randsburg, work is reported progressing. Returns from the June milling show from ninety tons of ore a total of \$6900 was extracted, says Superintendent McMahon.

### Los Angeles County.

Near Santa Monica the Salt Lake Oil Co., in which J. D. Wood, W. S. McCornick and J. E. Bamberger of Salt Lake City, Utah, are interested, has thirteen producing wells on its tract, each having capacity of 100 barrels and over daily. The wells are near the interurban electric line of the Los Angeles-Pacific Railroad Co., and the oil is piped to tanks on this road. The railroad company uses oil as fuel in the generation of electric power.

### Mariposa County.

At the Loughurst mine on the North fork of the Merced river, near Kinsley, J. Reynolds, owner, continues driving the lower tunnel. The vein is of decomposed quartz and free gold is showing.

### Nevada County.

J. Harrigan, T. O'Neil and four others report having struck ore in the Perrin mine, near Grass Valley. The men were working on a percentage with the company, instead of being on regular pay. In twenty-three days they took out ore netting them \$4000, as shown by the mill report, after the rock was crushed at the company's mill.

Men have been put to work at the Round Mountain Champion mine, near Nevada City. The water has been pumped out and the shaft retimbered to the bottom, says Superintendent Kartschoke.

Grass Valley reports say the Idaho-Maryland mine, which has been abandoned since 1901, will be reopened by B. Wilkinson et al. of Boston, Mass. The machinery is being overhauled in order that pumping may be started. The property is owned by S. P. Dorsey of Grass Valley.

### Placer County.

(Special Correspondence).—The Auburn G. M. & Co. is working the Buckeye mine, 5 miles from Forest Hill. The main drift is in 1300 feet and a 283-foot raise has been completed. The company is preparing to put in a Krogh roller gravel mill, a 6-foot Huntington mill and Wilkey table. As soon as these are in, Superintendent J. A. Johnston expects to open up with fifty men. The plant is expected to handle 150 tons of gravel per day.—The Mayflower is running a tunnel to tap the lower channel.

Forest Hill, July 6.

(Special Correspondence).—Work is being increased around Last Chance. The Placer Gravel G. M. Co. has bought up a number of claims, including the El Dorado and Missouri Flat channels, the Morning Star channel and the Root Hog. El Dorado channel had already been opened up and the others have been developed since the company bought them. The Morning Star channel was formerly worked following the downward course of the stream. This method had to be abandoned because of the accumulation of water. It has now been tapped from the lower end. This is the main channel of Last Chance. It is expected to take six or eight months to block it out and prepare for proper working.—The Root Hog channel has been tapped from below. It is yielding well at present, 105 ounces gold being stated as the cleanup of June 30. D. M. Ray has charge.

The Deep Canyon quartz mine, 3 miles above Last Chance, is being operated and developed by G. E. Moore of Port Huron, Mich. The property is equipped with a 5-stamp prospecting mill run by water power. Eight men are at work.—The New El Dorado quartz property comprises a number of locations owned by E. Hains, C. P. Tolotson, F. Tolotson, E. F. Kavanagh and M. Savage. They are bonded to Moore & Partridge, represent-



ing New York men. They contain four high-grade veins on the surface. A main tunnel is being run to determine whether these veins combine into one pay shoot and to find if the surface richness continues. Ten men are at work.

Three miles northwest of Last Chance, W. T. Davis and R. Caples are developing the Morning Star property. H. Parmelee and E. E. Parmelee are developing the Bishop mine, the southeast extension of the Morning Star. East of the Parmelee claim, A. J. Bishop and B. Caples are running a bedrock tunnel.

Last Chance (via Michigan Bluff), July 6.

(Special Correspondence).—Near Michigan Bluff, W. C. McGilvray is leasing and working the gravels at Horseshoe Bar.

The Hidden Treasure M. Co., operating the Hidden Treasure and Mountain Gate drift mines at Sunny South, near Michigan Bluff, started July 5 to sink a 720-foot shaft to meet the face of the drift. This is to be equipped with an electric hoist and will also be of material assistance in ventilation. A 40 H. P. electric locomotive will be used to help in hauling the cars in the tunnel, this work having formerly been done with a 20 H. P. motor. Commencing at the end of the first 4000 feet of the drift, a new 4000-foot tunnel is to be run in the cement. This will replace the sinuous drift in the swelling bedrock that has been used in the past. The drift follows the channel. Offices for the company and for H. T. Power, manager, have been put up at the new postoffice of Bullion.

Michigan Bluff, July 6.

#### San Bernardino County.

W. Osborne, who has been developing the Irish-American copper properties west of Needles, has closed camp temporarily. He will open camp again in the fall and continue development work.

#### Sierra County.

The Mexican quartz mine, near Downieville, on the South Fork, has been bonded to H. B. Tiedemann of San Francisco. The mine consists of four locations and includes the High Commission mine. Work will be started next week.

The Poor Boy gravel mine, near Downieville, owned by J. Mason et al. of Port Wine, has been bonded to T. A. Patteson, Jr., superintendent of the Pilgrim mine of American Hill. A. Fitzgerald has charge of the property and has started operations.

W. H. Squire, electrician of the Empire mine at Gold valley, near Downieville, says the company is unwatering the shaft and development work will be resumed.

#### Siskiyou County.

(Special Correspondence).—A gold find has been made in northern Siskiyou county, near the Oregon line, near Holland, Or. It was made by R. Briggs while tracking a wounded deer, on a steep hillside on the headwaters of Thompson creek. The gold-bearing ledge occurs in a contact of granite and porphyry. The values are of free gold in quartz.

H. B. Siskron is developing a quartz proposition near Holland, carrying gold values in hematite and limonite, some of which is high grade.

Holland, Or., July 5.

G. V. Gray has bought the Phillips mine, on Canal gulch (known as the Red Hill claim). It is 1½ mile from Hawkinsville. Gray has put men at work and will open up the mine. The ledge has a width of 3 feet and averages \$20 per ton, says the News. There is a shaft 120 feet deep and two open cuts.

J. Horn, owning a mine on Humbug creek, near Hawkinsville, is taking out ore preparatory to shipping to the mill. Teams are hauling ore from the mines of the Headwater G. M. & M. Co., on Humbug, to Yreka, whence it is shipped to Keswick. Manager Johnston says a body of high-grade ore has been opened.

T. A. Fisher of San Francisco, owner of the Columbia and Golden Eagle mines, in Scott River mining district, near Etna, has arranged for resuming work on the properties under J. B. Chase as superintendent. As development work proceeds the ore extracted will be run through the mill at the mine.

The Blue Lead group of copper mines in the Elliott Creek district on Siskiyou mountain, near the Oregon line, have been sold for \$175,000 to J. S. Allen et al. of New York. The group comprises twenty-seven claims, to which a railroad will be built for connection with the S. P. line in getting supplies and shipping product. J. F. Reddy of Spokane, Wash., who held the bond on the group, retains an interest.

#### Trinity County.

P. Joyce, superintendent of the Mason & Thayer mine, under bond to the Chloride-Bailey M. Co. of Carbon creek, says he is putting men to work to build a wagon road from Dedrick to the mine, a distance of 3 miles. The company is to

put up a mill in the fall. Joyce has men developing the mine.

#### Tuolumne County.

The Beehive M. Co., which has a bond on the Stinchfield gravel property on Mormon creek, near Sonora, will put in a gravel mill.

Supplies have been taken to the Hubert mine, near Groveland, and work is in progress. The shaft will be carried down to 60 feet.

The New Calico M. & M. Co., for \$6000, has taken a bond on the Calico mine, near Stent.

### COLORADO.

(Special Correspondence).—Railroad building in the mining sections of Colorado is active. The line from Silver Plume around Leavenworth mountain, in upper Clear Creek county, to the mines of that section is under way. The final surveys are being made and grading has started. This line will be the means of opening up new ground, as well as increasing output from the mines already in operation. The road will connect with the Colorado & Southern at Silver Plume.—Work is also progressing on the line from Sunset to Eldora, in Boulder county, being built by the Colorado & Northwestern Co., which operates from Boulder to Ward. The line from Central City and vicinity in Gilpin county, to connect with the Moffat line on South Boulder creek, is going ahead. This will be a feeder to the Moffat road from that section.

The trial of the men charged with blowing up the Sun & Moon transformer house, near Idaho Springs, last fall, is under way at Central City.—It is given out that the coal strike in the southern part of the State will be extended, not only to other camps in Colorado, but to districts in adjoining States, in order "to force the operators into line" to suit the miners.

Matters seem to be settling down in the Cripple Creek and Telluride districts. No more trouble is anticipated from those quarters. The citizens of Telluride are standing by their edict that the deported miners shall not be allowed to return to the district, as some of them returned and were again forced to leave. The mines in Cripple Creek are again in full operation. Denver, July 2.

(Special Correspondence).—The business and mining outlook in this State are improving. Many sections are undoubtedly better than for years past; the districts that have had labor troubles to contend with are beginning to recover. In Cripple Creek district the mines are back to their usual production and the outlook is indeed promising. Deportations still continue from this section. The coroner's jury inquiring into the deaths of R. McGee and J. Davis, the men who were killed in the riot at Victor on June 6, has declared the leaders of the Western Federation of Miners responsible for the riot. On this decision warrants were issued for a number of the leaders of the Federation. They will be brought to trial before the civil courts. The officers in charge of affairs in Cripple Creek district will find the guilty parties if possible.

In Telluride things are not improving as it was hoped they would. The Smuggler-Union mine and mill have been closed down indefinitely and it is rumored that other properties will follow the action taken by the Smuggler-Union.

Stratton's Independence at Victor has been closed on company account, and it is understood the ground will be blocked off and leased to responsible parties.

The Federal Government, through Commissioner Wright of the Labor Bureau at Washington, D. C., has detailed a man to visit Colorado and investigate the labor conditions here. The people who stand for law and order in the State will be pleased to have the Federal Government take a hand in the affairs.

Denver, July 4.

#### Boulder County.

Near Eldora the power plant of the Mogul mine is running and the air drills are in operation.—The Fourth of July tunnel is making progress. It is in 1845 feet and last week the drills cut two small streaks that show ore.—The United States G. Co. tunnel is being driven to cut the Monroe dike.

#### Clear Creek County.

Work has begun on the Silver Plume and Grays Peak railroad, near Silver Plume, the final surveys having been made. The distance from the Baltimore mine to the Santiago mine in the East Argentine district by this route is about 9½ miles. It is estimated the grading can be completed in two months with 200 men employed. A mill will be built at the Baltimore mine to treat the ores of the Hazelton-Santiago Con. properties and all the mines of the East Argentine district. The completion of the railroad will benefit the East Argentine section as the ores of the district will be transported at a low

figure, the present price of hauling being high.

Ore shipments from Idaho Springs for the first three weeks of June show increase of 65% over the same period of last year, says the Times. The three weeks' output for this year is 149 cars against 90 last year. While not so large as the production, the incoming shipments, principally of merchandise and coal, also show increase. For the same period 284 cars were received this year as against 191 last year.

#### Dolores County.

The San Juan Ore Co. has been incorporated by P. D. Sexton, C. E. Nobles, E. A. Franke, F. A. Otis and C. H. Jones of Chicago, Ill., to engage in extracting and refining ores in Dolores county. The principal office is in Chicago, Ill., with the Colorado office in Denver.

#### Gilpin County.

The Grizzly mine, southeast of the Lutz property in Russell mining district, has been started up by Russell Gulch men, under lease and bond. The property is owned by W. C. Hood of Georgetown, and the main shaft is down 200 feet. They will clean out the shaft workings. They propose putting up a shaft building and plant of machinery. Those interested are M. A. Harris, D. Davies, E. R. Fouts, G. Miller and T. Turner.

A lease and option on the Nemaha group on Bobtail hill, near Central City, have been given to J. E. Sidwell of Chicago, and part payment made. The property is on Bobtail hill in Gregory district and consists of three patented claims. The Nemaha main shaft is down 450 feet and the shaft of the Nemaha extension is 100 feet deep, and it is intended to sink the main shaft to the 1000-foot point and the Nemaha extension shaft several hundred feet deeper. The property has produced smelting and milling ores.

The J. C. Robertson I. Co. of Colorado Springs will reopen the Lillian M. Co. mines of Gilpin county, says R. Willis of Colorado Springs. The Lillian is patented and is at Russell Gulch, adjoining the Old Town mine. The Lillian has shipped smelting ore which averages 3 ounces gold per ton from one shoot. The property is equipped and shipments will be made regularly. The president is F. S. Bannon, and E. S. Giles, superintendent.

With completion of retimbering the shaft of the Freedom mine, near Central City, from top to bottom, the Freedom has resumed shipments. Milling ore is being sent to the concentrators, as well as high grade ore to the smelters. Besides these shipments, several cars of first class smelting ore are lying in the stopes to be shipped to the Argo smelter. There are ten men employed, five men in breaking ore, two trammers, two timbermen and one engineer, and as fast as new mill holes and stopes are opened up more men will be put to work, and Manager Borchardt expects to have twenty-five men breaking ore by the 15th inst. In raising with the stopes from the 500 to the 400-foot level, a strike of a high grade streak of smelting ore was made, averaging 18 inches wide. The length of the ore shoot is 300 feet. The stopes are nearing the 400-foot level. In addition to this, stopes have also been started in the 571-foot level on a 3-foot iron streak and production is being made from that level also. The mill in Chase gulch, bought by the company, will be running this month on Freedom ore, and the proposed driving of the tunnel from Chase gulch through the Freedom Extension and along the Freedom vein towards the main shaft and Freedom No. 2 shaft, now operated by leasers, who are taking out good ore, will make quite an economical change in the operation of the property, as the entire output of the property will then go through the tunnel and be delivered directly to the mill. This will do away with hauling and treatment charges, and as this tunnel will tap the main shaft at least 300 feet below the collar, it means a saving of 300 feet of hoisting and pumping. Eighty tons of ore sent from the Freedom mine to the Rocky Mountain concentrator yielded 42 tons of concentrates which were shipped to the Argo smelters.

#### Gunnison County.

In Tin Cup district much work is reported going on and the prospect of getting a railroad is stimulating mining. The West Gold Hill M. Co. has thirty men at work driving the tunnel and putting up a 100-ton mill. A body of concentrating ore running \$12 per ton is opened up.—The Brunswick M. & M. Co. is refitting its mill. The tunnel is in 1150 feet. They are also drifting on the Little Mack vein and ore is being taken out.

A settling dam is being built by the Iowa M. Co. on the Bertha placer near Tin Cup. Fifteen men are at work and they will start washing gold this week. Developments are reported favorable

at the Woods Investment Co. property, and the mill will be started up next week to concentrate the ore in sight.—A strike has been made by Hubbard, Haynes & McManus on the Star mine on Italian mountain. A vein 7 feet wide, assaying 20 ounces silver and 30% lead was cut in the bottom of the 90-foot incline. They are drifting on the vein.—About twenty-five men are working on the Enterprise mine. They have large bodies of low-grade ore exposed in the tunnel, which is in 3000 feet.

The Spar C. M. & T. Co., with workings at White Pine, has been incorporated by F. W. Downs, W. D. McIntire, J. Landigra, E. E. Timm and F. N. Stiles.

The strike reported made by Hurley, McShane & Short on Copper mountain, 2 miles from Pitkin, toward Bowerman, has been opened up for 40 feet.—G. Brant, manager of the Golden Islet mine, has doubled the number of men. Two shifts are working in the raise and one shift in the drift. Machinery is being hauled to the property and building a 10-stamp mill has begun.

The Climax and Chicago claims have been sold to J. E. Phillips of Denver. These claims are in the Gold Belt and lie between the Golden Islet and Raymond properties, near Pitkin. Phillips will do extensive work on the property and will put in machinery.—A. E. Moyn, owner of the Maid of Orleans group of ten claims on east side of Quartz creek, opposite the Mineral Farm basin, is preparing to increase development. In the Maid of Orleans tunnel, which has been driven 100 feet, a 10-foot vein of ore is showing, which is said to run 12% zinc. On the Zinc King a 7-foot vein of 13% zinc is opened up.

Tin Cup reports say C. J. Carpenter and J. Waldron of Brunswick, N. J., interested in West Gold hill mines, comprising the Blistered Horn tunnel and Brunswick M. & M. Co.'s property, say arrangements have been made to drive the tunnel, which is in 1000 feet, ahead 1000 feet farther, which at that length will have a vertical depth of 1100 feet. At a point 500 feet from the present head, it is estimated the Jimmy Mack vein will be cut, where already the vein has been explored by shaft and drill holes to a depth of 900 feet. A. Lejune, manager, says ore bodies were shown by the drill holes. Beyond this point it is planned to cut the different contacts, such as the Gold Cup and Tin Cup contacts. It is planned to make trial shipments of milling-grade ore in carload lots.

#### La Plata County.

Between Wall and Kennebec gulches and about the Oro Fino hill, near Durango, there are from 200 to 250 men at work, either mining or prospecting, says the Times. Farther south in the Lightner creek sections several development enterprises are progressing. Since the May Day discovery in the south part of the district, which has shipped ore regularly, putting in heavier machinery, the Lightner country has been prospected more than formerly. The Sunrise lead, owned by the Three Metals Deep M. Co., 3 miles distant from the May Day, is said to be similar in its vein construction. Between the Lightner creek country and the May Day is Deadwood gulch, where prospectors are working on iron sulphide veins. The gold values in this section are low, with few exceptions, so far as surface workings have shown.

#### Park County.

The cyanide mill at Montgomery is now running on ore from the Magnolia dump. It is treating thirty tons per day.

The North London mine will add a night shift, says the Alma Bulletin. Work on the raise is going on steadily, but it is estimated that it will take until Sept. 15th to complete it.

#### San Juan County.

The weekly output from the mines of San Juan county is as follows, says the Silverton Standard: Silverton M. Co., four carloads of ore and one car of concentrates; Highland Mary, one car of ore; Gold King Con., twenty-one cars of concentrates; Silver Lake mines, twenty-one to twenty-eight cars of concentrates; Champion (from drift alone), one carload; Sunnyside, five cars of concentrates; Brooklyn, one carload of concentrates, also an occasional shipment of ore; Shendoah No. 3, two cars of ore; Dives, one car of ore; North Star Fraction, one car of ore; Iowa Tiger, irregular shipper in good quantity. The cars are loaded with twenty-five tons each. Approximately, the ores going out over the D. & R. G. from Silverton weekly aggregate 1400 to 1600 tons.—The Columbia mine, above Gladstone, J. Bordeleau owner, has started up with five men on contract work.

The Brooklyn mine, near Silverton, is supplying the mill at the Burro bridge with eighty tons of second-class ore weekly. This is concentrated four into



one. A retort of the amalgam from the plates is made for every carload of concentrates shipped. Besides this output, first-class ore is being sent out to the smelters weekly. Machinery equipment in the mill is being increased.

The Little Maud mine, near Silverton, through expiration of bond held by A. Rice et al., is being worked by H. Born, its owner. He claims a 23-inch streak of ore in the drift, which can be sorted to a high-grade product in paying quantity. The pumps of the North Star mine, on Sultan mountain, which were inadequate to control the heavy flow of water for sinking purposes have been "pulled."

The holdings of the Gold King M. Co. of Silverton have been sold to the Venture M. Co. for \$5,000,000.

#### San Miguel County.

The Nellie and Ella mines, on Bear creek, 2 miles from Telluride, are producing enough ore to keep twenty stamps of the San Miguel Con. 120-stamp mill running night and day. The pulverized ore is put through a fine mesh screen and from forty to fifty tons are treated daily. The ore carries uniform values in gold, running \$10 per ton. Large quantities of ore are reported blocked in the mines.

#### Teller County.

The Findley G. M. Co. and the Valley City G. M. Co., at Cripple Creek, the latter owning the Shurtleff No. 2 claim, are to be consolidated, says the Gazette. By the consolidation of these properties apex litigation will be prevented. In the Findley property three shifts of miners are at work continually, hoisting ore. It is said they are breaking the ore for a width of 40 feet.

Harrison & Seaver, lessees on the W. P. H. mine at Cripple Creek, are shipping a car of ore per day. The production from the W. P. H. during June was 750 tons. The ore gives an average of \$70 per ton. The greater portion of the ore being shipped is mined from a drift extended 130 feet west of the shaft at a depth of 325 feet. They have two other ore bodies, but work is confined to the bottom level.

The Shurtleff No. 2 claim, on Bull hill, Cripple Creek, containing 2.95 acres, has been sold to A. E. Carlton for \$250,000. Ore is being hoisted by three shifts and is being broken 40 feet wide.

Lessees operating the Sweet shaft of the Gold Bond Dev. Co., on Bull hill, Cripple Creek, will deepen their shaft an additional 275 feet, giving it a total depth of 400 feet from the surface. The shaft, which has reached a depth of 125 feet, has been sunk on the incline, but it is intended to straighten out the block before starting to sink. The new leasing company has a 4-foot vein in the bottom of a winze in the 125-foot level which assays two ounces gold.

Though the mines of Cripple Creek district were closed down, as well as the samplers, for one week—June 6th to 16th—the output is reported satisfactory. The mills, as well as the samplers, had to draw on the reserve ore or otherwise the output must have been lower than the figures given. May was the banner month since the strike was inaugurated August 10th last. The tonnage in June was 7800 tons less, the average value was \$1 lower, while the total value fell short \$288,800, says the Cripple Creek Times. The following table shows the ore treated by the mills and the smelters:

	Tons.	Value.
Smelters.....	8,500	\$340,000
U. S. R. & R.....	18,000	450,000
Portland mill.....	6,500	195,000
Telluride.....	6,500	210,000
Economic.....	2,400	96,000
Doreas.....	2,500	112,000
Homestake.....	6,000	34,000
Sioux Falls.....	2,000	8,000
Cyanide plants.....	500	2,000
Totals.....	54,200	\$1,607,000

#### IDAHO.

##### Ada County.

Boise reports say a smelter is to be built there. The Boise M. & S. Co. has been incorporated by J. Bartlett, J. Dillon et al. of Toledo, Ohio. The plant will draw ore from Pearl, Horseshoe Bend, Black Hornet and other districts near Boise.

##### Blaine County.

The Bullion and the Mayflower mines, near Hailey, will be reopened under management of H. S. Bunting of Chicago, Ill., who has a lease and bond. It has been shown, says the report, on the Minnie Moore that the disappearance of the silver-lead ore bodies is due to a fault in the formation, and the Minnie Moore is producing more ore than formerly, having a daily output of two cars, which brings in \$100 per ton. It is operated by I. E. Rockwell, et al., of Chicago, Ill.—The Quincy-Julia Co., which owns the Elephant mine, has had men on development work since last fall and has opened up ore in the workings. Shipments are expected before the close of the summer. —A great deal of new work is in

progress in the Little Wood River district, 40 miles from Hailey, and near the Muldoon mine. There are 100 men at work developing and prospecting. The most work has been done on the Bradley claims, from which shipments are being made which run 100 ounces in silver and 52% lead.—At Ketchum the Guggenheim Exp. Co. is working men on its claims.

##### Idaho County.

The New York C. M. & S. Co. has been incorporated to operate in the Upper Snake River mining district, above Lewiston, by J. J. Moynahan of Spokane, Wash., C. R. Kendall, A. J. Murphy, M. S. McDonald, A. McClaudin and P. E. Seelye. The company will develop and operate properties in the Eureka mining district on Innaha creek, 1 mile from the property of the Eureka M., S. & P. Co.

##### Nez Perce County.

The Rosetta M. Co., operating in Rosetta district, 24 miles from Lewiston, is putting in a 10-stamp mill with which to work its \$10 gold ore.

##### Shoshone County.

The Monitor mine, 7 miles south of Saltese, Mont., is being pumped out, preparatory to being worked. It is near the Bitter Root divide on the Idaho side.

##### Washington County.

S. Dorsey, J. C. Rogers and W. Hayward, who have a bond on the Blue Jacket group at Landore and on the old Peacock mine in Seven Devils district, have put men to work on development.

A company has been organized by C. Green et al. of Boise to dredge bars in the Snake river, 12 miles below Weiser. Plans for a dredging boat have been prepared and it is stated construction of the boat will begin this month. A 100 H. P. boiler and a 20 H. P. engine will be used. The dredger will handle 2000 yards of gravel per day at a running expense of \$60 per day.

#### KANSAS.

##### Cherokee County.

At Baxter Springs mining is reported active. About twenty shafts are sinking and considerable drilling is being done. —The Sunny Side mill is running steadily and making a ton of jack per hour. The mill is running ten hours per day, but work goes on underground night and day.—Ford, Troupe & Co.'s new mill has been fired up and the jigs are bedded. A large body of ore has been developed there.

The Dark Horse mine at Baxter Springs is hoisting ore, both lead and silicate.—D. B. Perkins has his shaft to the ore body. The drill showed a large amount of free ore there.—The Grace Hill M. Co. drill is down 80 feet in promising ground.—The Baxter M. Co. has begun drilling on the Mattie Dardenne land.

#### MISSOURI.

##### Jasper County.

In Webb City and Cartersville district the Mary Louise electrically operated mill on the Missouri Zinc Fields mine has begun operations, says Manager Coyne. He will not be able to run up to full capacity till next week, as the delay in the shipment of the hoister held him back on the opening up of the ground. It is said that electricity within the next few years will supplant steam in the district as the motive power for concentrating plants. —The Venture mill and lease on the Connor land have been sold to J. W. Durby.

The Stepp & Keyser mill, near Webb City, is closed down temporarily to put in a compressor, as the ground is in shape for use of more machinery.—The Great Scott tailings mill on the Aylor land has started operations, and on its trial run of some of the tailings produced ore at the rate of six tons per shift, says Manager Scott. He says the output can be run to thirty tons per week on single shifts, but owing to the fact that the Lucky Budge Nos. 1 and 2, Holy Smoke Nos. 1 and 2, Avondale Nos. 1 and 2 and Old Dominion are running double shifts, a night shift will be put on at the tailings mill. The plant has been wired for electric lights.

Hollingsworth & Co. of Cartersville, who have the lease of the Main street mining property, near Carthage, and have been opening up their ground, have put their mill in operation. In one shaft they made five and one-half tons of jack from 173 tubs of dirt, after bedding the jigs.—Ashcraft & Burch have completed another drill hole on the Ashcraft-Reynolds land, near the line of the Underwriters land, on which is located the Golden Rod mine, owned by W. R. Caulkins & Co. The ore was found at a depth of 172 feet and shows good cuttings to 184 feet, the usual amount of lead being found with the zinc. They have started a shaft on the first drill hole put down by them.

Transfer of 560 acres, of mining land north of Joplin has been made from the

Mexico-Joplin Land Co. to C. M. Wilson for \$200,000, says the News-Herald. Wilson will further develop the property with drills, which are being set this week. The land is surrounded by the Sherwood, the Creller & Young, the Lincoln-Mitchell and other producing mines on the west, Tuckahoe on the south and the new developments of Webb City parties on the east.

The Vandalia mine, near Joplin, has been sold at sheriff's sale to satisfy labor claims and other judgments, and was bid in by C. F. Brown for \$1075.

At Zincite the strike in the new shaft 300 feet south of the Scranton mill is reported improving.—The reorganized company on the G. B. Young land, consisting of R. Burr, F. McCrary, J. Walker and D. Powers of Zincite, and A. F. Place of Humeston, Ia., began work last week.

The Liberty Bell shaft, east of the Daisy Belle plant, near Zincite, is being sunk by contract.—Kirkpatrick & Son of Webb City are sinking a drill hole in their shaft west of Radish Hollow.—The First Iowa mine in Radish Hollow has struck ore in the shaft.—Many of the mines reported are having trouble with water.

##### Washington County.

T. W. Hill of Webb City has an option on eighty acres in Washington county and two shafts started. Good shines have been found, but it is all free ore, says Hill.

#### NEVADA.

##### Elko County.

M. M. Johnson, who has bonded the Greenback mine at Mountain City, says the sacked ore on the dump awaiting shipment averages 1000 ounces silver and \$32 gold per ton. In the Nelson group a drift is being run both ways on the 400-foot level on 4 feet of ore. In one drift 2 feet of this averaged \$20 gold and 200 ounces silver, and in the other drift 14 inches of ore averaged 400 ounces silver and \$10 gold per ton. The mill is crushing thirty tons of second-class ore daily, the coarse concentrates of which give an average of 230 ounces silver and \$15 gold, the fine averaging 65 ounces silver and \$200 gold per ton.

##### Lander County.

It is said the Tenabo M. Co.'s property at Cortez has been closed down for an indefinite period. Five men are retained to look after the property.

##### White Pine County.

The Ne Plus Ultra group is increasing production as a lead mine. A preliminary 75-ton shipment netted \$35 per ton, the ore running, in addition to gold and silver, 60% lead. A contract to deliver 2000 tons more to the same smelter has been signed, and a steam hoist will be set up this month. A new shaft has been started and it has reached a depth of 60 feet. The mine adjoins the Rocco-Homestake, near Hamilton.

#### NEW MEXICO.

##### Grant County.

The concentrating plant for the St. Louis mine, in the Burro mountains, near Lordsburg, has started up. The company has added five tables to the Frue vanners and is putting in two pumps with a capacity of 100,000 gallons daily; also, an electric light plant of seventy-five lights. New steel rails for the mine are being put in.

J. C. Woodward will start work on his Casino mine, near Lordsburg.

##### Lincoln County.

W. P. Thompson, superintendent of the coal mines at Dawson and at Coalora, says the mines are working with a reduced force, due to lack of demand for coal.

##### Taos County.

J. K. Turner, manager of the San Cristobal C. Co., near Arroyo Seco, says the company is working a dike of a low-grade ore which is 80 feet wide. The ore runs \$3 in gold per ton, and will be worked in the 40-ton cyanide mill in course of erection. Should it be proved that this ore can be treated at a profit, the company proposes to build a cyanide mill of 500 tons capacity.

W. Penn and J. Melson are working and developing the Melson mine at Red River and report having struck payable ore.

#### OREGON.

##### Baker County.

To reopen and operate the Virtue mine, near Baker City, the Virtue Mines Dev. Co. has been incorporated by J. K. Romig, S. L. Baer and C. A. Johns. The mine has been closed down for several months. It is 7 miles from Baker City and near the Emma mine. The ore is free milling.

#### UTAH.

For month of June the aggregate values of gold, silver, copper and lead output of Utah was \$1,780,200. In the preceding month, with thirty-one days, the value of the total output was \$2,004,700. For the output of copper matte from the valley smelters, the figures are slightly below those for May, says the Tribune. The difference can be partially explained by the two days' suspension at the Highland Boy smelter at Bingham when the new furnaces were being connected up. The estimated figures in pounds, including silver and gold with the unrefined copper, are 4,035,663 as against 4,326,000 for May. During the month the Utah Con. (formerly the Highland Boy) has increased its capacity nearly one-third by the addition of roasters and furnaces. The estimated figures in pounds are as follows:

United States.....	975,000
Blugham Con.....	990,042
Utah Con.....	1,126,621
American S. & A.....	938,100

Total..... 4,035,663

The dividends declared during the month were as follows:

Silver King.....	\$100,000
Daly West.....	72,000
Gemini.....	50,000
Annie Laurie.....	12,500
Grand Central.....	25,000
Tetro.....	3,000
Salvator.....	2,500
Century.....	3,000
Utah.....	1,000

Total..... \$269,000

##### Beaver County.

A strike is reported made in the Reciprocity mine, midway between the Horn Silver and the Cactus groups, near Frisco. The find was made at a depth of 60 feet from the surface and consists of 16 inches of silver-lead ore and from 6 to 12 inches of talc on each side of that. Assays show 42.5% lead, 80 cents in gold and 28 ounces in silver. Indications of copper are also coming in. The strike is in a fissure vein.

##### Juab County.

The management of the Swansea mine of Silver City has been unable to make satisfactory terms with the smelters for the profitable marketing of its large volume of low-grade fluxing ore exposed in the mine, says the Reporter, and there will be no resumption of operations and production.

##### Salt Lake County.

By August 15th the daily capacity of the Utah C. Co.'s works at Bingham will be increased from 450 to 600 tons of copper ore, says Manager Jackling. Thirty-two more Frue vanners will be put in. Work has begun on a 300-foot addition at the lower side and end of the present building. The crushing plant is capable of furnishing all the ore that can be handled by the extension.

J. P. McCarty says he is preparing to put in an oil drilling outfit on the tract of ground adjoining the holdings of Guffey & Gailey at Farmington. There are seventy-six acres in the tract.

The South Columbus M. Co. is preparing to operate machine drills at its mine at Alta, says Manager J. A. Jacobson. The company will secure its power from the Columbus Con. C. Co., which is ready to start its electric power and compressor plant. By 1500 feet of pipe the air will be conveyed to the mine. It is intended to increase development. It is said the vein opened up in the Alta-Quincy mine is in the territory of the South Columbus.

The Boston Con. C. Co. of Bingham will be equipped with a concentrator, says S. Newhouse. It is expected a start will be made before the close of the present season.

##### Plute County.

The Boston & Gold Mountain mine, near Marysville, is being prepared to resume work, says Manager Weal. The company will put up buildings and start work of extending the tunnel, which is in 260 feet. In addition to its Gold Mountain property, the company also owns mining claims (copper) in the Antelope district, and also a group of gold-copper claims in the Meadow Dry Creek country.

##### Tooele County.

It is said the output of the Ben Harrison mine at Stockton, owned by the Stockton G. M. & M. Co., will go to the Honerine mill, which is doing custom work in addition to treating the output of the Honerine mine, which averages 200 tons daily.

#### WASHINGTON.

##### Stevens County.

Ore is reported struck in the Nellie S. mine, near Chewelah, assaying \$20. The management has been drifting on the ore body for 40 feet, and there are 4 feet of ore in the face of the drift. The company is putting in machinery and will put in an engine, hoist and pumps.—W. W. Warner has charge of the Copper King property, in same district, and expects to start shipments from the mine this week.



They have opened up the ore body. Besides the Copper King and Nellie S. strikes there have been several other strikes in that district within the past month.

At Northport, the smelter of Le Roi C. Co., of Roseland, B. C., is running four furnaces at full capacity. The product being sent down from the mine is low in silica and is smelted with small charges of fluxing materials. The ore in reserve is fluxed with lime from the quarries near Northport and with iron ore being shipped from the Kootenay mine. It has been estimated that the end of July will see the last of the reserves of ore through the furnaces. Manager Wilson remains until end of that period. Beyond that, the company's plans are not given out.

A gold find is reported made on Sullivan creek near Metaline and Ione, on the Pend d'Oreille river. C. Gilmore, while prospecting for placer ground, found a 10-foot quartz ledge showing free gold. Other ledges have also been located.—The Whirlpool Placer M. Co. has placer diggings below the Gilmore ledge in which the pay dirt is reported high grade. The gold is coarse. The placer company has a good waterfall and is preparing to start hydraulic mining. The diggings are reached by train from Spokane to Newport and thence by boat down to the Pend d'Oreille river.

## WYOMING.

### Laramie County.

Guernsey reports say once more a large number of men are at work on the iron mines of the Colorado Fuel & Iron Co., and the 400 tons of ore mined daily will be increased to 1500 tons a day. By an agreement made, the Colorado & Southern is to transport all the ore from the mines, at Guernsey, to Pueblo, Colo., the shipments over the Burlington via Sidney, Neb., being discontinued. All of the ore being mined is taken from the four-compartment shaft, the ore heretofore having been mined in deep cuts with steam shovels. By deep mining ore of a higher value is obtained.

Cheyenne reports say J. Morris has made a strike in the Hecla mining district, west of Cheyenne. At a depth of 25 feet he opened up a vein of ore 4 feet in width, running \$30 per ton in copper and silver. Several Denver, Colo., companies, including the Hecla G. & C. M. & M. Co., own claims in the district.

## FOREIGN.

### AFRICA.

#### Rhodesia.

The Tanganyika Concessions, via Bulawayo, report at the Ruwe mines the April gold output was, from sluice boxes 349 ounces; March output, 300 ounces.

### AUSTRALIA.

#### New South Wales.

At the Broken Hill Proprietary mines at Broken Hill the output for four weeks ending June 15 (including product from ores bought), was as follows: Refinery products—Fine silver, 437,149 ounces; soft lead, 5531 tons; antimonial lead (estimated), 36 tons.

### BRITISH COLUMBIA.

#### East Kootenay District.

E. J. Roberts, representing C. Sweeney owner, says the Sullivan mine smelter at Marysville will be completed and operating early in September. He says his company will handle the ores of the Slokan country, and especially the "dry" ores. The Sullivan smelter is 25 miles from the Slokan country, in a direct line, but by railroad is about 75 miles.

After an idleness of two years the St. Eugene mine at Moyie is in full operation, with 300 men employed.

#### Nelson District.

The Ymir G. M. Co., at Ymir, reports for month of May: Forty stamps ran 28 days and 19 hours, crushing 2950 tons of ore, producing 789 ounces bullion, value (gross), \$8450; 220 tons of concentrates, shipped, gross estimated value, \$6250; cyanide plant treated 2090 tons of tailings producing bullion, estimated value, \$1100; sundry revenue, \$900; total, \$16,700. Working expenses, \$15,000. Development expenses during month, \$1690.

E. J. Stratton et al. of San Francisco, Cal., owners of the Mount Alamo M. Co., have bought the Pingree group of claims on Forty-nine creek, near Nelson. There are six claims in the group. There are three ledges—two of copper-gold ore about 5 feet wide and one of free gold 2 feet 8 inches wide. Men will be put to work this week developing the property.

#### Roseland District.

At the Cliff mine, near Roseland, E. L. Tate et al., of Spokane, Wash., are resuming work. At the start ten men will

be employed under R. Angus. By August 1st thirty men will be at work on the Cliff. The management will equip the mine with a compressor plant. In parts of the vein the ore is said to run 5% in copper. The question of transportation will have to be solved, although the wagon road from the mine to the railroad is in fair condition and a new road to the nearest loading point could be built at comparatively low cost, says the Roseland Miner. Eventually a spur will be run from the Canadian Pacific to a point below the mine, delivering the ore by tramway at the terminus of the spur.

#### West Kootenay District.

J. McGlone of Philadelphia, Pa., and C. E. Ehrehart of Hanover, Pa., report making final payment of \$11,000 on the L. B. group of claims at Trout Lake, in the Lardeau, for the Lucky Boy M. & M. Co. of Philadelphia. The total amount for which the property was bonded was \$23,000. The property has shipped \$30,000 worth of ore since it has been taken over by the company. Work is temporarily suspended on account of the lack of pumps to handle the water. The necessary machinery will be put in.

## CANADA.

### Nova Scotia.

R. M. Pope, manager and half owner of a gold group near Halifax, reports work progressing. It is the North Star mines, 50 miles southwest of Halifax, on Chester bay. It covers 1800 feet of a vein of low-grade, free-milling gold ore. The former owners had developed it with a 200-foot shaft, but encountered water and worked out the best of the ore on the 200-foot level. R. M. Pope and P. H. Moore have put in a 5-stamp mill and a sinking pump. The mill has been running since May 15. Men with an air drill were put in the bottom of the shaft and others began drifting on the 12-inch vein. The average value of the rock is said to be \$20. P. H. Moore has three claims there. A 10-stamp mill erected at one of the claims burned down, but will be rebuilt. The Canadian mines remain vested in the crown and 2% royalty is collected on the output, but twenty year leases are given, and the tax is not found to be onerous. Miners, Pope says, can be hired at \$1.50 and \$1.75 a day. Living is correspondingly cheap.

#### Yukon Territory.

Dawson reports say the gold output to June 30th has been \$150,000 more than during the same period last year. The season's output is estimated at \$13,000,000.

### CHINA.

#### Fukien.

U. S. Consul S. L. Gracey, at Fuchau, writes that French mining men have been making examinations of the mineral resources of the northwestern prefectures of Fukien for the last two years and have found deposits of coal and gold. These both give promise of profitable returns; the Societe d'Etudes du Fukien has applied for mining concessions in the districts of Kienning, Shaowu and Tungchow. A British company during same period has been exploring mining districts in the southern part of the province, near Amoy, but has not yet succeeded in obtaining satisfactory arrangements, as it is also asking for privilege of building a railroad from the mines to tide water at Amoy. The rights are secured through the mining board at Peking and the approval of the provincial authorities.

### COLOMBIA.

The Darien G. M. Co. at Cana reports during month of May having crushed 1569 tons of ore and obtained 1463 ounces of gold, of value of £5744. The new shaft was sunk 23 feet and raised 35 feet. They are dropping twenty stamps.

### MEXICO.

#### Chihuahua.

It is reported a deal is under way on the Puerto Rico mines, and the 10-stamp mill of E. C. Creel, near Sahuayacan, in western Chihuahua, for sale to G. F. Ellis of Santa Barbara, Cal., and P. B. Weare of Chicago, Ill. The Puerto Rico mines belong to Mexican mining men. The ores are silver-gold.

The Chicago-Mexican M. Co. has been incorporated to take over the Chicago silver mine, 40 miles west of Cusihuiriachic. The mine is owned by P. McDonald et al., who will start work this week. The officers are C. B. Reed, T. W. Gilmore, J. B. Myers and J. T. Costillo of Chicago, Ill.; P. McDonald is superintendent and J. B. Myers is secretary and manager.

T. H. Oxnham, manager of the Palmarejo & Mexican G. F., Ltd., operating mines near Chinipas, says that the unusually dry season has hampered milling operations at Palmarejo, but good rains

have fallen the past month and the mill is resuming normal capacity. Development on the mines is progressing favorably.

E. M. Parrish, of Parral, with F. Howard, is developing properties at Guazapares, in western Chihuahua.

#### Guerrero.

The Carrizal gold mines, near Carrizal, owned by a New York company of which J. R. Butler is president, are under water. The mines were flooded as a result of blasting in the face of the tunnel at the ninth level. The shots opened up a flow of water. Pumps are being put in to unwater the mine. The management is arranging for a complete electric plant and hoist.

#### Jalisco.

M. G. Perez, of Guadalajara, has taken over the "antigua" Spanish mines known under name of La Estrella del Sur y Anexas, and is organizing a company to work them. The mines are on the Una de Gato mountain in the southern part of Jalisco, two days' ride from Zapotiltic, a station on the Zapotlan branch of the Central. Two of the mines, the San Pedro and La Fortuna, are full of water. The ores produced by the mines in the past were largely of native silver, a specimen weighing two kilos, and assaying all but 60 grams pure silver. There is a wagon road from Zapotiltic to the mines.

The capacity of the mill at the Lupita mine, west of Ameca, owned by Colorado Springs, Colo., men, and managed by P. Fitzgerald, will be increased by addition of five stamps. A pipe line is being built to increase the water power. Ore has been blocked out in the Lupita. With the increased capacity of the stamp mill it is expected to increase the production to \$75,000 per month.

The Keystone C. S. Co., at Tapalpa, under management of A. L. Waters, has put in another boiler and the plant will run to full capacity. The company operates a smelter, concentrating plant and stamp mill. Shipments of copper matte have already been made.

F. W. Page, general manager of the United Mexican M. & M. Co., is putting in machinery for the fine-ore furnace completed at the cinnabar deposits owned by the company, near El Moral. The stack of the furnace has a height of 132 feet, and there are 14,000 square feet of condensing surface outside of the main conveying flue. The company has denounced the majority of the cinnabar deposits around El Moral, and development work is in progress at four, the Jesus Maria, Ojo de Agua, La Mexicana and La Evallina. At the Jesus Maria mine a tunnel 500 meters in length is being driven. The 100-ton custom mill which the United Mexican M. & M. Co. is preparing to build will be on the San Geronimo hacienda in Navidad district. The site of the mill is 30 miles from Mascota and five hours' ride from El Moral, which is also 30 miles from Mascota. In connection with the mill there will be a chlorination plant, reverberatory furnace, concentrating tables and a sawmill. The sawmill equipment is now being taken overland from Ameca, but the mill equipment will not be shipped until after the rainy season. The holdings of the company include 2000 acres of timber land. The ore of Navidad district are silver-gold.

It is reported that W. C. Greene of Cananea, Sonora, is interested in the company which is preparing to work the Rosa Amarilla copper mine in Autlan district. This property lies on west slope of the Sierra Madre and is accessible from the Pacific coast. Operations will be increased and the property equipped with facilities for heavy production. A standard gauge railroad will be built from the mine to the Pacific port of Navidad. The mine will be equipped with machinery and reduction works.

The San Rafael M. Co. of Guadalajara is working silver-lead property at Parnaso, 65 miles southwest of Ameca. The mine has been producing for a year and is equipped with a 5-stamp mill and table concentrators. They are putting in a plant to treat the tailings. The works have been handicapped by a scarcity of water for the past several months, but arrangements have been made for increased water supply. F. M. Fouts is superintendent.

The San Antonio M. Co., operating a 10-stamp mill, amalgamating pans and settlers on the Santiago river, six hours' ride from Hostotipaquillo, reports doing a large amount of custom work. This is due to development of mines in Hostotipaquillo district, and to the fact that the mines owned by the company are not at present producing heavily. L. P. Larson of Fremont, Neb., is president, A. Lundvall is manager, and J. O. Worden, superintendent. The plant is on the site of an old "hacienda de beneficio" (metallurgical works), which was established about the middle of the 18th century. The arrastras and patios of the ancient system

are said to be still capable of use. The plant is operated by steam and water power. The company owns the San Antonio, Verde and Palomas mines and a half interest in the San Jose mine. The products of the plant are shipped to San Marcos, the terminus of the Central branch.

The general scarcity of labor in Mexico at the present time is affecting the mines of Jalisco to some extent, says the Jalisco Times of Guadalajara. Within the past few months hacendados (ranch managers) have raised the wages of farm laborers from 25 cents per day to as high as 75 cents per day, and as a result many men have deserted the mines for the haciendas. At many of the mines laborers who formerly received from 40 to 50 cents a day are now receiving from 60 to 75 cents.

#### Sonora.

The cyanide plant of the Creston-Colorada M. Co. at La Colorada, is completed and is expected to be in operation next week, says Superintendent Doveton.

#### Tepic.

The Castellanos mines, near Ixtlan del Rio, are again at a standstill, says the Jalisco Times. These mines were sold two years ago to an English company in which W. Pearson and the MacArthur-Forrest Cyaniding Co. are interested. Machinery was put in, including a seventy-ton concentrating plant, and preparations made to operate the mines on a larger scale. For a time the production averaged \$30,000 per month.

#### Zacatecas.

The San Rafael El Grande M. Co., of which A. E. Stilwell of Chihuahua City, Chihuahua, is president, has bought thirteen mines in the State of Zacatecas. The principal of the mines is the San Rafael, and arrangements are being made to unwater it. Pumps will be set up in the Late shaft which is 1200 feet in depth. By taking the water out of the Late shaft, the San Luis shaft, which is 600 feet in depth, will be cleared, and as soon as this is done the old workings will be cleaned out and sinking resumed. Since the Stilwell interests obtained control of the property, mining operations have been carried on only in the upper workings of the San Luis shaft, which were clear of water. The ore there is of a low grade.

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 Personal.  
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F. J. McNAIR has returned to Leadville, Colo., from Denver, Colo.

F. G. KING of Redding, Cal., is in San Francisco, Cal., on mining business.

T. F. WALSH of Washington, D. C., is in Colorado, looking after mining interests.

F. A. THOMPSON is superintendent of the reduction works at Forks Creek, Colo.

F. J. HERTHAL, Jr., of Soulsbyville, Cal., is in San Francisco, Cal., on mining business.

W. J. DOUGLASS, a mining superintendent of Virginia City, Nev., is in San Francisco, Cal.

W. G. SCOTT has resigned as superintendent of the Continental-Alta mine at Alta, Utah.

E. J. SNYDER, manager of the Sonora M. & M. Co., is in Nogales, Ariz., from Utica, N. Y.

J. W. PHILLIPS, a mine manager of Silver City, Lyon county, Nev., is in San Francisco, Cal.

O. R. HARRINGTON is superintendent of the Anita copper mines, 40 miles from Williams, Ariz.

E. J. BUMSTED is assayer and civil engineer at the Highland Mary mine, Silverton, Colo.

W. W. WARNER is manager of the Copper King mine, near Chewelah, Stevens county, Wash.

J. M. HYDE, Professor of Mining in the University of Oregon, at Eugene, is in San Francisco, Cal.

J. STORM returned last week to Denver, Colo., from Silverton, Colo., and is now in Leadville, Colo.

F. SUTTON, interested in Tuolumne county, Cal., mines, is in San Francisco, Cal., from Sonora, Cal.

JESSE J. MACDONALD is examining mining property for the Mendoza C. C. M. Co. at Triunfo, Baja Cal.

J. JACOBS, superintendent of the Sultana mine at Angels, Cal., returned there last week from Colorado.

C. W. LEIMER, formerly of Denver,



Colo., is mill superintendent of the California King G. M. Co., at Pico, Cal.

G. DERN, manager of the Con. Mercur G. M. Co., is in charge of the company's mines and mills at Mercur, Utah.

R. A. F. PENROSE JR., mining engineer and geologist of Philadelphia, Pa., has gone to Australia on professional business.

H. T. POWER, manager of the Hidden Treasure mines, near Michigan Bluff, Placer county, Cal., is in San Francisco, Cal.

CHAS. N. TIBBITTS, general manager of the Mine & Smelter Supply Co., has returned to Denver, Colo., from the East.

R. N. JONES, formerly in charge of the Cornucopia mines, near Baker City, Or., for several years, is again in charge.

J. KASSON of Hillsboro, N. M., has returned there from making mine examinations in Graham county, Arizona.

J. W. ASTLEY, manager of the Snow Shoe mine at Phoenix, B. C., returned last week from a trip to England.

C. M. FUELLER has returned to Denver, Colo., from Socorro, New Mexico, where he was examining mining properties.

I. L. BRYNER AND R. H. SMITH, interested in oil properties at Coalinga, Fresno county, Cal., are in San Francisco, Cal.

E. H. POWER, manager and principal owner of the Rodman Bay mines, near Juneau, Alaska, is at the company's mines.

W. F. DUBOIS of Seattle, Wash., is superintendent of the Continental-Alta mine at Alta, Utah, vice W. G. Scott, resigned.

W. A. CLARK of Butte, Mont., owner of the United Verde copper mines at Jerome, Ariz., is in New York from a European trip.

R. ANGUS, at one time superintendent of the Le Roi mine at Rosslund, B. C., is superintendent of the Cliff mine, in the same camp.

JOHN ROSS, JR., superintendent of the Wildman-Mahoney mines at Sutter Creek, Cal., has returned there from San Francisco, Cal.

W. W. WORTHING, superintendent of the Rhetta Con. mine near Plymouth, Cal., has returned to the mine from San Francisco, Cal.

E. J. WILSON has resigned as manager of the Northport, Wash., smelter of the Le Roi Co. of Rosslund, B. C., to take effect August 1st.

R. D. SEYMOUR, manager of the Denver, Colo., branch of the Trenton Iron Co., has returned there from Chicago, Ill., and St. Louis, Mo.

M. J. AND W. P. O'MEARA returned last week to Salt Lake City, Utah, from a business trip to Nevada mines covering several weeks' duration.

R. M. POPE, formerly of Salt Lake City, Utah, owner and manager of gold mines near Halifax, Nova Scotia, is visiting in Salt Lake City, Utah.

J. S. ICKIS, part owner of the Barranca del Oro mine near Ixtlan del Rio, Tepic, Mexico, returned there last week from Guadalajara, Jalisco, Mexico.

L. W. TRUMBULL, E. M., has been elected to the chair of mining engineering and geology, University of Wyoming, vice W. C. Knight, deceased.

A. H. BROWN has resigned as superintendent of the Golden Gate mill of the Con. Mercur G. M. Co. at Mercur, Utah, to engage in leasing at Mercur.

W. E. BEATTY of Eureka Springs, Ark., has sold his Venture mill and mining lease at Webb City, Mo., and has returned to Eureka Springs, Ark.

CHARLES T. ALLEN, manager of the Union Steam Pump Co. of Battle Creek, Mich., has been unanimously elected president of the City Bank of that place.

H. C. HOLTHOFF, manager of the Power & Mining Machinery Co. of Milwaukee, Wis., is in Denver, Colo., on business connected with his company.

T. H. OXNAM, manager of the Palmarajo & Mexican G. F. Ltd., has returned to the mines of the company, near Chinipas, Chihuahua, Mexico, from England.

G. A. TWEDDY, until recently superintendent of the Boston quicksilver mine at Knoxville, Cal., has opened an office in Los Angeles, Cal., as consulting engineer.

J. K. TURNER, formerly with the Copper Hill M. Co., near Rinconada, N. Mex., is manager of the San Cristobal C. Co., near Arroyo Seco, Taos county, N. Mex.

A. W. MCCUNE, manager of the Cerro de Pasco copper mines, at Cerro de Pasco,

Peru, is in Salt Lake City, Utah, from Peru, having stopped at New York, en route.

PRESIDENT J. DERN of Salt Lake City, Utah, of the Con. Mercur G. M. Co. of Mercur, Utah, attended the annual meeting of the company at Jersey City, N. J., this week.

MANAGER C. W. WHITLEY of the American S. & R. Co. plants returned last week to Salt Lake City, Utah, after visiting the Pacific coast and a number of Nevada mining camps.

E. W. JONES, superintendent of the Cerro Azul Con. M. Co., operating near Imuris, in Magdalena district, Sonora, Mexico, has returned there from a seven week's visit in Mesa, Ariz.

J. ANNAND, former superintendent of the Tom Boy mill, near Telluride, Colo., has returned to Denver, Colo., from Obuassi, Ashanti, West Africa. He will spend some time at Delta, Colo.

C. M. BECKER, formerly assistant manager of the Smuggler-Union mine, at Telluride, Colo., is manager of the Stratton's Independence, Ltd., at Victor, Colo. W. W. Trevall has been appointed assistant manager.

PROF. W. F. DURAND of Cornell University, at Ithaca, N. Y., has been appointed as head of the department of mechanical engineering at Stanford University, Palo Alto, Cal., vice A. W. Smith, resigned, to become head of Sibley College of Mechanical Engineering at Cornell.

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**Commercial Paragraphs.**  
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THE office and salesroom of the Hercules Gas Engine Works of San Francisco, Cal., has moved into the new building, No. 63 Mission street.

A HANDSOME MAP in colors, correctly portraying the territory of the Russian-Japanese war and adjoining regions, is received from the Vulcan Iron Works Co., Toledo, Ohio.

THE Machinery Supply & Implement Co., 1926-30 Lawrence Street, Denver, Colo., are supplying the machinery and material for the testing plant of C. M. Strong, Ward, Colo.

A. M. MATTICE, chief engineer of the Allis-Chalmers Co., has returned from his European tour of inspection and has now settled down to the duties of his position in Milwaukee, Wis.

WALTER H. WHITESIDE has been appointed general manager of sales for the Allis-Chalmers Co., including the sales of their electrical department, i. e., the Bullock Electric Manufacturing Co.

A 50-TON concentrating mill, including Bartlett tables and all other machinery, has recently been ordered from the Colorado Iron Works Co., Denver, Colo., by the Ruby Basin M. & M. Co., of the San Juan district, Colo.

H. C. BOSWORTH, formerly with the Denver Fire Clay Co. of Denver, Colo., has retired from that firm and is now in the City of Mexico, where he has bought an interest in the assay supply business of the Hoffman-Pinther Co.

THE Durable Wire Rope Co., 16-24 Atlantic avenue, Boston, Mass., have installed in Machinery Building, Block 34, at the St. Louis Exposition, a full line of samples of their wire rope. They have also a ropedrive in operation.

A SHIPMENT of portable balances has recently been made by the Denver Balance Co., 3000 Larimer Street, Denver, Colo., to Bolivia, South America. They state they have received orders for their balances the past week from Butte, Montana, and Baker City, Oregon.

B. F. STURTEVANT Co. announce the removal of their entire plant from Jamaica Plain, Boston, to the new works at Hyde Park, Mass. With nine acres of floor space and modern appliances they will continue to manufacture blowers, engines, motors, economizers, forges, steam heating, ventilating and drying apparatus.

THE Holtzer-Cabot Electric Co., Boston (Brookline), Mass., have some time ago discontinued the issuing of a general catalogue, and publish instead special "bulletins" of the different electrical specialties manufactured by the company. These cover a wide range of electrical goods and will be sent to interested parties upon request by mentioning the MINING AND SCIENTIFIC PRESS.

THE Wetherill Separating Co., of 52 Broadway, New York, have their separators on exhibition at the Universal Exposition, St. Louis, in the Mines and Metallurgy Building, New York State

space (block 21): Type "E" No. 3, separating magnetite from hornblende and apatite; North Carolina Geological Survey space: Type "E" No. 1a, separating monazite from garnets and gangue.

JOHN W. CARY, formerly with the Mine & Smelter Supply Co., Denver, Colo., has formed a partnership with Thomas Fielding at 1711 Tremont Street, Denver, Colo. They represent the Power & Mining Machinery Co., manufacturers of the American Crossley gas engines, Loomis-Pettibone gas generating system, the Evans-Waddell Chilian mill and the Holthoff Mining Machinery. They will also handle the Rand Drill Co.'s line of machinery and are agents for the Rand "Rack-a-rock" powder.

AT a recent meeting of the stockholders of the Brown Corliss Engine Co. of Corliss, Wis., the stockholders voted on a proposition to increase the working capital \$150,000. This is designed to put the company in splendid financial shape, and to be in a position to carry on some of the largest work on the market. The Brown Corliss Engine Co. are building an up-to-date engine, and have one of the most modern shops in the country. With the increased capitalization they should be able to increase their business materially.

THE Star Brass Manufacturing Co., 108 East Dedham street, Boston, Mass., have recently issued their annual catalogue of over 300 pages, dealing with the steam engineering specialties which they manufacture and which are in use on battleships, cruisers and torpedo boats of the U. S. Navy, transatlantic steamships, electric light and power stations, factories, mills and mines. Copy of this catalogue may be obtained, by responsible persons, by addressing the company and mentioning the MINING AND SCIENTIFIC PRESS.

THE Allis-Chalmers Co. cordially invite MINING AND SCIENTIFIC PRESS readers to use as headquarters the facilities they have provided at their power exhibit in the Machinery Building at the St. Louis Exposition. The 5000 H. P. Allis-Chalmers engine and the Bullock electric generator which form this exhibit, furnish electric energy for the decorative lighting for the buildings and grounds of the Exposition. The installation stands in the center of the Machinery Building, with sufficient space about it to afford views of the largest generating unit ever placed on exhibition.

THE S. H. Supply Co., dealers in new and second-hand machinery and supplies, Twenty-second & Larimer Streets, Denver, Colo., have enlarged their quarters, and now occupy the second story of the building for their main office, the lower floors being used as a display and sales rooms. On Twenty-second Street, opposite their place, they have a building, 50x75 feet, used for store room for plumbers' supplies; on Larimer, directly opposite their main office, they have 50x50 feet for supplies; farther up on Larimer, near Twenty-third, a two-story building, 125x100 feet, is used for electric mining and milling machinery. In this building they will have in operation all of the types of concentrators, second-hand, including Wilfleys, Wilds, Bartletts, vanners, etc., and will have on exhibition the various makes of milling machinery. They have in contemplation a warehouse on the tracks, to be 300x100 feet. Since January 1, 1904, they state they have shipped eighteen carloads of machinery east of the Mississippi river and are now shipping nine carloads of Babcock & Wilcox boilers to Ashland, Ky. In a short time they state they will be manufacturing and selling the Wild line of machinery, including concentrators, mills, crushers, roasters and milling machinery.

\*\*\*\*\*  
**Obituary.**  
\*\*\*\*\*

J. R. RYAN of Virginia City, Nev., superintendent of the Con. California & Virginia, the Ophir, Andes and Hale & Norcross mines, and superintendent of the Comstock Pumping Association, died at St. Louis, Mo., on July 1st. Deceased was a native of Brighton, Mass., 55 years of age. He was miner and later assayer of the Carson City, Nev., U. S. Mint under the first administration of President Cleveland. For the last twelve years he has been in charge of mines on the Comstock. A wife and daughter survive him.

#### Dividends.

The Bunker Hill & Sullivan M. & C. Co., Idaho, July 5, dividend No. 81, \$75,000, a total paid since January 1st, 1904, of \$363,000, and total paid to date, \$1,896,000.

\*\*\*\*\*  
**Books Received.**  
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"Gold Assaying" is the title of a book on this important branch of metallurgy by H. J. Phillips. Unlike most works on assaying, this volume treats of gold assaying only. A chapter is devoted to the occurrences of gold, and others to the sampling of gold ore, and a thorough treatment of assaying apparatus and practice, not only of ores but of solutions in the cyanide, chlorination and other processes. In the appendix is found much miscellaneous and valuable information, beside tables of weights and measures. 138 pages, illustrated. D. Van Nostrand Co., 23 Murray street, New York. Price \$2.50.

#### New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 380 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING JUNE 28, 1904.

763,652.—HOSE COUPLING—J. A. Allen, Seattle, Wash.  
763,655.—GAS APPARATUS—C. M. Baker, S. F.  
763,657.—RAIL LUBRICATOR—M. W. Bird, Seattle, Wash.  
763,654.—FILTER BEDS—H. W. Blaisdell, Los Angeles, Cal.  
763,730.—HYDRAULIC LIFT—R. W. Campbell, S. F.  
763,563.—CULINARY UTENSIL—C. Canciani, Sonoma, Cal.  
763,594.—HOSE NOZZLE HOLDER—Annie L. Chubb, Oakland, Cal.  
763,541.—RANGE—Q. Crane, San Diego, Cal.  
763,470.—WRENCH—A. D. Erb, Hubbard, Or.  
763,475.—EXERCISING MACHINE—Frazee & Whitcomb, S. F.  
763,878.—SCHOOL DESK—Gilson & Rowe, Oakland, Wash.  
763,480.—HORSE RELEASE—F. C. Goettfert, Seattle, Wash.  
763,879.—SASH FASTENER—M. L. Gordon, Los Angeles, Cal.  
763,880.—SEWING MACHINE—G. I. Green, S. F.  
763,386.—FORCIPS—J. F. Hemphill, Arlington, Or.  
763,891.—HARVESTER—C. Hesse, Red Bluff, Cal.  
763,607.—UPHOLSTERY SPRING SUPPORT—J. Hoey, S. F.  
763,609.—SIDEWALK ELEVATOR DOORS—P. H. Jackson, S. F.  
763,663.—SIGNAL—H. L. Jennings, Clifton, Ariz.  
763,612.—THAWING GROUND—C. W. Joynte, Seattle, Wash.  
763,492.—DRAWER GUIDE—W. Laakso, S. F.  
763,773.—ROTARY MOTOR—C. A. Marlitt, Portland, Or.  
763,919.—GAS GENERATOR—P. Meyer, Santa Rosa, Cal.  
763,568.—PIPE DRESSING MACHINE—O. Quandt, Los Angeles, Cal.  
763,932.—NUT LOCK—J. M. Schofield, Stockton, Cal.  
763,573.—WATER WHEEL GOVERNOR—D. W. Starrett, Oakland, Cal.  
763,519.—PURSE AND HOSE SUPPORTER—Taylor & Flint, S. F.  
763,824.—WELL DRILL—H. H. Wilburn, North Yakima, Wash.  
763,584.—EXHIBITION CASE—D. Woods, S. F.

#### Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

UPHOLSTERY SPRING SUPPORTS.—No. 763,607. June 28, 1904. John Hoey, San Francisco, Cal. The object of this invention is to maintain spiral vertical springs which are used in certain classes of upholstery work in a vertical position, and it consists in a means for supporting and uniting these springs at both top and bottom in such a manner that with any compression or extension they practically maintain the vertical lines, and they are also united transversely by an elastic support.

LOCKING AND INTERLOCKING ATTACHMENT FOR SIDEWALK ELEVATOR DOORS.—No. 763,609. June 28, 1904. Peter H. Jackson, San Francisco. This invention relates to improvements in means for locking and interlocking doors such as are closable horizontally upon sidewalks or other places, and especially when used in conjunction with elevators which run between the basement and sidewalk level. The object of this invention is to lock and interlock such doors without requiring the operator to be on the rising or falling platform. It comprises automatically interlocking hook-shaped latches, one of which is weighted and has a connection by which it may be disengaged from the other to allow the doors to be opened as the elevator rises.

HOSE NOZZLE HOLDER.—No. 763,594. June 28, 1904. Annie L. Chubb, Oakland, Cal. The object of this invention is to provide a means for holding and directing hose nozzles in the sprinkling of lawns and the like. It comprises a conical spring between the coils of which a hose may be fitted and supported at any desired angle or position and from the upper coil of the spring the wire is returned centrally through the cone to provide a shank of sufficient length to be thrust into the ground, the opposite end of the spring being knotted or secured upon this shank.

WATER WHEEL GOVERNOR.—No. 763,572. June 28, 1904. D. W. Starrett, Oakland, Cal., assignor of three-fourths interest to F. D. Nowell, Juneau, Alaska. It is the object of this invention to provide a means for maintaining a substantially constant rate of speed for a momentum water wheel such as are driven by the impact of a stream of water under a high bill, such a water wheel having peripheral buckets, and a discharge nozzle delivering water into said buckets is provided with deflectors movable with relation to the nozzle so as to impinge upon the surface of the column and by means of a clutch mechanism a wheel and brake is operated between a fixed shoe and an annular shoe revolvable with the wheel.

HYDRAULIC LIFT.—No. 763,720. June 28, 1904. R. H. Campbell, San Francisco, assignor of one-half to Harron, Rickard & McConne of San Francisco. This invention is designed to be used in placer mines and pertains particularly to means



employing hydraulic jet for lifting gravel, tailings and the like above their original bed and depositing them on a higher level. The invention comprises a series of loosely arranged aligned metal sections, peripheral annular grooves and packing bands, tie rods for holding the parts together and an exterior casing embracing the intervening sections. In conjunction with these is a removable throat liner for the uplift pipe and yielding packing is fitted between the intermediate sections and the liner with means for holding the several parts together.

**REVOLUBLE EXHIBITION CASES.**—No. 763,584. June 28, 1904. David Wood, San Francisco, Cal. The object of this invention is to provide an apparatus in which photographs, pictures and the like may be mounted upon structures which are turnable in various ways so as to exhibit the pictures consecutively. In conjunction with these picture supports is a general turnable frame upon which they are mounted and means by which said frame may be moved to expose any desired picture. A slidable shutter is so connected with the mechanism that reciprocation of the shutter will partially revolve the supporting apparatus. Supplemental independent revolvable frames are mounted upon the main frame and means are provided by which these will be turned at stated intervals.

## Latest Market Reports.

SAN FRANCISCO, July 8, 1904.

### METALS.

**SILVER.**—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c, refined (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 46½c New York.

Within the week silver has advanced in price both at home and abroad. The New York quotation is 2 cents higher than that of last week. In his recent visit to San Francisco, Geo. D. Roberts, Director U. S. Mint, said there would be no more new silver dollars coined in any United States mint, the silver bullion purchased under the Sherman law being now all minted.

**COPPER.**—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.87½; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper, \$17.00; bars, 18@24c. London: £57 5s spot per ton.

**LEAD.**—New York, \$4.35; Salt Lake City, \$3.50; St. Louis, \$4.25 San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 13s 9d long ton.

**SPELTER.**—New York, \$4.95; St. Louis, \$5.00; London, £22 5s ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

**TIN.**—New York, pig, \$25.60 @ 25.80; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, \$30 @ 32½c. London, £117 spot.

**PLATINUM.**—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

**QUICKSILVER.**—New York, \$44.50 @ 45.50, large lots; London, £8 San Francisco, local, \$43 @ 43.50 per flask of 75 lbs.; Denver, \$46.00. Export, \$43.00 @ 43.50.

**BABBITT METAL.**—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

**ZINC.**—Metallic, chemically pure, \$1.10, 50c; dust, \$1.10; sulphate, \$1.10, .04c.

**NICKEL.**—New York, 40@47c per lb.; ton lots, 40@47c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

### STRUCTURAL MATERIALS.

**IRON.**—Pittsburg, Bessemer pig, \$12.85 @ 13.35; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$23.00 @ 23.00; open hearth billets, \$23.00 @ 23.00; San Francisco, bar, 7c to 12c per lb.

### CHICAGO CURRENT QUOTATIONS.

Bessemer .....	\$15 00@15 25
Foundry Northern 1 .....	13 75@14 00
Northern 2 .....	13 25@13 50
Northern 3 .....	12 75@13 00
Southern 1 .....	13 15@13 65
Southern 2 .....	12 65@13 15
Southern 3 .....	12 15@12 65
Forge .....	11 40@11 90
Charcoal .....	14 50@15 00
Billets, Bessemer .....	24 00@24 00
Bars, iron .....	1 30@ 1 35
Bars, steel .....	1 51@ 1 51
Rails, standard .....	28 00@30 00
Rails, light .....	24 00@26 00
Plates, boiler .....	1 91@ 2 01
Tank .....	1 76@ 1 81
Sheets, 27 store .....	2 26@ 2 31
Angles .....	1 76@
Beams .....	1 76@
Tees .....	1 81@
Zees .....	1 81@
Channels .....	1 76@
No. 1 railroad wrought .....	10 00@10 50
No. 1 cast, net ton .....	10 00@10 50
Iron rails .....	14 50@15 00
Car wheels .....	12 50@13 00
Cast borings .....	3 00@ 3 25
Burnings .....	6 00@ 6 50

**WHITE LEAD.**—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less

than 500 lbs., per lb., 7c; in 25-lb. tin pails, 7½c per lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, 7c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

**LUMBER.**—(Retail): Pine, ordinary sizes, \$24.00 @ 25.00; extra sizes higher; redwood, \$28.00 @ 30.00; lath, 4 feet, \$4.50 @ 5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @ 35.00.

**NAILS.**—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

**LIME.**—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

**CEMENT.**—Imported, \$2.15 @ 2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.45 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

**ANTIMONY.**—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300 @ 500-lb., 8½c; 100-lb. lots, 10½c.

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

**CAPS.**—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

**FUSE.**—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s, 11½c per set; 14 oz., 40s, 10c.

**CHEMICALS.**—Cyanide of potassium, 98½%—99%, jobbing, 23@24c per lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20 @ 1.40 per 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3¼@3½c; alum, \$2.00 @ 2.25; California refined, 1¼@2c; sulphide of iron, 8c per lb.; copper sulphate, 5¼@5½c; chloride of lime, spot, \$2.50 @ 2.75; sulphuric acid, in carboys, 66% B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

**OILS.**—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil boiled, bbl., 45c; cs., 50c; raw, bbl., 43c; cs., 48c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 68c; Sperm, crude, 63@68c; Natural White, 70c; Bleached, do., 80c; Whale Oil, cs., 52@57c.

**COAL.**—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.00; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$11.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$11.50, long ton.

**BONE ASH.**—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

**RED LEAD.**—500 lbs. and over at one purchase, \$1.10; 7c; less than 500 lbs., 7½c.

**LITHARGE.**—Pure, in 25-lb. bags, 8@9c per lb.

**BORAX.**—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

**MOLYBDENUM.**—Best, \$2.00 per lb.

**CHROMIUM.**—90% and over, \$1.00.

**PHOSPHORUS.**—American, \$1.10, 70c.

**SILVER.**—Chloride, per oz., 90c @ \$1.00; nitrate, 55c.

**MERCURY.**—Bichloride, per lb., 77c.

**MANGANESE.**—Pure, per lb., 60c.

**SODIUM.**—Metal, per lb., 50c.

**BISMUTH.**—Subnitrate, per lb., \$2.10.

**ALUMINUM.**—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c; Pittsburg, No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

**URANIUM.**—Oxide, per lb., \$3.50. (These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## SITUATIONS WANTED.

**ASSAYER, WITH KNOWLEDGE OF BOOK-keeping, wants position with mine or mill. Address J. L., this office.**

**EXPERIENCED ASSAYER DESIRES POSITION** with mining and milling company. Thoroughly competent in bullion, control and analytical work. Best of references. Address "Bullion," care of this office.

**EXPERT MINE FOREMAN WANTS POSITION.** Competent to handle extra difficult conditions underground. Address "Limestone," Room 602, 330 Market St., S. F.

**MANAGER OR SUPERINTENDENT FOR A** gold, silver or copper property; 20 years' experience in different parts of the country. All references. Can furnish any bond. Mexico preferred. Address D., this office.

**MILL AND CYANIDE SUPERINTENDENT** wants position. Thoroughly understands milling of gold ores and the cyaniding of same. Good assayer. Address D. A., this office.

**MINE SUPERINTENDENT IS OPEN TO ENGAGEMENT** with a live company. Thoroughly understands his business. Address B. R., this office.

**POSITION DESIRED AS SUPERINTENDENT** to develop or operate mine and small mill; will do own assay work; would accept part salary in stock; experienced all round man; excellent references. Address "Dividend," care of this office.

**WANTED, POSITION AS SUPERINTENDENT** of mine and mill; amalgamation and concentration; competent assayer and analyst; good references. Address "Vanner," care of this office.

## HELP WANTED.

**WANTED AT ONCE, A PRACTICAL ALL** round Miner and Mill Man for gold mine now being developed in South America, Republic of Colombia. Climate good. Must speak Spanish and be able to handle peon labor. Must thoroughly understand cyaniding and other modern methods and be competent to take entire charge of mine at times in absence of superintendent. Must not be a drinking man, but a pusher. Young man with technical education and Western experience preferred. Good references required. Chance to advance. Address, stating salary expected with full particulars, South American Development Co., R. 410 Ft. Dearborn Bldg., Chicago, Ills.

## Michigan College of Mines.

F. W. McNAIR, President.

A State institution located in and making use of an active mining district. New Metallurgical Building and Gymnasium completed in the fall of 1904. For Year Book and Record of Graduates apply to President or Secretary. Houghton, Mich.

**CYANIDE TANKS ERECTED.**—Having been engaged in erecting steel Cyanide Tanks for the past six years, and having erected tanks at the following well-known plants—Ymir, B. C. San Sebastian of C. A. Octave of Arizona, Seal of Gold of San Bernardino, Cal.,—which in each instance have given perfect satisfaction, always using the labor at hand and thereby making a great saving to the company in traveling expenses for skilled labor, I am prepared to make engagements for further work. Can furnish the best of references as to ability and workmanship. Address Box 25, this office.

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stands alone as the greatest known invention for the prevention of water and oil escaping from the exhaust pipe and to deaden noise of exhaust.



"If we had 100 more exhaust pipes we certainly would not be satisfied until we had them all equipped with the Burt Exhaust Heads."—Zeeland Milling Co., Zeeland, Mich.

The time to order is NOW. Send size of pipe; if dissatisfied, return.

**THE BURT MFG. CO.,**  
Largest Manufacturers of Exhaust Heads in the World,  
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has neither weights, levers nor direct acting springs, and will sustain a constant back pressure without clattering, hammering, or noise of any kind.

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NEWARK, N. J.

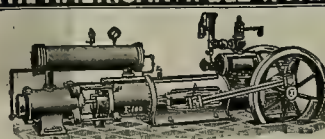
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The man who has  
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TIME  
every time

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REMOVES CORES FROM ROCK OR MINERAL FORMATIONS

CHICAGO ILL. SALLAS TEX. AURORA ILL. U.S.A WRITE FOR CATALOGUE



# MINING AND SCIENTIFIC PRESS

Whole No. 2295.—VOLUME LXXXIX.  
Number 3.

SAN FRANCISCO, CAL., SATURDAY, JULY 16, 1904.

THREE DOLLARS PER ANNUM.  
Single Copies, Ten Cents.

## Secondary Enrichment.

The secondary enrichment of ore deposits by the oxidation of the ores of the sulphide zone, and the reprecipitation of the minerals under conditions which were favorable to their redeposition, at lower levels, has come to be accepted as a fact, but there are instances wherein it is difficult to account for the extreme richness of some of the ore found in the zone of enrichment. The phenomena have been chiefly studied with reference to the copper deposits at Butte, Montana, which appears to offer the most tangible evidence to support this really rational theory. It was recognized for many years, before the "secondary enrichment" theory took definite shape, that the iron gossan of many copper-bearing deposits had been deprived, to a great extent, of the copper contents, and that in many instances, beneath the "iron hat" was found a zone of rich carbonate and oxide ores of copper, beneath which again was an enriched sulphide zone, in which the ores were usually "glance" and similar minerals with high values in silver or gold, or both. It was realized or believed that these rich zones were the result of the precipitation of ores from the oxidized surface portions, but the secondary enrichment theory, as now generally understood, had not yet been offered to account for these occurrences. In most cases where the secondary enrichment of copper ores had occurred the amount of superficial ore which has been leached has evidently been sufficient to furnish all the copper found in the zone of enrichment. There are, however, other deposits, wherein the enrichment must have been produced by the continued precipitation of solutions from below within the zone of and during the period of oxidation, for no other theory could account for the unusual richness of the ores, and their amount. Take as an example the rich chloride silver-lead deposits of Fryer Hill, at Leadville, Colorado. The famous mines of that flat eminence—the Robert E. Lee, Matchless, Little Pittsburg, Annie, Little Chief, Chrysolite and others—all within the oxidized zone, and occurring relatively within a few feet of the surface and above the horizon of local



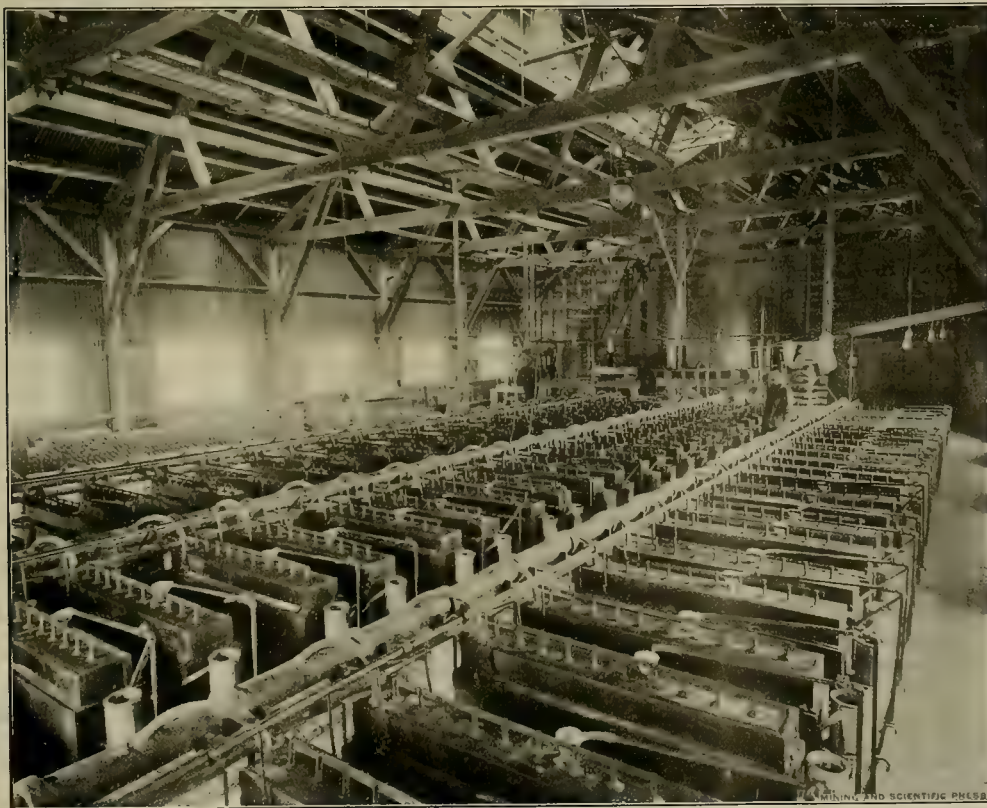
Buildings of the U. S. Reduction & Refining Co., Colorado City, Colo. (See Page 40.)

drainage, and consequently of possible secondary enrichment—produced millions of dollars. It is now a well-known fact, long since established, that the normal ore of the lead-silver mines of that district are low-grade pyritous ores, containing an abundance of zinc sulphide and some copper sulphide, and that the normal ore, with a few exceptions, is low in silver. On Fryer Hill there was not enough ore available above the level of these rich deposits to have sup-

plied the large amount of silver chloride and sulphide found in those noted deposits, within the zone of secondary enrichment, consequently the large amount of silver, mostly as the secondary products of the alteration of silver sulphide, must have been derived from below, not necessarily from the ore lying in the immediate neighborhood of the rich superficial deposits, but more probably from solutions which continue to rise from great depth, and which supplied the ore found in the normal deposits. There is no evidence, in fact, that these solutions are not still rising, and by their slow and imperceptible action still forming ore bodies. The evidence furnished by the exposure of the rock strata in mine workings in Leadville district leads to the conclusion that the ores were formed in nearly horizontal beds at great depth—not less probably than 10,000 feet, and that the faulting, which is such a marked feature of the district, geologically, topographically, and incidentally commercially, occurred long afterward, but there is no evidence that the mineral solutions are not still coming up from the barysphere.

It is an established fact that minerals are being deposited in certain fumaroles and hot spring formations, where the solfataric action is still in evidence, as at Steamboat Springs, Washoe county, Nev., and at Sulphurbank, Cal. Curiously enough, the principal mineral deposited in each of these instances is cinnabar, though at the former place, it is said on good authority, both gold and silver also exist. An attempt was recently made to mine at Steamboat Springs, a shaft being sunk in the deposit, which, had it proven successful, would doubtless have furnished much valuable information in reference to the formation of mineral deposits; but the great heat of the workings, the sulphurous gases, hot water and the low grade of the ore found made the attempt commercially and practically abortive.

The Comstock Lode at Virginia City, Nevada, affords one of the most notable examples of extensive mineral deposition as a result of solfataric action, and without doubt mineral is still being deposited in that system of fissures. To what the bonanza deposits owe their origin is a matter for discussion.



Interior View of Electrolytic Plant of U. S. Reduction & Refining Co., Colorado City, Colo. (See Page 40.)



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THE development of water power and of electric power generated by water has become one of the most important of modern engineering undertakings. The cost of plants built for this purpose varies greatly both in the United States and abroad. In France it is stated that this cost ranges between \$25 and \$150 per horse power generated. It is probable that small plants generate power at a lower cost per plant than large ones, though it is also probable that the large plant generates power and is maintained at a lower cost per horse power than the small plant. The cost per horse power per month is also variable, though in many instances the charge is arbitrary and far higher than it should be, competition being the only means by which the power users may hope for better terms from companies distributing power. The cost of electric power can only be compared with the cost of generating and applying power by other means. Electric power in and about a mine at a cost of \$6 per horse power per month may be found more economical than steam or water power at \$5 per month, owing to the easy facility with which the electricity may be applied in a variety of ways, both above and below ground. It can be utilized to run hoists, to run fans and pumps, mills and crushers. It furnishes light and may be applied to various branches of the metallurgical equipment.

FOR more than a quarter of a century Leadville, Colo., has been a steady producer of lead, gold, silver, copper and zinc. The total output was estimated January 1, 1904, at about \$310,000,000. Since then the monthly output has exceeded 60,000 tons of ore, being in June 66,000 tons. The developments of the past few years in Leadville have extended the known area of profitable mineral, and it is improbable that its limitations have yet been fixed, and still further extensions may be anticipated. The history of Leadville has been a most interesting one. At first a placer gold camp, later a producer of rich silver-lead ores, and the past few years, by reason of

the constantly expanding operations, it has been enabled to maintain a large output of both precious and base metals. Many important changes in lead smelting and refining have been the result of the experience gained in that district, and it is likely to have an era of long continued prosperity.

## The Zinc Industry.

Zinc ore concentrates from Leadville, Colo., go this week via San Francisco, Cal., to Belgium for treatment, illustrating another phase in metallurgy. Prior to 1898 Leadville did not ship zinc ores for the zinc values therein alone, the market being limited, the grade being about three-fourths that of Missouri jack, and the freight charges to Kansas smelters precluding possibility of profit. In the last three years the reduction, or rather separation of zinc ores in and around Denver, has been a promising commercial proposition in special works apart from the rescinding by the smelters of the former penalty imposed by the latter on lead-silver ores carrying more than 10% zinc. The Belgium shipment of 5000 tons zinc concentrates is from Pueblo, because of the present inability of the zinc smelter there to handle it.

The zinc industry of the United States is a growing one, and is strikingly illustrative of the development of the nation's mineral resources. Thirty years ago the United States supplied about 7000 tons zinc. Even up to 1898 the annual production was under 100,000 tons. Since then increased output in the vicinity of Joplin, Mo., and development of the Colorado zinc fields has brought the annual production up to about 150,000 tons. And the increase of supply hardly keeps up with the increase in demand for that useful metal. In 1902 the United States used 160,000 tons spelter; in the previous year Europe used 165,000 tons for roofing purposes alone.

The increase in price is also noticeable—from \$10 per ton for zinc ore in 1875 to \$30 per ton in 1901, and a present figure of \$40 per ton is a remarkable advance.

It is estimated that of the 160,000 tons used in this country in 1902 about 51½%—82,400 tons—were used by the steel companies, largely for galvanizing purposes; brass foundries used 23%—36,800 tons; 16%—25,600 tons—was made into sheet brass; 2%—3200 tons—was used for roofing; a similar percentage was used in desilverizing lead; about 1%—1600 tons—was used for gold extraction in the cyanide process; 3%—4800 tons—was used for casting and monumental work. The remainder was used in electrical storage, etc.

## The Militia in Labor Troubles.

The militia company at Grass Valley, Cal., has recently decided to disband by a two-thirds vote, and it has been announced that the company will be mustered out. The organization is largely made up from the membership of the miners' union of that town, which appears to be the reason that this step has been taken. The statement has also been made that the recent action of the military authorities in Colorado has hastened this step, which has long been in contemplation. Ordinarily the voluntary disbanding of a militia company would be viewed with regret, if it were merely a lack of interest in the perpetuation of the organization; but it is evident from the reports coming from Grass Valley that the members of the militia anticipate the possibility of being called upon to preserve the peace in the event of labor troubles, and that it is to obviate such possible unpleasantness that they have adopted a precautionary measure and determined to remove themselves from the danger of such possibility. Under the circumstances, it is undoubtedly the best thing they could have done, for if in the event of lawless actions arising from labor troubles they can not be depended upon to protect life and property when called upon by the State, it were better for them to disband. As far as known, there is no immediate or even remote prospect of serious trouble in the mines of California; but that State has once before afforded the spectacle of a militia company refusing to obey its officers when called upon at the time of a strike, and in view of that fact, the action of the Grass Valley company, though demoralizing in its influences, is the more readily understood.

## The Disadvantage of Rich Ore.

The Tuolumne County, Cal., Miners' Union has called a strike at the Jumper mine, near the village of Stent, because of what they consider an obnoxious order issued by the management of that mine. For years the Jumper mine has been noted for the rich specimen ores it occasionally produces, and at one time the mine was worked for pockets of gold only, all low-grade ore, or that which did not show visible gold, being considered too poor to mine and mill. Within recent years a change was made in mine methods and now, for most part, a zone of rock of considerable width, within which the gold specimens occur, has been mined and the entire rock mass sent to the surface to be crushed in the mill. Where rich gold specimens are found in a mine the temptation for miners to appropriate a portion of the gold is a strong one, and one to which, on occasion, some have been known to yield. In the past there has been some experience of this character at the Jumper, and it is presumable that the workings have again entered a rich shoot, as the obnoxious order complained of by the men is one requiring them to "strip to their naked bodies" just after coming off shift and before passing from one apartment of the change house to another. The men declared this to be humiliating, and after refusal on the part of the management to rescind the objectionable order, struck July 3d. The mine is closed and 150 men are idle. This is not the first time where the management of a specimen producing mine has considered it expedient to require the miners to strip, and it is probable that the management of the Jumper has a good reason for issuing such an order at this time. This appears to be one of the disagreeable features of operating a specimen producing mine.

THE announcement of the discovery of diamonds in their matrix on Oakley creek in New South Wales, Australia, will doubtless stimulate the search for the source of diamonds in other districts where these gems are known to occur. Diamonds are now won from their matrix in South Africa, in India and to a limited extent in Brazil, the greater number of diamonds from the latter coming from conglomerate, which is thought by geologists not to be their original matrix. In California diamonds have been found in the beds of several ancient rivers in several counties, and in Wisconsin diamonds have been found in the glacial drift. Diamonds are also reported from Georgia and North Carolina, but in none of these States are there any authenticated records of diamonds having been discovered in their matrix. There are numerous localities in the United States, however, where the rocks are remarkably similar to the noted "blue ground" of South Africa. This rock is similar in appearance to some serpentines and was originally an olivine rock, a variety of peridotite. The rocks became altered and partly serpentinized, and are of dark bluish green color in depth, though usually yellow at the surface, due to decomposition. Although rocks of this description are of frequent occurrence in the United States, no diamonds are reported as occurring in it.

ANOTHER interesting, and what may prove to be a long-contested and expensive, lawsuit involving the extralateral right is to begin on the 21st inst. at Denver, Colo. This is a contention between the Morning Glory Gold Mining Co. against the Mary McKinney Gold Mining Co., and involves the right to follow what is known as the Republic vein, which is said to apex on the Aileen location of plaintiff. The contending parties to this litigation endeavored to settle the affair by arbitration, but after each side selecting an arbiter, these two were unable to agree upon a third, and in consequence the matter will be carried into the courts. In a district where the fissure system is as complex as that of the Cripple Creek district there is likely to be considerable difficulty in the settlement of the differences between the contending parties.

SINCE the labor troubles in Colorado are for the time being, at least, at an end, the mining industry has once more taken on new life and the outlook for a large production during the year 1904 is promising, although it may fall short of the normal output.



## CONCENTRATES.

THE radio activity of a number of minerals was recognized several years prior to the discovery of radium. Uranium minerals have long been known to be radio active.

\*\*\*\*\*

AN undercurrent is a broad table having a low inclination and covered with burlap, cocoa matting, rifles or some other materials or devices for catching fine gold. They are placed so as to receive the fine material discharged from sluice boxes through a grizzly or screen.

\*\*\*\*\*

THE grade of quicksilver ore which will pay to mine and reduce depends the same as in any other ore upon the conditions surrounding, the amount of ore available, character of ground, and other things influencing mining cost, as well as the cost of fuel used in roasting the ores.

\*\*\*\*\*

"BARYSPHERE" is a word which in recent years has come into use in the discussion of the genesis of ore deposits. It is used to indicate a deep-seated region in which the minerals are of higher specific gravity than the average of those found at and near the surface of the earth.

\*\*\*\*\*

IN 1884 an act of Congress provided "that the rules and regulations of the General Land office and Department of the Interior governing the administration of the mining laws of the United States be adopted for and extended to the district of Alaska, so far as the same may be applicable."

\*\*\*\*\*

IRIDIUM occurs with platinum and other metals in the platinum ores, but most commonly as osmiridium. Iridium is much like platinum, but is brittle, fuses with great difficulty and has a specific gravity of 22.4. It is not soluble in any acid, not even in aqua regia, in which it differs from gold and platinum.

\*\*\*\*\*

THE "law of the apex" is responsible for nine-tenths of the mining litigation in the United States. The extralateral right law was introduced in British Columbia several years ago, and though it was in operation but a short time before being repealed, it led to litigation which has not yet been wholly settled.

\*\*\*\*\*

AURIFEROUS SULPHURETS may be successfully treated by amalgamation in pans or arrastras after being subjected to a "dead roast," that is roasted until completely desulphurized, but the attempt is rarely made, it being considered cheaper and more satisfactory to recover the gold by chlorination or cyanide process.

\*\*\*\*\*

BREA is a Mexican name for the black tar-like bituminous mineral found oozing from rock strata, principally from shales and sandstone. It represents an intermediate stage between normal petroleum and asphalt. When the latter condition is reached, nearly all the volatile constituents of the oil have disappeared, while in the "brea" some of them still remain.

\*\*\*\*\*

VARIOUS FABRICS have been successfully used to concentrate black sands and sulphide minerals from sand and crushed ores by passing them over inclined tables. Cocoa matting, burlap, blankets and Brussels carpet have been used for this purpose, but in recent years canvas has generally replaced the other materials. Formerly skins were also used for a similar purpose.

\*\*\*\*\*

IT is almost impossible to outline a line of treatment for ores by the cyanide process without exhaustive experiment. In a general way it may be said to consist in pulverizing the material to be treated if it is not already in that form; the separation of the material by means of hydraulic classifiers into coarse sands and slimes; the leaching of the sands by percolation and the treatment of the slimes by agitation and decantation, or filter pressing.

\*\*\*\*\*

REAGENTS are substances which are employed to produce noticeable changes in minerals, in order that their composition may be tested and the constituent elements become known. Reagents are dry, wet or gaseous. They should always be plainly labeled to prevent the likelihood of a mistake by some of them being misplaced. Many reagents have a marked physical resemblance, and labeling saves uncertainty and avoids errors which might otherwise occur.

\*\*\*\*\*

WHEN it is desired to concentrate the valuable minerals in an ore it is necessary to crush the ore sufficiently fine to free the valuable mineral particles, but sliming should be avoided, as it renders the subsequent operation of concentrating far more difficult. Often high-grade minerals, particularly the silver-bearing minerals, slime readily, so also does chalcocypite and mispickel. With this class of ores it is advisable to take extraordinary precautions against sliming.

\*\*\*\*\*

WHERE gravel is cemented with clay and is found difficult to wash without puddling, it is often found advantageous to allow the gravel to lie for several months exposed to the weather, which causes it to disintegrate,

and it is then easily washed in the sluices with little loss of gold. The occurrence of clay in gold-bearing gravel often causes a considerable loss of gold, not only due to the fact that the gold is not readily freed from the clay, but gold already freed is sometimes picked up by the rolling balls of clay and carried by them to the tail-race. This kind of gravel can sometimes be worked over two or three times with profit.

\*\*\*\*\*

WING DAMS are constructed for various purposes, but generally for placer mining a portion of a river bed under water. The wing dam is built partly across the stream and then is turned down stream and extended a greater or less distance. Often the lower end is carried back to the same bank as that where the construction commenced above. The water is then pumped out and mining begun, and continued until all the inclosed area has been worked out. If the amount of water seeping in is too large to be handled by sluicing, then dredging, or elevating by hydraulic ejector is resorted to. Wing damming is only resorted to when it is believed the amount of water to be handled is comparatively small.

\*\*\*\*\*

A GOOD dryer for concentrates and ores that are to be shipped or to be pulverized by dry crushing may be made by laying a series of pipes horizontally and about an inch apart in a suitable frame or box, the pipes so arranged that either hot water or steam may be passed through them in a manner similar to steam heating radiators in buildings. The pipes are laid on the floor of the dryer, which may be 10 feet square or of any desired dimension. The space between the pipes up to the level of their upper surface may be filled with sand, and on this the ore or concentrates are placed, heat being supplied by an ordinary steam boiler or special heater for water. A device of this construction is inexpensive and will thoroughly and quickly dry substances placed upon the floor, from which they may be easily removed by shoveling.

\*\*\*\*\*

A MINING LOCATION may be made on a lode, vein or deposit which does not outcrop on the surface, but which is discovered in a shaft. In the case of flat or nearly horizontal deposits the locator labors under the disadvantage of not knowing the direction of the strike of his ore shoot, for in ore beds occurring in sedimentary rocks, it is unusual for the ore to be found extending in an unbroken sheet over a large area. It is generally found in a deposit of irregular form, longer in one direction than in another. If the strike of other shoots of ore in the vicinity, or the strike of the dikes, if there are any, be known, it will be safe to locate in the direction of these known shoots and dikes. In the Black Hills the ore shoots occurring in the sedimentary formations have a northwesterly strike, which corresponds to the general strike of the dikes cutting those formations and to that of the underlying Archean schists.

\*\*\*\*\*

CONCERNING the question of damages to property from mining operations by the removal of ore beneath the surface, the State of Colorado has enacted the following law: "When the right to mine is in any case separate from the ownership or right of occupancy to the surface the owner or rightful occupant of the surface may demand satisfactory security from the miner, and if it be refused, may enjoin such miner from working until such security is given. The order for injunction shall fix the amount of the bond." Idaho, Wyoming and South Dakota have similar laws, but these have never been tested in the highest courts. The owner of the surface owes the same duty to the miner as the latter owes to the former. The surface proprietor has no right to in any way damage the property of the miner, nor in any manner illegally interfere with his operations underground.

\*\*\*\*\*

THE ore of mercury (quicksilver), from which the supply of commerce is obtained, is cinnabar (HgS). The natural compounds of mercury are few and, with the exception of cinnabar, are of limited occurrence, and most of them, when found, are usually associated with cinnabar. Native mercury is comparatively rare. Calomel, Hg<sub>2</sub>Cl<sub>2</sub>; metacinnabarite, HgS; tiemannite, HgSe; Onofrite, H (S<sub>2</sub>Se) with Se; coloradoite, HgTe, are the other known minerals of mercury. Cinnabar, pure, contains 86.2% Hg, and calomel, 84.9% Hg. In Europe, the most important deposits of cinnabar are at Almaden, Spain, at Idria, Austria, and Bakmut, Russia; in the United States at New Almaden, Cal. A noticeable fact is that all of the principal mines of cinnabar in the world are in connection with bodies of serpentine associated with sandstones and shales. The Latin name for cinnabar was minium, which is now applied to natural red lead (Pb<sub>3</sub>O<sub>4</sub>), it having been used as an adulterant for cinnabar.

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THE cost of smelting in reverberatory furnaces is stated by E. D. Peters in his work, "Modern Methods of Copper Smelting," to be for a furnace treating thirty tons of ore in twenty-four hours and having the slag removed by a stream of water, per shift of twelve hours: One fireman, \$3.50; one-half skimmer, \$2; one-half laborer, \$1.50. Total, \$7. He says such a furnace will burn about eight tons of fair coal per twenty-four hours, at \$6 per ton, or about \$1.60 per ton for fuel. (The necessary comparison should be made with oil.) Black-smithing and other slight expense about the furnace, \$0.17 per ton of ore. Repairs, including bottoms, vary greatly under varying conditions, but is about \$0.16 per

ton of ore smelted. To the above add \$1000 annually as a sinking fund to replace the furnace in five or six years. The total cost per ton, exclusive of general expenses and interest on investment, is: Labor, \$0.47; fuel, \$1.60; miscellaneous, \$0.17; repairs, \$0.16; sinking fund, \$0.10. Total, \$2.50. These figures are for Butte, Mont. If the operations contemplated can be carried on on as large a scale as that contemplated above, the cost of smelting should not be more excessive under the existing conditions stated in the inquiry than at Butte. In the case stated the gold alone in the ore should pay all expenses and leave a good margin of profit, exclusive of silver and copper. These costs do not include refining charges.

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THE variation of the magnetic needle in California depends on the location. In southern California it is about 15° east, in central California about 16½° east and in the northern portion of the State somewhat more. The magnetic variation changes constantly, though very slightly. It continues to move to the eastward for a period of years and then slowly moves westward. The movement is about three or four minutes annually. The daily variation is often as much as one-fourth of a degree. Often the magnetic needle is influenced by local causes, one of which is electricity generated by rubbing the glass covering the compass box, which causes the needle to tilt. This may be removed by touching the glass with the moistened finger. In order to lessen the likelihood of making mistakes by reading at times from one end of the needle and at others from the opposite end, it is better to always point the north end of the compass box toward the object sighted at and to read the bearing from the north end of the needle, which usually may be recognized by a small copper pin set transversely in that end of the needle. Most good compasses have an arrangement for "setting off" the magnetic variation, which simplifies calculation.

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WHERE it is desired to construct a dam in a torrential mountain stream, and where the volume of water varies from a rivulet to a roaring torrent, it is as economical to build a cheap temporary dam which will be carried out with each flood as to construct an expensive one of permanent character, for in streams of this description a basin formed by the permanent dam would soon be filled with debris, thus rendering the dam useless, or greatly impairing its utility. In such constructions the provision of a sluice in the lower part of the dam is necessary, and yet it may weaken the dam, for in torrential streams great boulders are often carried down which strike the dam with great force, and the sluiceway being unable to accommodate the flood is likely to become jammed with large rocks and cause much expense and trouble in their removal. A log and brush dam, if carried out, can usually be replaced at no great expense, whereas the cost of building a masonry or concrete dam would in most cases pay for a number of temporary dams. Concrete for piers and abutments is superior to either dry walls or masonry. This was shown recently at the time of a flood in Deadwood, S. D., when stone bulkheads and piers were swept away, while concrete piers standing in midchannel, and subjected to the full force of the flood and the debris borne on the current, are still standing. In numerous places in California mountains concrete piers have stood in the streams for years and will endure for many years to come. If abutments of this character are placed on bedrock on either side of a stream they will afford a substantial basis for the construction of log dams and render their replacing easy of accomplishment.

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A CLEANUP BARREL is usually run at about twelve to fifteen revolutions per minute, and twenty-four hours should be the minimum, but forty-eight hours is not too long to effect a good result. The operation is not intended merely to mix the contents of the barrel thoroughly, but to grind fine so as to completely amalgamate the minutest particles of gold present. The finer the grinding the cleaner will be the amalgam. The amount of quicksilver to be added in charging the barrel will depend on the quantity of material handled and its richness in free gold. For the grinding, any one of several things may be used—steel balls, round steel bars (pieces of old stamp stems or shafting), more or less flattened, water-worn boulders of quartz or flint or of a hard rock like a close-grained granite or diorite (10 or 12 inches in diameter). These last make most effective grinding agents, as they present a greater surface for action, and then the material ground from them does not collect with the amalgam, as do particles of steel or iron when stems or steel balls are used. When the grinding is completed, do not entirely free the cross-bar or the nuts holding the cover down. Partially free them and tap around the edge of the cover, loosening it gradually, as sometimes there is a gas generated during the grinding process which will exert enough pressure when the cross-bar and nuts are taken from the cover to blow the cover off and scatter mud over the cleanup room. After the cover is removed, turn in a stream of water and wash out the main portion of the slimes, which will run out with the overflow. Place a large amalgam kettle under the small hole in the bottom of the barrel and carefully unscrew the plug so that the amalgam will run out gradually, and not at one rush, as the latter is likely to result in loss. The iron scraps and bits (nails, etc.) are collected in pans with the coarser sands and panned down. The amalgam is cleaned with a porcelain mortar and pestle and the excess quicksilver squeezed out.



## The Young Quartz Miner.

NUMBER IV.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by  
MATT. W. ALDERSON.

The writer well remembers when giant powder was a new thing, and a representative of the manufacturers came into the little Western town where he was attending school and gave an exhibition of its superiority over black powder. In front of the school house a piece of the giant powder was placed on a boulder and on top of this a stick of wood. The explosion shattered the boulder as well as the stick of wood, and it was asserted that giant powder was different from other powder in that it expended its force downward more than in any other direction. This idea still seems to prevail in some minds, an expert at recent tests at the Stevens Institute of Technology at Hoboken, N. J., saying that, "unlike most other explosives, dynamite exerts practically all its crushing force downward and not in a general direction."

The practical miner soon finds out, however, that dynamite will only do the work it has a chance to do. If one drills a "dead hole" in massive rock, he may fail to break it and the exploding gas will simply find its way out of the hole. The fact is that dynamite is subject to the law governing all exploding gases—its tendency is "to expand equally and evenly in all directions. But if escape on one side be cut off by an unyielding wall, the lateral force of the explosion on the other side will be greatly increased."

There is but one safe way to thaw dynamite, and that is by the aid of hot water. Never under any circumstances should one attempt to thaw it with radiating heat, not even by the direct rays of the sun; for heat of this character is uneven, and when some point is raised to a temperature beyond that which is safe, an explosion may be easily caused. There are a number of good powder thawers on the market, but when one is where he cannot easily obtain such he may find a very good, inexpensive temporary expedient in a common oblong syrup can. This may be filled with hot water and taken to the mine. The powder laid on this will thaw while one is at work, and, covered with a cloth, keep warm for several hours. If necessary, even short candle ends may be burned under the can and the powder thus kept for any length of time as warm as may be desired.

In loading a hole, cut each stick of powder in two, then slit each piece down the sides, so that when it is placed in the hole it easily expands to fill the hole when pressed by the tamping stick. Ordinarily about three slits may be made. Into one of these slits in the last half stick used—called the primer—insert the cap, in which the fuse has been previously fixed and "crimped" with a crimper. Push the cap in, so it is lengthwise of the stick and in the powder just the length of the cap. In inserting the primer the tamping rod follows and the direct pressure is on the powder, and not on the cap. Exercise care to see that the powder is not pushed away from the cap. Some miners insert the cap in the body of the charge of powder. This is very bad practice, as there is always danger of the blast being set off by the heat of the burning fuse, in which case it will not be nearly so effective as it should be. For good work the blast must be fired by the detonation of the cap, and to secure this the cap must be in the end of the charge. One should not tamp the powder in the hole with his tamping stick as if he were tamping dirt around a post set in the ground. Dynamite is fired by concussion and one should avoid giving it blows, even with wood. One may tamp it as solid as he wishes by pressure, it being possible to exert a pressure of several hundred pounds to each push of the tamping stick.

The Coal and Metal Miners' Pocketbook says: "By experiment it has been proved that, as a rule, the length of charge of explosive for single holes should not exceed eight to twelve times the diameter of the hole—that is, a 1-inch hole should never have a charge of more than 12 inches of explosive placed in it. When several holes are fired together, this rule is sometimes slightly deviated from. It is usually best to employ a length of charge between these two limits, as, for instance, about ten times the diameter of the hole."

This rule will work very well if one is careful not to reach out after more ground than the charge will rupture. In general, however, Montana miners will use more powder. Take, for instance, a breast hole or dead hole in massive rock. The charge indicated would be just enough to spring the hole. If I were to give a rule, based on my own experience and observation of the work of others, I would say: Get all the explosive you can in the lower half of the hole. This would mean three sticks of powder in a 3-foot hole, and one and a half to two sticks in a hole 2 feet in length. Where this amount of powder will not do good work, you should spring the holes—that is, fire half a stick or a stick of powder in the bottom of the hole, thus "springing" or expanding it—then charge this chamber with such amount of powder as is necessary to fill it, usually three or four sticks.

Some miners save out a little powder when load-

ing, split the end of the fuse and insert the powder in the split ends, pressing them together again. A touch of a flame ignites the powder instantly. I am aware that dynamite may usually be burned with comparative safety, and that miners with whom I am acquainted have fired fuses in this way for twenty-five years; and yet I can never feel comfortable when I see it done. After loading, I turn the ends of my fuses up and split them down about  $\frac{1}{2}$  inch. When about to fire, I hang my candle on the wall and with a short candle end light the fuses by turning the ends of each one down over the flame. It is easy to light half a dozen fuses in this way before the smoke becomes oppressive, and one knows positively that each fuse is lit beyond the chance of any miss.

It is well for one to learn to put system into his work wherever possible. Some miners take their drills in to where they are to work and, leaving them in a pile, pick one out as they need it. It is better to stand the drills up in order at one's side. In drilling a hole, use the shortest as a starter, and, if it is not dulled in the first hole, stand it in place for use again. If it is dulled enough so it needs to be sent to the shop, throw it back by itself. Thus one does not waste time by picking up the wrong drill or in sorting out dull drills from those he is using more than once. It is well, also, to have an order in which one lays down his fuses as he is preparing to charge his holes. Some miners aim to cut their fuses all the same length for a round of holes. This is not easy to do and have the lengths exact. I am not so particular in cutting the fuses. Then, as I go to lay them down at the face where they are to be used, I straighten them out, lay the shortest near the face, the next in length back a bit, and so on. Then, in loading, I load the holes in the order in which I wish them to go off, picking up the fuse nearest me as I proceed. I light them in the order I have loaded them, and as the fuses vary in length, each succeeding fuse being from 1 inch to 2 inches longer than the preceding one, no two shots are fired at the same time and one may be always sure he has heard every discharge.

There are some things it is always well to do in view of a possible emergency, and then use care to see that that emergency never arises. Thus, one will do well to always carry a short piece of candle in his pocket. Then if, in working in a raise, his candle should drop from him, or he should otherwise lose it, he is protected from being left in the dark till he can recover the candle or get another. Some miners cut their fuses just long enough to give them time to get to a place of safety by the time the shots go off. It is better to make the fuses a few inches longer. Then, if one should stumble, or if by his quick movements or a strong draught his light should go out, he will have time to recover himself or relight his candle. A missed hole is something every good miner seeks to avoid, but with the greatest care they cannot always be prevented. In charging a hole, therefore, I always follow the primer with a piece of paper, usually a page of a mining journal from which I have clipped what I wish to preserve. In case of misfire, I know I may remove the tamping with safety down to the paper. I put in a new primer and the force of its discharge above the paper wadding will fire the powder below. Arrange to fire whenever possible when going off shift. If there is misfire, do not go back for at least an hour, as instances have been known of fuses being imperfect and the fire being held just long enough for the impatient miner to find his way back to the charge about the time it goes off.

If necessary to timber, see that the timbers used are sufficiently strong to stand any probable stress or crushing force. If an entry is to be timbered, allow for future settling. One will not miss it if he makes such a place 1 foot higher and wider than the present demands seem to require. Excellent works and articles on timbering are accessible and the young miner may familiarize himself with them to advantage.

Last, but not least, the young quartz miner should be a man of good habits. In some walks of life a man may stumble and pick himself up again. In many situations in a mine the man who makes a misstep has no chance for recovery. If he is careless in the use of explosives, he may not live to tell how the accident happened. The miner, therefore, should have a clear, active intellect. This he cannot have if he befuddles his brain by strong drink and neglects to read and think. Above all things, he must be careful. It is an old saying, "Want of care causes more loss than want of skill." The careless miner not only endangers his own life, but the property of his employer and the lives of those who may be employed with him.

A SUCCESSFUL cyanide operator advises dipping the zinc shavings in a solution of lead acetate when the ores contain copper, which becomes troublesome in the precipitation boxes. After packing the boxes with zinc shavings, turn on clear water and allow it to run until it carries no sediment or cloudiness from the boxes. When the water runs clear, turn in the cyanide solution. This destroys the tendency of the zinc to precipitate copper, and the gold and silver present in the solution is precipitated on the zinc practically free from copper.

## THE PROSPECTOR.

The rock sample from Holmes, Wyo., is a granitic dike rock, much altered, the feldspars having been altered in part to a silvery mica. Rock of this description occasionally carries gold, though usually not in large amount.

Two packages of rock samples were received from Tucson, Ariz., reported to be from Yavapai county, at Cottonwood, Ariz. In the first package the granite is a rather coarse rock, in which are visible quartz, feldspar and biotite. No. 1 is syenite, consisting of quartz, feldspar and hornblende. No. 2 is felsite, and No. 3 appears to be a much decomposed and mineralized granitic rock. The second package, consisting of eight specimens, was determined as follows: Nos. 1 and 2 are aplite, a variety of fine-grained micaless granite. No. 3 is syenite and similar to No. 1 of the first series. No. 4 is similar to No. 3, though finer grained and darker in color. No. 5 belongs to the same series as Nos. 3 and 4, but contains less quartz and the feldspars are more altered. The hornblende is comparatively fresh, showing only occasional signs of alteration. No. 6, while at a glance resembling Nos. 3, 4 and 5, contains little or no hornblende and is nearer a normal granite-quartz, feldspar and biotite. In all of these rocks the feldspar is more abundant than the quartz. No. 7 is of similar character to Nos. 3, 4, 5 and 6, but is more altered and is possibly near a vein, as it contains limonite crystals, pseudomorph after pyrite. No. 8 is probably a much altered diorite, in which the hornblende crystals have become decomposed and lined about the edges with crystals of magnetite. There is no rhyolite in any of the samples sent.

Molybdenum may be successfully concentrated, it is claimed, by the oil process.

The dark colored mineral in white quartz sent in a tin box from Randsburg is boulangerite (a combination of sulphur, lead and antimony).

The samples from North Yakima, Wash., are: No. 1, alum (sulphate of alumina); No. 2, arsenical iron; No. 4, silica, silicate of alumina, iron and sulphate of lime.

The rock specimens from Nevada City, Cal., marked J. H. R., are: No. 1, augite andesite, and is apparently from the wash of an ancient river channel; No. 2 is granite, but as the black mica (biotite) present is very limited in amount, the rock belongs to the type of granite known as aplite.

## How Far Can Power Be Transmitted Electrically?

How far can power be transmitted electrically?

What is the cost of transmitting electric power?

What per cent loss takes place in transmission?

These will be recognized by any electrical engineer as typical of the questions that are continually being asked by the investor in electrical enterprises, by the users of electrical power, and by the interested laymen in general, writes Paul M. Lincoln in Cassier's Magazine.

The crucial question in any commercial enterprise—and an electrical transmission scheme is always a commercial enterprise—is, will it pay? There is no real limit beyond which it is impossible to deliver electric power, provided no limit be put upon the amount of money to be spent. The engineer could easily be found who would undertake to deliver Niagara power in South Africa. The difficulty would be to find the financier to put up the necessary cash. The law of supply and demand operates no less in the realm of power transmission than in any other department of commercial enterprise.

If the price that could be demanded for power in South Africa were sufficient—say a million times its present cost—the idea of delivering Niagara power to that region would not seem the absurdity that it is under present conditions. In fact, there are in operation to-day dozens of transmission lines exceeding 3000 miles in length that have been for years transmitting power successfully, both from an engineering and from a financial standpoint.

The success of these enterprises is simply a question of the price which can be successfully demanded for the power delivered. In the case to which reference is made, this price is perhaps one billion times that for which Niagara power is sold in Buffalo, or say \$25,000,000,000 per K.W. per year. The writer refers to the transmission of energy in the Atlantic cables. The motion of the syphon recorder at the end of the cables is just as truly the result of power transmission as the running of a printing press or the driving of a factory. The same laws of transmission apply, whether the power transmitted be used for operating the syphon recorder or the factory. It is in the value of power transmitted that the great difference lies. If the power for driving factories were worth as much as that for operating a syphon recorder, Niagara power would, perhaps,



have been sold in the markets of Europe long before this.

The distance, therefore, to which power can be successfully transmitted by electricity depends almost entirely upon the price which can be successfully demanded for such power. The price is regulated by the law of supply and demand. The power user will buy power where he can get it cheapest and will install his own steam plant, unless the power transmission company can sell him power as cheaply as he can generate it. The most important single item in the cost of steam power is the cost of fuel. An electric transmission scheme which might fail utterly among the coal fields of a country, with coal at say \$1 a ton, might succeed brilliantly in places where coal costs \$10, or in South Africa, for example, with coal at say \$50 a ton.

### Equipment of the Fremont Mine, Amador County, Cal.

[FROM A SPECIAL STAFF CORRESPONDENT].

The mill of the Fremont Con. Mining Co., operating near Drytown, Amador county, Cal., is located midway between the two shafts, the Fremont shaft and the Gover shaft. Ore can be trammed from the rock breakers at either shaft over trestles to the mill.

The 40-stamp mill offers an example of recent California milling equipment and practice, and while in the main it differs but little from many similar installations, yet it contains a number of interesting details. Throughout its construction it has been designed so that renewals and repairs may be quickly and economically made.

Concrete is used for foundations and mortar blocks. The battery posts are set on cast iron sole plates. The frame is of the back-knee type, but contains no top bracing. One longitudinal tie-piece binds together the battery posts. A  $\frac{1}{2}$ -inch sheet of asbestos

bin being within the gallows-frame. Consequently, the vibrations of the rock breaker are not transmitted to the gallows-frame, and vice versa.

The old gallows-frame has been converted into a bin for the waste rock, the skips passing directly over it to the ore bins. The new equipment, designed for a depth of 3000 feet, straddles the old one. The small gallows-frame and hoist at the Gover shaft will prob-



Interior of the Fremont Gold Mill, Amador Co., Cal.

ably be similarly replaced in time. This shaft is now 1500 feet deep and connected with the Fremont underground.

The new change house is a model of its kind, containing separate booths for each man. It is equipped with shower baths and hot and cold water. It is particularly well heated, roomy and light.

The mine is not operating at present, owing to trouble with the miners' union, but expects to open up within a month with non-union men. Advantage has been taken of the shut-down to make repairs and improvements. The machinery has been overhauled, cottages have been built, etc. A cut or ditch is being dug to relieve the village of New Chicago from the

### Gold Milling.

Written for the MINING AND SCIENTIFIC PRESS by ALGERNON DEL MAR.

This most interesting subject is necessarily one of the utmost importance to every young man starting out on a mining career, as well as to others more in-

timately connected with mining interests, and to these I beg to dedicate the following notes. The majority of mining problems that will come before those just starting out will be problems requiring technical knowledge and a great amount of personal work, for these will be propositions where he will be "up against it" from the start. The treatment of low grade propositions will be his main work, and to efficiently cover this field all the various details of mining and milling should be followed most closely and wherever possible a saving made, however small. Mines should be mapped in regard to assays of the various blocks of ore, as well as the mill checked as to the quality of work being done. An even product should be fed to the mill, if possible, for better work can be done on such ore than where it is one day hard and poor and the next day soft and rich, or otherwise variable.

The mill work should be checked by assays before and after amalgamation, so that any loss, due to a variety of causes, may be rectified. The accounts at the mine and mill should be kept as in any commercial enterprise, and should be in such form as to be easily understood by a shareholder of ordinary intelligence, though he be unfamiliar with mining details.

Since stamp mills are still recognized as efficient pulverizers and amalgamators, my theme will be upon this variety of milling. The expense of running a 40-stamp mill is little more than running one of ten stamps, and the relative cost much less per ton. This applies equally to a 10-stamp and a 5-stamp mill.

The number of tons of ore crushed by a stamp mill is proportional to the amount of energy in foot pounds developed by the fall of the stamps, providing its discharging capacity is equal to or greater than the crushing capacity. As the stamp mill is used as an amalgamating machine, the crushing capacity should not be greater than its amalgamating ability, except where it is experimentally found advisable to crush a large tonnage with less saving than a small tonnage with higher saving in gold.

The amount of ore crushed by a battery depends upon the area and size of openings of the screen, the height of discharge and the number and character of the splashes produced by the fall of the stamp. The discharge can therefore be influenced to a limited extent by the speed and height of drop. With most ore to increase the amount crushed it is better to increase the weight of the stamps than the height of drop. This is being done generally in California, where it is common to have stamps of 1000 to 1150 pounds dropping at the rate of 100 to 105 per minute. The speed at which a stamp can drop is limited to the point at which the cam rising meets the tappet on the stem descending. This point should never be reached, or a broken cam will be the result. A safe margin should be left for accidents.

In Colorado, where the gold is finely disseminated in the ore, and where amalgamation largely takes place in the battery, the ore is kept a longer time in the battery. For this purpose the weight of the stamp is from 550 to 660 pounds, drop 16 inches, speed thirty drops per minute and discharge about



Head Frame, Fremont Mine, Amador Co., Cal.



Rope Driven Compressor, Fremont Mine, Amador Co., Cal.

is put between the heavy mortars and the concrete foundations. This sheet is intended simply to make a perfect joint. The mortar is secured by eight 2-inch bolts which are readily removable and may be replaced in five minutes. Vibration seems to have been reduced to a minimum.

The stamps weigh 900 pounds and have a 6-inch drop, with a speed of 104 to the minute. They are equipped with 10-inch shoes and dies. Iron guides are used. The stamps and concentrators are run by separate electric motors. Each 5-stamp battery is independent.

The mill is roomy and well lighted both by day and by night. Three enclosed arc lights give abundance of light at night. The concentrating equipment consists of eight Frue vanners and eight Woodbury tables.

The Fremont shaft was sunk to a depth of 1000 feet by a small prospecting hoist and gallows-frame. With the installation of the new 14x18 double-stem hoist made by the Fulton Iron Works, a new 95 foot head-frame and ore bin were put up. The gallows-frame and ore bin are on separate concrete foundations, extending down 28 feet to solid rock, the ore

sands of the tailings. The mill will not start until after this is completed. Wales Palmer is superintendent and Arthur Goodall manager at the mine.

The mother lode of California extends from the southern part of Mariposa county, in that State, to the north central part of El Dorado county. The veins of this mineral belt are of three distinct types—those associated with great masses of dolomite (sometimes ankerite), with walls of black slate and serpentine and in some cases greenstone (amphibolite) schist, like those at Placerville, El Dorado county, and those of Coulterville, Mariposa county; a second type, wherein the veins occur associated with amphibolite schist and black clay slate, a class found in central Amador county; and a third class in which the veins occur wholly in amphibolite schist, as those at Angels in Calaveras county. Rock formations are found in other parts of California essentially similar to those of the auriferous belt known as the mother lode, but these occurrences have no connection geologically with that lode, though sometimes this mistake is made.



13 inches, while in California the usual weight is from 850 to 1050, speed 95 and over, drop 6 to 8 inches and discharge 4 to 6 inches. The height of discharge, or the vertical distance between the top of die and lower edge of screen opening is a most important factor in gold milling. It determines the length of time a given particle of ore should be held in the mortar subject to amalgamation and to the disintegrating power of the stamps, and therefore is as important a factor on the ultimate size of the issuing pulp as the mesh of the screen. There is a point at which a certain height of discharge will be the most efficient and as near as possible to this point it should be kept as the dies wear down. This can be done by chuck blocks of different sizes, strips of wood on screen frame, having top and bottom of screen frame of different widths and reversing, by raising the chuck block by means of strips between it and the mortar or by putting iron plates under the dies as they wear down.

The material of which screens are made is a matter of individual preference, but the mesh should be a question of experiment. Some use brass wire; others Russia iron, angle slot or perforated; others burnt tin, while others use steel wire screens. This last class of screen I have found efficient and durable, giving a maximum discharge surface and outlasting Russia iron on the same ore. I can imagine cases where the ore containing copper sulphate might quickly destroy a steel screen. This emphasizes the fact that each individual ore must be treated on its own merits, and what would do well on one ore would be a disastrous failure on another. Burnt tin screens last a little longer and in some places will cost less than wire screens. The decreased discharging capacity, compared with wire screens, is a serious consideration. Slot screens generally give a coarser product than the number would indicate, while needle point perforated give a finer pulp.

The particular mesh to be used is the mesh that will give the least value in the tailings and the maximum output. There may be cases where the latter consideration overbalances the former; but the ore in sight or blocked out in the mine must be considerable to warrant this policy. The size of mesh will also be governed by the after treatment of the tailings. For example, an ore that is discharged through a 50-mesh screen, with tailings having values sufficiently high to cyanide, might be more economically worked with a 30-mesh screen. I have a case in mind where the result of a change of screen from 50-mesh to 30-mesh not only gave a more suitable cyanide product, but actually reduced the values in the tailings about one-third. The mill had been sliming not only the quartz, but the gold also.

The screen frame is inclined outward at an angle of 10°, to facilitate the discharge, and may have from 3½ to 4 square feet of screening surface. As the lower 5 or 6 inches does most of the screening, the screen frame can be made sufficiently narrow, so as to leave a space between it and the top of mortar screen opening for a hand hole through which to clean the screen of chips without taking off the screen frame.

The five factors—weight of stamp, height of drop, number of drops per minute, character of screen and height of discharge—should be so co-related as to produce the best results on the ore under treatment. The weight of stamp, being generally nearly 1000 pounds and wearing down as milling proceeds, is independent of the operator; but the other five can be regulated at will. Having had no previous experience with a battery, it was best to keep the drop below 7 inches, for, with a heavy stamp, the higher the drop the more liability of a broken stem. With new shoes, 5½ inches is sufficient drop to start on for most ores.

It will be seen that the stamp mill is not the rough machine that many imagine, but a machine that needs intelligent and constant care.

The ore coming into a well designed mill will be immediately dumped upon the grizzlies (grates) to separate the fines, or that portion not requiring further crushing before being fed to the stamps, from that portion to be broken by the rock breaker. The ore should travel of its own gravity from step to step of the operation and the mill building be large enough to eliminate overcrowding.

Where steam is employed for power the boilers should be blown off once a day and the water-gauge cocks opened at least every other shift, so as to be sure that the passages are not choked. The engine should be in a dust-tight housing or room, and will then require little more attention than regular oiling.

In a small mill it is generally economy to have the rock breaker of a greater capacity than that actually needed, for it not only allows the breaker man time for other work, but is on hand if the capacity of the mill is increased, and, if large enough, all the ore for the twenty-four hours' run may be broken during the day shift. A 40-stamp mill is generally provided with two grizzlies, each with a rock breaker at its lower end. The bars are generally of wrought iron, set parallel and covering a space 4 feet wide and 12 feet long. The bars are usually 1 inch wide, set from 1½ to 2½ inches apart and held in place by four or five rods passing through them horizontally, with ferrules between the bars. The bars should be wider on the top side than the bottom, so that all rock passing

through the top will go through and not choke the grizzly. They are set at an angle of about 40°. The grates last three or four years and may be protected to a great extent by having the upper end covered with an iron plate, on which the ore is dumped. Old wrought iron rails may be used, but do not last so long. Some mill men set the grizzly bars wider apart at the bottom than at the top to prevent clogging by large pieces of ore.

The ore passing through the grates goes to the bins ready to be fed to the stamps, while that passing over the grates may go to a bin over the mouth of the crusher or falls to the crusher floor to be broken and fed by hand. The ore from the crusher joins the fines in the bin below and is ready to go to the self-feeders. Some bins have flat floors, instead of inclined. The space in this case may be occupied by a reserve pile of ore, which can always be used if for some reason the supply of ore is stopped for a time. This practice is not advisable on low-grade ore, as it costs from 15 cents to 20 cents per ton to shovel the ore to the feeders.

A long experience in milling operations has demonstrated the advisability of having the rock breakers set at the mine or at some point intermediate between the mine and mill. This relieves the mill building of the heavy vibration incident to the operation of crushers and also admits of delivering to the ore bins back of the feeders a more uniform character of rock, instead of the greater part of the fines in one place and coarse rock in another.

If the ore were delivered to the stamps in a finer state of subdivision there would not only be a greater equality in the feeding, less wear on screens and on shoes and dies, and less wear on the guides, but an increased efficiency of the stamps. A trommel and a pair of crushing rolls may sometimes be advantageously employed, or a rock breaker of great capacity and set to, say, half an inch, following the ordinary rock breakers. The increased complexity of machinery is the main objection to this method; but where the coarse crushing is done away from the mill there is no reason why this should not be done.

The ore from the bins runs into the hopper of the automatic feeders. This is regulated to feed "low," so that the shoe and die shall almost, but not quite, come in contact when dropping on ore. The feeders, although practically automatic, require more or less attention by the mill man, particularly in mills that treat ores that are not well mixed. If the feed is regulated by a collar on the stem striking an arm, one of the latter should always be ready to replace a broken one. This applies also to other wearing parts of the self-feeder.

The duty of a stamp, or the number of tons crushed per twenty-four hours, will vary from 1½ to 4 or 5 tons, according to the physical character of the ore and its susceptibility to amalgamation.

The best material for shoes and dies is often a local consideration depending upon the proximity of foundries. As a general rule, steel shoes are more economical than cast iron. The time taken to change shoes when worn out is a consideration in favor of the most durable material. Dies are made of various materials, such as chrome steel, forged or hammered steel, or cast iron. The material of which the die is made should be a little less tough and hard than the shoe, so as to give the die a chance to wear in preference to the shoe. This will lessen "cupping"—the cup-shaped depressions often noticed in the dies.

In one instance steel shoes weighing 200 pounds lasted 140 days, crushing 350 tons of ore; the dies weighed 80 pounds and lasted 82 days.

The amount of water used for milling varies from five to seven gallons per stamp per minute for all purposes except water power. Where water is scarce and a tailing pond is used to settle and pump back from, and the engine steam condensed, about one gallon per stamp per minute will suffice for boiler, stamps and concentrators, depending, of course, upon the character of the ore. The above applies to medium hard quartz; but if the ore be soft and clayey, producing much slimes, then at least 1½ gallon per stamp per minute. When the machinery is run by distillate or oil engines and the tailings are settled in tanks, 100 to 110 gallons per ton of ore crushed has been found sufficient.

The scroll or order of drop for the battery is generally 1, 4, 2, 3, 5; 1, 4, 2, 5, 3, or 1, 5, 2, 4, 3. With the first scroll No. 5 must be given a longer drop than the other stamp, for the action of 2, 3 dropping in succession tends to pile the material up in the end of mortar under 5. The last scroll—1, 5, 2, 4, 3—gives a good regular wave in the mortar and an even discharge on the plates. The regular equality of the wave prevents choking on one side, which would inevitably occur if allowed to drop in regular succession. To prevent the ore piling up at the ends, No. 1 and No. 5 are often kept heavier or given a higher drop than the other three. The speed at which the stamps drop will have an influence on which scroll is to be preferred, for this speed will determine the splashes and the time that the next dropping stamp meets the wave produced by this splash.

The width of the mortar at discharge is from 17 to 19 inches for the new type of narrow-discharge mortars. The object is not to keep the ore in the mortar any longer than necessary to crush it to the desired mesh.

(TO BE CONTINUED.)

## The Ore Deposits of Bisbee, Arizona.\*

Written by F. L. RANSOME.

The Bisbee quadrangle owes its economic importance exclusively to the occurrence of ores of copper. The unimportant deposit of lead carbonate in Hendricks gulch, which was the first discovery in the district, is still being worked in a small way, and the Easter Sunday mine has supplied a siliceous gold ore used in the Copper Queen smelter for converter lining. But these, so far as known, are the only instances in the quadrangle of ores commercially exploited for other metals than copper. In comparison with the copper deposits, the known occurrences of other ores are economically insignificant.

For a district that has produced nearly 400,000,000 pounds of copper the Bisbee quadrangle, in spite of the general bareness of its rocky slopes, exhibits little patent evidence of its mineral wealth. The porphyry mass of Sacramento hill, and the schists that partly inclose it southeast of Bisbee, show considerable alteration and contain abundant disseminated pyrite, which by oxidation imparts a rusty stain to the rocks. But so far as known no deposits of value occur wholly within these discolored rocks. Some dark rusty masses, composed principally of limonite, outcrop along the Dividend fault in Bisbee. Similar ferruginous ledges occur in Hendricks gulch, on Queen hill, and in the limestones south of Bisbee. Experience has shown that such limonitic croppings, although rarely containing appreciable quantities of copper-bearing minerals, are nevertheless frequently, although not invariably, associated with an underlying ore body. They mark loci of fracturing and mineralization in the limestone. They evidently result from the oxidation of pyrite, the less soluble iron oxide and some silica remaining near the surface, while such copper as was originally present has been carried down by percolating solutions and redeposited at lower levels. These bodies of limonite, when not too siliceous, are the best surface indications of ore that the district affords. Many of the most important ore bodies, on the other hand, would have remained undiscovered were superficial phenomena alone relied upon to suggest exploration.

Although the rocks of the quadrangle are seamed with faults and dikes, none of the workable ore deposits occur as lodes or fissure veins. With a few exceptions they are irregular replacements of limestone. Originally pyritic, containing probably subordinate amounts of chalcopryite, they owe their present value to secondary concentrations effected by processes of sulphide enrichment and oxidation.

**DISTRIBUTION OF THE ORES.**—The principal bodies of copper ore thus far exploited in the quadrangle are contained within an irregular area of approximately a quarter of a square mile in extent. This area begins on the north in the heart of the town of Bisbee and extends south for three-quarters of a mile. It lies west and northwest of Sacramento hill, and for the most part between the Czar and Calumet & Arizona (Irish Mag) shafts.

Outside of this limited area no large bodies of copper ore have yet been discovered, although more or less ore is known to occur in the Lowell, Uncle Sam, Whitetail, Wade Hampton and other mines and prospects. The extent to which future development in these outlying properties is likely to increase the known area of important production will be discussed in another place.

**UNDERGROUND DEVELOPMENT.**—The Bisbee quadrangle contains two large productive mines—the Copper Queen and the Calumet & Arizona. In addition to these are a few undeveloped mines that have produced comparatively small quantities of ore, and a number of prospects ranging from shallow pits to shafts several hundred feet deep connected with extensive systems of drifts.

**COPPER QUEEN MINE.**—This comprises a maze of workings connecting with the surface through four working shafts and several other less-used openings. The area more or less thoroughly intersected by drifts and crosscuts covers nearly half a square mile, while the extreme vertical range of underground exploration is about 950 feet. They are practically all Carboniferous limestone.

The ore at the only point where it was exposed at the surface was first worked by an open cut, which still yawns upon the hillside just above the Copper Queen store. With the need for deeper development the Queen incline was sunk just east of the open cut. From this incline, which reached a vertical depth of 280 feet, four levels were run, known as A level, B level, 300-Queen level and 400-Queen level. With the exception of the lowest level, a very small part of these old workings is now accessible.

As work proceeded and successive ore bodies were discovered to the southeast, vertical shafts were put down and levels run approximately 100 feet apart. The first of these shafts is the Czar, 440 feet deep, situated on the southwest edge of the town of Bisbee. The Czar levels are four in number, the second level, corresponding to the old 400-Queen level, being the

\* Abstract Professional Paper No. 21, U. S. G. S.



most extensive. Large bodies of ore have been stoped southwest of the Czar shaft. All of the important ore bodies so far discovered west of a meridian drawn through the Czar shaft have been above the third level.

**CALUMET & ARIZONA MINE.**—This mine, the underground development of which is chiefly within the bounds of the Irish Mag claim, is operated through the Irish Mag shaft, situated 900 feet south-southeast of the Spray shaft and about three-quarters of a mile in the same direction from Bisbee.

The Irish Mag shaft, begun November, 1900, was about 1200 feet deep at the time of visit. It was connected with four levels, run at depths of 750, 850, 950 and 1050 feet below the surface, and a station was then being cut for the 1150 level.

For 750 feet the shaft was carried down, without drifting, through barren limestone. At this level some exploratory drifts were run and connection made with the air shaft near the northeast end of the Irish Mag claim. Very little ore was encountered, however, until the 850-foot level was reached. This level is about 30 feet lower than the sixth level of the Spray, with which there is connection through a raise in the northern corner of the Irish Mag claim. On the 850, 950 and 1050-foot levels large bodies of ore were discovered and partially blocked out before active stoping was begun in November, 1902.

The ore from the Calumet & Arizona mine is all hoisted through the Mag shaft and carried in steel cars to the company's smelter near Douglas. By the end of 1902 this plant was turning out about thirty tons of copper per day, with a single furnace running on ore with an average tenor of about 10%.

**LOWELL MINE.**—This property, purchased for \$500,000 by the Copper Queen Co. in June, 1901, is situated a little over a mile south-southeast of Bisbee. It is worked through a vertical shaft about 1120 feet in depth. There are nine main levels consisting chiefly of drifts from the shaft, and numerous crosscuts. The workings are probably entirely within Naco limestone, which is cut by some small dikes of granite-porphry. The drifts in general follow the strike of the easterly dipping beds, which are disturbed by slips along the bedding planes and by strike faults.

No important ore bodies have been encountered in the Lowell above the 900-foot level. Ore occurs, however, on the 1000-foot and 1100-foot levels, but has not yet been developed by stoping.

At the time of visit the mine was making about 175,000 gallons of water a day, mostly from the 1100-foot level.

**COPPER KING MINE.**—This is an abandoned prospect situated a little over half a mile southeast of Bisbee. The workings comprise a vertical shaft, supposed to be about 700 feet deep, and some short drifts. The dump consists of hard, light-gray quartzose material heavily impregnated with pyrite. The microscope shows that this material is composed chiefly of quartz in irregularly interlocking grains, with considerable sericite, pyrite, and a little zircon and rutile. It is a highly altered rock and, so far as revealed by its lithological character, may have been originally either schist or porphyry. As the shaft is sunk in the center of the area of intrusive rock, the material is probably altered and mineralized porphyry.

**CALUMET & PITTSBURG MINE.**—This property is about  $\frac{1}{4}$  mile southeast of Bisbee, near the road to Naco. At the time of visit it comprised a well-equipped vertical shaft 950 feet in depth. No drifting had yet been undertaken and no ore encountered. The shaft is entirely in solid Naco limestone. There are no superficial indications of ore and the shaft has been sunk with the expectation of finding in depth a continuation of the ore-bearing ground that has proved so profitable in the Copper Queen mine.

**LAKE SUPERIOR & PITTSBURG MINE.**—This mine, still in the prospecting stage, comprises two unconnected sets of workings, from shafts half a mile apart.

**WHITETAIL MINE.**—The Whitetail (or Whitetail Deer) mine lies about  $\frac{1}{4}$  mile south of Bisbee, on the northern edge of Espinal plain. It has produced a few hundred tons of good copper ore from primitive and shallow workings on the contact between Abrigo and Martin limestones. The mine has been idle for years, but as it has recently been acquired by the Copper Queen Co. it is likely to be systematically explored in the near future.

**UNCLE SAM MINE.**—This mine—situated in the gulch of the same name—lies five-eighths mile southwest of Bisbee. The developments comprise a tunnel and a shaft, but as no work has been done for several years both were inaccessible at the time of visit. The dump of the tunnel shows evidence of considerable mineralization, and the mine is said to have produced a little good copper ore.

Bisbee West mine is a prospect 2 miles southwest of Bisbee. A vertical shaft about 700 feet deep has been sunk close to the junction of the Bisbee fault with a short northeast fault. The shaft was partly filled with water at the time of visit, and none of the levels could be examined.

Easter Sunday mine is 5 miles east from Bisbee on the south side of Mule gulch. It has been worked on a small scale and in a primitive manner. The developments comprise a tunnel a few hundred feet in

length run into a steep northern hill slope, and a series of irregular stopes and raises extending up to the surface. The mine is unique in this district, inasmuch as it produces a free-gold ore. The gold occurs rather irregularly in a fractured quartzitic bed of the Morita formation. The best ore is said to run as high as \$30 per ton. But as such ore contains considerable calcite, and as the Copper Queen Co., which has been utilizing the ore as a siliceous lining for its converters, requires that the silica shall not fall below 84%, the ore actually hauled to the smelter is purposely allowed to contain more or less quartzitic waste.

Glance mine is a prospect 8 miles southeast of Bisbee, near Glance station, on the El Paso & Southwestern Railroad. It has a vertical shaft 505 feet in depth in Glance conglomerate. At the date of writing the shaft had just penetrated this conglomerate and reached the underlying limestone, but encountered at the contact so strong a flow of water that sinking had to be temporarily abandoned. A drift has been run for 120 feet to the southwest, just above the water level, cutting through a dike of monzonite-porphry about 13 feet thick. According to a letter from S. W. Clawson, portions of the dike carry 3% copper.

The Modern mine is a prospect just outside of the northern boundary of the quadrangle on the northeast side of the Tombstone canyon, and is in Pinal schist. The developments comprise a vertical shaft 200 feet in depth and two short drifts. Two narrow veins are encountered, one in the schist and the other between the schist and a dike of granite-porphry. They are nearly vertical and their general strike is from  $10^{\circ}$  to  $30^{\circ}$  east of north. The maximum width of the vein is 18 inches and they contain cupiferous pyrite, with a little galena and sphalerite, in a gangue of quartz. The presence of native copper and cuprite was reported by those in charge of the work, and the ore was said to carry as much as an ounce of gold, but there was no opportunity of confirming these statements. The schists in the vicinity of the shaft show considerable fissuring and are traversed by narrow anastomosing dikes of granite-porphry and by veins of quartz.

(TO BE CONTINUED.)

### Follow the Crevice.

TO THE EDITOR:—In presenting this brief article it should be stated at the outset that the writer is not opposed to the perpendicular shaft, as such, but solely for economical reasons in the class of instances hereinafter referred to. He is fully aware, from personal experience, that a perpendicular shaft is very often a necessity and an economy, especially where a mine has developed a large amount of ore, and the vein dips at a large angle from the vertical. Yet he can recall instances where financial ruin has come to an otherwise paying mine as a result of the ambitious plans of the management to abandon the old workings and sink a new, up-to-date perpendicular shaft. However, such matters should be considered from the economical standpoint alone, always allowing for the element of safety.

Recently while spending some time in one of the newest mining camps of Colorado, the writer had his attention called to the particular manner of carrying on mining operations. The deepest shaft had attained over 600 feet on the dip of the vein. Three others ranged between 300 and 400 feet, vertical, while four or five more were down over 100 feet, also perpendicular. Thus, only one out of eight or nine had followed the vein.

Now this idea of the perpendicular shaft appears simply as a matter of custom, for very many of the prospectors are directly from the Leadville district or its vicinity. The contacts and blanket formations of the Carbonate camp present peculiar economic reasons for carrying a vertical shaft, as it is the cheapest and quickest method of reaching the ore deposits. But in the new camp referred to conditions are entirely different.

The veins are fissures in the granite and seldom have a greater dip than  $10^{\circ}$  or  $15^{\circ}$  from the vertical. Furthermore the crevice matter is loose and soft and in many instances is picking ground throughout, shading off into very hard granite walls. It has been found by comparison that the cost of sinking the perpendicular shaft in the solid granite is even treble the cost of the shaft on the vein. In addition must be added the cost of crosscutting at the several stations to reach the vein. Then aside from primary expense is the ever-present possibility that a good pocket of ore may be missed between the levels, which otherwise would have been opened by the shaft, but is left for some lucky leaser of the distant future.

In speaking of these points the superintendent of the 600-foot shaft, which is on the dip of the vein, stated that he opened very little pay until near the 400-foot point. He said further that had his company expended their money in a perpendicular shaft and crosscuts, in the hard, tough granite, no doubt they would have become discouraged and another failure went on record, while, as it is, this proposition is paying dividends.

The idea may justly find support in a highly miner-

alized section where the veins and crevices are very numerous, or where it is the most economical way of reaching the deposits of ore between flat formations, but not in the average new mining camp. As a rule, the prospector for precious metals, or their ores, has a limited amount of capital with which to reach his goal, and cannot afford to waste time and money in blasting hard granite, when a pick and shovel are about all that is necessary in following the crevice.

Black Hawk, Colo., July 6.

W. G. ADAMS.

### Belt Power Hammer.

Herewith is illustrated a new belt power hammer, known as the "Denver," designed and being patented by George Bignell of Denver, Colo. This hammer is intended for general blacksmith use and ranges from  $\frac{1}{2}$  inch to  $3\frac{1}{2}$  inches round or square and up to 6x1 inches. Attachments can be supplied upon order to enable a blacksmith to weld rings from 8 inches to 3 feet in diameter. Dies are furnished for spreading and shanking drill bits of all sizes. The manufacturers claim with this machine a blacksmith and helper can spread and shank from sixty to eighty drills per hour. It is made in three sizes and in two styles.



Belt Power Hammer.

No. 1, shown herewith, is a post hammer bolted to 12x12-inch post and weighs 900 pounds. No. 2 is self-contained with cast-iron frame and weighs complete 1600 pounds. No. 3 is the same style as No. 2, but of lighter pattern, and weighs 1100 pounds. No. 4 is parts of No. 3 bolted on 8x8-inch post; weight, 650 pounds. The heaviest piece is the anvil block of No. 1, which weighs 250 pounds and can be transported on mule back. No. 1 and No. 2 have 14-inch stroke. Weight of crosshead and die is sixty-five pounds, with 350 to 400 revolutions per minute. The hammer is now being manufactured and placed on the market by the Denver Power Hammer Co., 1433 Broadway, Denver, Colo.

### Chlorine Produced Electrolytically.

The large electrolytic plant of the United States Reduction & Refining Co. at Colorado City is among the most interesting metallurgical works in America. In these works, illustrations of which appear on the front page, a concentrated solution of sodium chloride is electrolyzed, the result being the production of chlorine gas and caustic soda. The chlorine gas is absorbed by water and the liquor used in the treatment of gold ores by chlorination process. The caustic soda is employed in another portion of the works. The management states that the production of chlorine gas by means of the electrolytic decomposition of a solution of sodium chloride is much less expensive than the generating of chlorine gas by the action of sulphuric acid upon bleaching powder (chloride of lime). The electrolytic method of generating chlorine gas would be of undoubted advantage at points where transportation charges are high, but where salt is sometimes comparatively cheap, being found in the dry lake beds. These conditions are not infrequently found in desert regions. J. D. Hawkins is general superintendent of the United States Reduction & Refining Co.



## Mining and Ore Treatment in Western Australia.\*

Written by DONALD CLARK.

So far as mining is concerned, Western Australia was certainly the Cinderella of the States. Queensland, with its Charters Towers, Gympie and Mount Morgan; New South Wales, with its extensive coal measures and Broken Hill; South Australia, with its Moonta and Burra Burra; Tasmania, with its Tasmania, Mount Bischoff and Mount Lyell; Victoria, with its £260,000,000 worth of gold; were apt to look upon their western sister with a tolerant, patronizing air. Now she has outstripped all her sister States, and shown how one small field such as Kalgoorlie can turn out as much gold as the whole of the fields in any State. The area of Western Australia is 975,920 square miles, its greatest length from north to south being 1400 miles, and from east to west 1000 miles. The southern and southwestern areas are fringed with coastal limestones from Eocene age to the recent calcareous sands around Perth and Fremantle.

Carboniferous and Mesozoic rocks occur over large areas; Cambrian rocks have been identified in the Kimberley district, while the Archaean rocks, comprising gneiss, granite and schist, are said to be more extensive than in any other portion of the world. These Archaean rocks are important, in that the valuable metallic deposits occur in them. Mr. Woodward considers there are six distinct belts running north and dipping slightly eastward. The first belt runs nearly parallel to the western coast and contains lead, copper and zinc. The second belt contains the Greenbushes tin fields and fine deposits of graphite.

The third belt lies about 100 miles inland from the coast, and is about 100 miles wide. This belt contains bold, bare outcrops of granite, which are flanked round with sand. Rain runs off as from the roof of a house. This water finds its way through the sand to be entrapped in hollows, giving rise to soaks and gnammas holes. Drains are now made circumscribing these outcrops, and the water led into excavated dams.

The fourth, or first auriferous belt, lies east of the granite belt. It is about 20 miles in width. Starting from Phillip's river, it includes Parker's Range, Southern Cross, Golden Valley, Mount Magnet, Cue, and Nannine. The fifth belt resembles the third; that is, it is made up of granites and other igneous rocks. This divides the Southern Cross auriferous belt from the sixth belt, whose width has not been determined. The sixth belt starts from the Dundas hills, and includes the famous fields of Coolgardie and Kalgoorlie, and extends right through to Marble Bar and Mulline on the northwest coast. The area of the present goldfields may be conceived when it is remembered that each of these belts is over 800 miles in length.

In 1861 a prospector found auriferous stone 30 miles east of Northam, but could never rediscover the place. In 1862 the Government engaged E. H. Hargraves, the discoverer of gold in New South Wales in 1851, to prospect and inspect the country for gold. Mr. Hargraves' opinion as published, "The Non-Auriferous Character of the Rocks of Western Australia," shows how the practical man will theorize, even to his own undoing. In 1864, C. C. Hunt headed parties which penetrated the country to the Dundas hills, Lake Lefroy, and probably passed over the Coolgardie goldfields. They named the "Hampton Plains" after the Governor of the day, but only looked upon the country from a pastoral point of view. In 1869 the Government offered a reward of £5000 for the discovery of a goldfield within 300 miles from any port, to be paid after 5000 ounces had been won; a still more progressive step was taken in 1873, when sixteen Ballarat miners were imported to prospect and mine for precious metals. A battery was erected at Fremantle. This venture ended in failure. In 1885 the Kimberley goldfield was opened up, and in the following year 2000 men had been attracted to the place. This marks the first successful move which has resulted in the modern discoveries. Prospectors again set eastward from Northam, and after many small finds Southern Cross was discovered in 1887. From that time for a number of years new fields were proclaimed with feverish haste—Pilbarra, Ashburton, Murchison, Cue, Siberia, were all discovered before 1891. In April, 1892, Bayley and Ford started eastward over that desolate, dreary strip which lies to the east of Southern Cross. After having been beaten back for want of water they slightly changed their course, and arrived at the native well—Coolgardie—where they camped. During the next three days they picked up 200 ounces of alluvial gold. Returning to Southern Cross for provisions they hurried back to the scene of their find, and on the day they reached Coolgardie for the second time discovered the famous Bayley's Reward mine. The first afternoon's work gave them 500 ounces in specimens. Bayley returned and showed 554 ounces to Warden Finnerty on the 17th of September, and obtained a lease of his discovery claim. The gold fever seized

the local inhabitants, and in less than a week hundreds were on the way to the latest land of promise.

Kalgoorlie was discovered in June, 1893. During the next three years Bulong (I. O. U.), the London-derry, the Wealth of Nations, Menzies, the Norseman, and other goldfields were discovered.

The difficulties the early prospectors had to contend with can never be properly understood by those who have not faced them. The country from Northam to the goldfields is so flat that for hundreds of miles there is neither cutting, embankment nor bridge. A few culverts are constructed where water might run. Isolated bare granite outcrops, or low rugged ridges capped with ironstone are dignified with the name of mountains. The country, however, is not bare, but sparsely covered with stunted gums about 50 feet in height, with a scaly butt and bare white or red stems; a thin cluster of pendant leaves is borne on the summit of umbrella-shaped branches. Mulga, quandongs, cotton bush and salt bush hide the bareness of the parched red soil, while on the sand ridges the globular tufts of the bright-green spinifex shows in marked contrast against the blue of the short scrub and the green of the scraggy gums. Great flat plains, covered in some instances with sand, in others with a stunted scrub, are known as lakes. The water, it is explained, is underneath the surface. The soil appears to be fertile, but is redeemed from being a desert by the scrub, which extends over hundreds of miles. As soon as settlement destroys vegetation the fine red sand which floats with every breeze envelopes and tinges all natural and artificial objects with a color peculiar to itself.

The climate of the southern and southwestern coastal districts is said to be the most salubrious in the world; most people would not say the same about the goldfields towns. The average mean maximum day temperature for January is very nearly 100° for the Coolgardie goldfields, while the Murchison is 105°. The nights are said to be cool, but this is only relative to the day temperature.

There is little doubt, had the eastern goldfields a rainfall like that of the coastal districts, the topographical features of the country would have been greatly different. Deep channels would have been cut and watersheds would have been clearly marked. The rainfall is from about 6 to 9 inches per annum; this limited supply has little or no geological effect in removing material and eroding channels. In more ways than one such a meager rainfall is of advantage in a country where the water lies, and where a down-pour of a few inches would mean flooding the country and converting the roads in the red soil into clay quagmires. Semi-tropical conditions would be much more trying than the clear, dry heat which now prevails.

There are many public condensing works on the fields, and special condensers have been evolved to suit local conditions. Many elaborate methods were tried, but a very simple form is almost universally adopted.

Five cubical 400-gallon tanks 4 feet by 4 feet by 4 feet are set on edge, so that they form a diamond-shaped boiler 20 feet in length. A similar row is set parallel to these with middle edges adjoining. These are built in. A fireplace is placed in front between the series, and flues are so arranged that the heated air circulates round the tanks and returns to a chimney alongside the fireplace. The tanks are connected below, while above they lead to a common pipe through which the steam passes. This pipe leads to a closed jacket which surrounds a galvanized iron tank, the tank itself being full of the salt water, which has to be condensed. A portion of the steam is condensed and drains away to a reservoir. The water in the tank becomes raised to near its boiling point by its contact with the steam, and runs continuously into the first tanks, or those on each side of the fireplace. The salts in the water, which soon deposit, are blown out at the opposite end from time to time.

The vapor which passes the first cooler goes through a series of inclined or vertical galvanized iron hollow cylinders about 4 feet in diameter and 20 feet in length. These have open pipes running through them. Each of the cylinders condenses some of the vapor which is drained away, and the number can be so arranged that very little escapes. These rows of columns, so common on the goldfields, are atmospheric condensers. Joints are made tight with a little paste. In some cases, in order to facilitate cleaning out, each tank is divided so that the upper half forms a cover resting in a water seal. The top can thus be lifted bodily with block and tackle, and scale or salt removed from the lower portion.

Before the completion of the pipe line from the Helena river the cost of distilling with wood at 15s per ton, or green wood from 24s to 25s per cord, was about 1d per gallon, or 4s 6d per 100 gallons.

The water from the shafts adjoining the mines—for the gold mines themselves may be said to be dry—contains from 6% to 19% solids, that from the Great Boulder mine giving sodium chloride 11.164, magnesium chloride 1.425, calcium sulphate .462, lime .422, a total of 13.473.

The salt water at the mines is a highly objectionable material, loaded as it is with solids. It has to be used over and over again, until it is so saturated that even a small amount of evaporation or change of temperature will cause it to deposit its

salts all over the place; every leak or drip of water about the works is indicated by long pencil-like stalactites, while the pipes and launders choked and filled with large and often perfectly formed crystals of gypsum (selenite) and even the grinding pans and settlers become coated with a thick incrustation of the same substance. When the water becomes alkaline through lime being added, a white inflorescence of magnesium hydroxide separates out; this covers the filter presses with a snow-like deposit.

Fuel is much higher than in other States. The wood used as a rule is so free-burning that it is like feeding a fire with paper. The country has been devastated of large timber for miles around, and though branch timber lines are pushed farther and farther back, it is likely that the price will reach that of coal conveyed on the railway from the local mines. The present cost of 15s per ton means about 20s when compared with the firewood we produce.

(TO BE CONTINUED.)

## Some Important Cripple Creek, Colorado, Mines.

Among the numerous productive mines of Cripple Creek, Colo., are those operated by the United Gold Mines Co., of Colorado Springs. Their holdings embrace a total of over 400 acres. Beside those portions of the property operated by the company there were, according to the last annual report of the company issued June 1st last, twenty-six blocks of ground being operated by leasers, these leases giving employment to 130 men. The various properties of the company consist of eleven separate groups of developed mines and claims in the prospective stage of development. One of the most prominent of these is the Wild Horse, in which the Wild Horse vein is the most developed. There are five working shafts, the deepest being 1280 feet. The main ore shoot is known to extend from the surface to a depth of 970 feet, below which depth the levels have not yet been extended to the shoot. The total production of the Wild Horse is stated to be \$2,072,580. The main vein occurs outside the volcanic vent in the granite, and is oxidized. The vein is irregular both as to size and values, though in depth the occurrence of rich pockets at intervals has raised the average grade of ore considerably. One of the accompanying engravings is that of the No. 1 shaft of the Wild Horse mine. Other veins in this group are opened by means of crosscuts run from the Wild Horse shaft. Some of the cross veins of this system contain high-grade ores. The Gleason shaft of this group is well equipped with machinery and it is calculated to eventually operate a large portion of the property through this shaft, after connection has been made with the Wild Horse vein workings. Near the Gleason shaft a cyanide mill of 100 tons daily capacity has recently been built in connection with a lease on the Wild Horse vein. Another of the engravings herewith shows the buildings about the Gleason shaft. It is a scene typical of the mining industry in Cripple Creek district. Among other properties of the company are: The Deadwood, which is credited with a production of over \$1,100,000. It has seven working shafts, the two deepest being 800 and 850 feet, respectively, with over 15,000 feet of levels opening eight separate veins, on an intricate vein system, a notable feature of which is the occurrence of large bodies of ore at the intersections of the several veins. The Damon, which has three shafts, the deepest being 450 feet deep. In this property also ore bodies of considerable size are found to occur at the intersection of the veins. Usually these veins are found in two systems, one nearly vertical, the other nearly flat. These veins are in the andesite breccia. The mine is being worked at present by leasers. It has an equipment for 1000 feet depth. The United Gold Mines Co. also controls the W. P. H. property, which is credited with an output of over \$420,000. It has four shafts, the deepest 450 feet. In the eastern end of this property the grade of ore is such that leasers willingly pay 30% gross royalty for the privilege of mining. The low-grade ore is stated to be amenable to cyanide treatment.

The Requa mine, with five shafts, the deepest 514 feet, has produced over \$110,000, with level workings and tunnels 5200 feet in length. Other properties of this company are the Bull Hill and Straub Mountain, the Pinnacle, the M. K. & T., the Panther, and the May Belle, each of which has shafts of variable depth, down to about 600 feet, beside extensive drifts, crosscuts, etc.

The total production of the United Mines Co.'s property is stated by their last annual report to have been \$4,268,000; the output since the mines were consolidated under this single management has been \$1,261,000, the production for the first five months of 1904 having been \$285,000. The several leases pay royalties ranging from 25% to 50% of the output.

As a general statement, it has been asserted that not over 20% of the productive area of the camp has been developed to a depth of 500 feet. This refers not alone to the properties above mentioned, but to the Cripple Creek district, and the outlook for many years of prosperous operation of the mines of the district is as promising as at any time in its history.

\*Abstract Australian Mining Standard.





Wild Horse Shaft of United Gold Mines Co., Cripple Creek, Colo.



Gleeson Shaft of United Gold Mines Co., Cripple Creek, Colo.

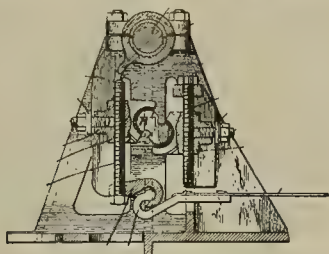


# Mining and Metallurgical Patents.

PATENTS ISSUED JULY 5, 1904.

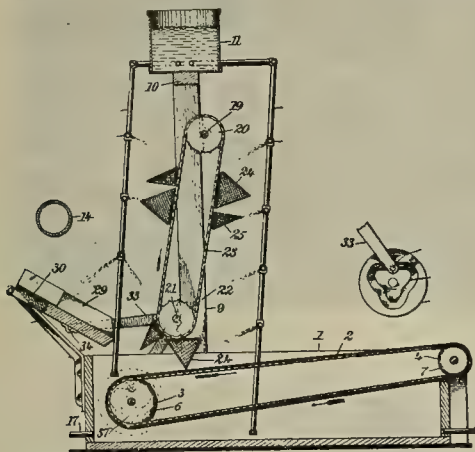
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ACTUATING MECHANISM FOR CONCENTRATING TABLES.—No. 763,785; G. A. Overstrom, Anaconda, Mont.



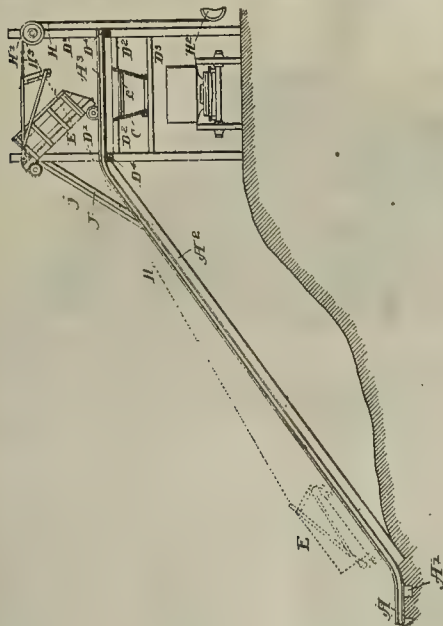
In actuating mechanism, combination with drive shaft having crank, pitman journaled at one end upon crank, connections between free end of pitman and part to be actuated, and rocker pivotally mounted and forming movable fulcrum for pitman at point between journal bearing and free end thereof.

ORE WASHER.—No. 764,448; F. H. Frankenberg, Pueblo, Colo.



Ore washing machine comprising tank, standards extending upward therefrom, water tank supported at upper ends of standards, water distributing pipes extended from tank downward at front and rear sides of standards, pipes having horizontally disposed sections provided with perforations, carrier chains supported by standards, and buckets mounted on chains, buckets being arranged in pairs of reverse order.

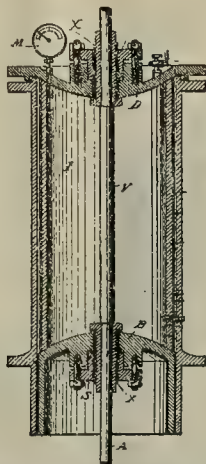
APPARATUS FOR REMOVING DIRT FROM EXCAVATIONS.—No. 764,201; W. J. Newman, Chicago, Ill.



Dumping apparatus comprising sloping track, upper part of which is horizontal, dumping car having traction wheels which travel on rails of track, guide hopper located below upper part of track, inclined deflector bars located laterally outside of track rails near upper end thereof, parts on sides of car adapted to engage deflector bars to tilt car when

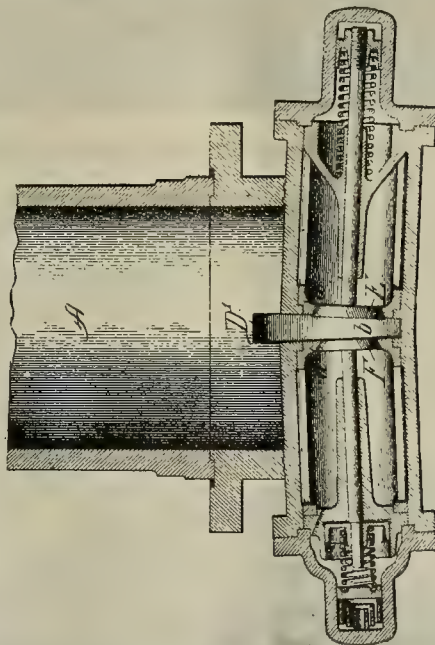
latter reaches upper end of track, door for closing front end of car and attached to frame which is hinged to car and cable for drawing car from lower to upper end of track and attached to upper side of door, whereby pull of cable acts to hold door closed while car is traveling up inclined track, but pulls door open when car is brought to dumping position.

PROCESS OF SMELTING AND REDUCING METALS.—No. 764,044; C. Diesler, Coblenz, Germany.



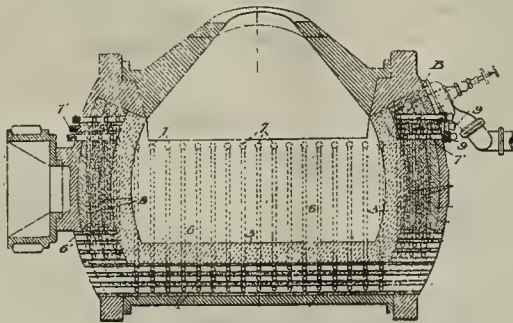
Process of smelting and reducing metals, consisting in mixing materials to be treated with carbonate of lime and carbon, placing mixture in air tight retort, exhausting air from retort, subjecting mass to action of electric current within retort and to action of gas generated therein in excess of five atmospheres of such gas, and exhausting such resultant gas after it has acted on materials treated

AIR COMPRESSOR.—No. 764,182; C. J. Diedrich and A. F. Cramer, Detroit, Mich.



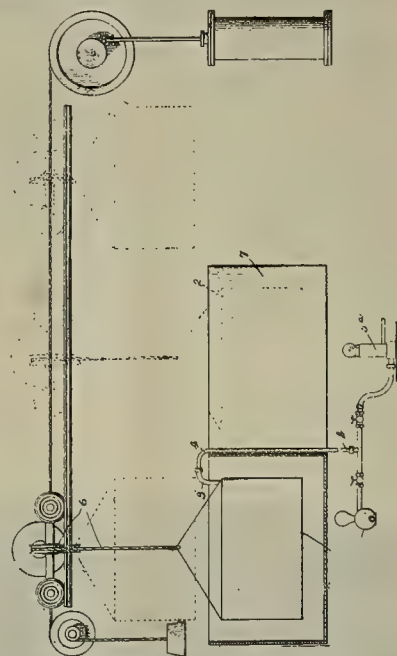
In compressor, combination with cylinder, of chamber exterior to and extending transversely across base of cylinder proper and containing converging valve seats forming between them tapering pocket leading to port through which chamber communicates with cylinder, spring-pressed suction valve in chamber at one of seats, and spring-pressed delivery valve in chamber at other of seats.

CONVERTER.—No. 764,332; Ralph Baggaley, Pittsburgh, Pa.



Converter having ventilated passages open to air at bottom, and other passages leading therefrom upward along shell, passages being constituted by pipes incased in bricks, tiles or metal blocks.

FILTERING PROCESS.—No. 764,486; G. Moore, Salt Lake City, Utah.



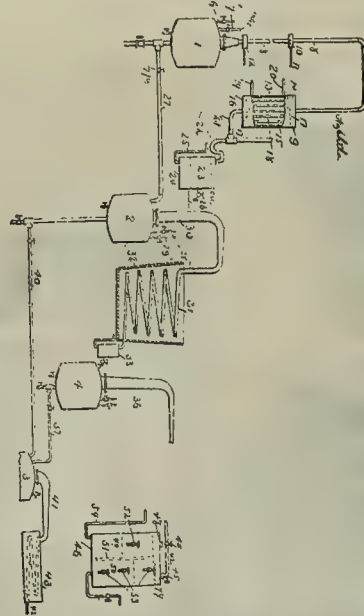
Process of filtering slimes, consisting in immersing filter in bath containing slimes and fluid in which they are suspended, forcing fluid through filter by difference of pressure between opposite sides thereof, whereby slimes are deposited thereon in layer of requisite character; removing filter from bath and cleaning it by air pressure applied to back thereof.

FASTENING DEVICE FOR IMPLEMENTS.—No. 764,283; C. Ehrenfeld, Pasadena, Cal.



Combination with implement head, provided with a socket adapted to receive handle, of handle therefor, jaws having projecting ends taking into head, shanks of jaws having tapered portions extending out on handle and provided at ends with means adapted to take into handle, and clamping ring adapted to spring over tapered portions of shanks to hold jaws in place.

APPARATUS FOR DISTILLING CRUDE OILS.—No. 764,138; J. C. Mallonee, Charlotte, N. C.



Apparatus for distilling products from crude oils, comprising in its construction still; means for heating still at bottom thereof; condensing and separating means; means for conducting products of distillation from still to condenser and separator; means for cooling heavier products of distillation to prevent them from passing to condenser and to be returned to still; second still; means for heating it and for conveying away therefrom products of distillation and separating same; means for conveying undistilled products from first still to second still; means for cooling and separating distillates of second still; fourth still; means for conveying thereto certain products of distillation of second still; third still; means for conveying thereto undistilled products of second and fourth stills; and means for separating and cooling distillates of second and fourth stills.



# Mining Summary.

SPECIALY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

The following figures for the copper production of the world for 1903, compared with 1902, are given by H. R. Morton & Co., London, Eng. The quantities are expressed in tons of 2,240 pounds:

	1902. Tons.	1903 Tons.
Africa:		
Cape Colony	1,150	5,230
Asia:		
Japan	29,775	31,360
Australasia	28,640	29,000
Europe:		
Austria	1,015	1,055
Hungary	485	330
England	480	500
Germany	21,605	21,205
Italy	3,350	3,100
Norway	1,585	5,915
Russia	8,575	10,320
Spain and Portugal	49,790	49,740
Sweden	455	455
Turkey	1,100	1,400
South America:		
Argentina	240	135
Bolivia	2,000	2,000
Chile	28,420	30,630
Peru	7,580	7,800
North America:		
Canada	17,485	19,320
Mexico	35,785	45,315
Newfoundland	2,400	2,080
United States	292,870	298,050
Totals	541,295	565,820

With other data concerning productions of the area included in the Louisiana Purchase issued by the Department of Commerce and Labor, Bureau of Statistics, the following on mineral wealth is given: The coal produced in this area in 1902 amounted to 30,000,000 tons, against 14,000,000 tons in 1890; the iron ore to 15,850,000 tons in 1902, against 1,269,000 tons in 1890; the silver product of 1902 to \$37,837,576 in coining value, against \$44,799,998 in 1890, and gold \$39,841,500 in 1902, against \$10,650,000 in 1890. The territory of the Louisiana Purchase embraces an area of 875,025 square miles.

## ALASKA.

E. H. Power, principal owner of the Rodman Bay mines, near Juneau, and G. E. Bent, manager, are preparing to make improvements necessary to put the property in working order. They are also interested in properties on Admiralty island. Development work will be increased.

H. H. Williams, manager of the Humboldt group, in Silverbow basin, near Juneau, says that in Berners Bay district the mining claims adjoining the Johnson property and belonging to the Gold King Co. of Portland, Or., of which Williams is president, are showing satisfactorily. A ledge was uncovered showing on the surface a width of 4 feet. The last 8 inches next to the hanging wall assayed \$200.

N. Macauley of Victoria, B. C., and J. A. Chapman reported having struck oil in a 9000-acre tract in the oil fields at Kayak. They have a four barrel a day gusher. This oil was struck at a depth of 1100 feet, though they had not expected oil until a few hundred feet deeper.

A dredger has been constructed and shipped to Haines by the Bachman Dredging Co. of Pasadena, Cal. The dredger will be used on Chilkat river. It is claimed that it solves the problem of bringing to the surface all granular material coming within reach of its suction pipes. All pockets or cavities holding precious metal will be emptied. Sand and gravel are removed by buckets. At any time, it is also said, a hydraulic giant can be attached to the discharge pipe for sluicing purposes.—It is reported that the Kensington group of mines, in the Berners Bay district, has been sold to the Alaska-Treadwell M. Co. for \$1,000,000.

Superintendent Hampton of the Juapla M. Co., operating near Juneau, has twenty men at work. Work has started on the flume, 7x20 feet, which will be used to handle the water of the creek.

A. Gfeller of the Helvetia G. M. & M. Co. and the Missouri M. Co. at Windham bay says the latter company has acquired a five-year lease on the property of the Little Basin M. Co. of Portland, Or. Experiments are being made to determine the proper working and ore treatment for these mines. It is intended to operate both properties through one plant as soon as opened up. Men are drifting on the Little Basin group.

The management of the Treadwell mines at Douglas are preparing to put in a compressor capable of running forty or fifty drills.

## ARIZONA.

### Gila County.

The production of the Old Dominion smelter at Globe for month of June is reported at 1,550,000 pounds of blister copper, a thirty days' run for two furnaces. At the new smelter the brick work on the dust chamber is completed. The blast

pipes are being put in place, and above the smelter the sills for the ore bins are being laid. Grading for the concentrator has been finished and the channels to carry off the tailings are being cut. Sinking of the main shaft below the tenth level is expected to proceed slowly until changes are made in the cages.

O. Gieseke, for New York and Montana men, has an option on the Stewart & Clark group of eighteen mining claims and seven other contiguous claims for \$150,000. This group of twenty-five claims is contiguous to the Old Dominion and United Globe properties, at Globe. On several of the claims considerable development work has been done.

### Mohave County.

(Special Correspondence).—With the reopening under bond by W. S. Fletcher, of the Star Spangled Banner, C. O. D. and Alpha groups of mines at Stockton Hill, that section of the Cerbat district is showing renewed activity. Stockton Hill, 10 miles northwest of Kingman, formerly produced large quantities of high grade ore, even when transportation was a heavier item of expense than at present; but for several years past little has been done toward developing the mines. The three groups mentioned are being worked under superintendence of P. Wiseman, with T. McMahon in charge of the C. O. D.; F. G. Holmes at the Alpha and C. Ogden at the Banner. The C. O. D. and Banner, employing 40 and 47 men, respectively, are sacking ore for shipment and will send about five carloads per day to the company's smelter at Needles, Cal., being fitted up by Manager Fletcher. These mines are on the eastern slope of Cerbat mountains, and the ore will be hauled to Kingman as the shipping point. The Alpha group is on the western slope above Todd Basin and adjoins the Night Hawk mines at Layne Springs. A few men are doing development work at the mine while a party of Indians are building a road to Mineral Station on the A. & U. Ry., the branch railroad running from Kingman to Chloride. By the time the road is completed it is expected that the Alpha will be opened up and capable of furnishing two carloads of ore per day.

A mile below the Alpha is the Oro-Plata mine, a section of which is under lease to F. O'Dea, who is opening up an ore shoot 90 feet deep by 180 feet long and preparing for stoping. This ore carries four ounces gold per ton. Most ores of the district are silver-lead. Of the latter class is the Paymaster mine near the Oro-Plata, worked by L. Hoffman. South of the Paymaster is Cerbat camp, near which is the Gem mine, F. Morgan superintendent. A contract for 300 feet of drifting on the third and fourth levels has been let to J. D. Jordan, who is working 20 men, and the superintendent is employing 10 men. This mine also carries gold values.

Two miles east of Cerbat, on the summit of the range, is the Stockton Hill M. Co., W. H. Cushing, of Topeka, Kan., president, M. Hughes in charge. On its two claims is a 400-foot shaft cut midway by a 900-foot tunnel. The ledge, 8 feet to 12 feet wide, crops out on the surface, and the pay streak is 18 inches wide in two chutes, one 250 feet long and one 150, cut by the tunnel. The ore carries galena, with silver, gold and zinc values. They are drifting on the ledge at the 370-foot level.

The Treasure Hill mine at the foot of Stockton hill is temporarily closed down, due to inability to handle the water struck at bottom of a 220-foot shaft. L. M. Teale, of Kingman, has the mine in charge, and H. F. Best, of Savannah, Mo., is president of the company. There are eight tunnels that have produced ore. A patent to the six claims has been applied for.

Cerbat, July 9.

### Yavapai County.

The Riley-McCabe M. Co. has been incorporated by J. L. Madden, L. Waggoner, J. K. Johnson et al., to develop the Jim Crow mining claim, extension of the McCabe mine at McCabe. M. J. Hickey is interested.

The Verde Chief M. Co. will resume operations on its mines in Black Hills district, near Jerome, this week. They have a tunnel 1000 feet in length, and the first work will be to crosscut the vein 600 feet from mouth of tunnel.

T. M. Earnhart, of Prescott, is reported to have leased the Model mill in Peeples valley and will add five stamps and a 20-ton cyanide plant to the equipment.

### Yuma County.

Machinery and lumber for the Bell of Arizona mine is on the ground at Quartzsite for a mill, being hauled by teams from Mohawk Summit. The road from Mohawk Summit to Quartzsite is in good condition and teams are loaded with one ton per animal.

The Castle Dome M. Co. has bought

four claims in the Old Napoleon camp, between Quartzsite and Ehrenburg. The claims contain high-grade ores of mercury and values in gold, silver and copper. The company intends starting operations October 1st and will put in a reduction plant about January 1st.

## CALIFORNIA.

### Amador County.

At the Central Eureka mine at Sutter Creek the June cleanup is reported at \$47,000.—At the South Eureka the mill started up last week.—The work of taking the water out of the Lincoln shaft is progressing rapidly. Work will begin on the tunnel as soon as the water is out.

At the Kennedy mine at Jackson the addition to the mill is going up.—About sixty men were laid off last week at the Zeila mine and the remaining crew put to work repairing the shaft.

Near Volcano, at the Treadwell mine, Superintendent Schenck has the 5-stamp mill in full operation.

At the Defender mine at Defender, Superintendent Joyce will sink and develop the property at a lower level. He will sink 100 feet before running crosscuts. The shaft will then be 400 feet deep.

At the Madrone mine at Volcano the mill is in operation.—The Glenn mine is still shut down owing to lack of water. The Robinson Bros' lease expired on the first of the month. The mill will not be started again before fall.

### Butte County.

J. M. Beck of Pasadena, W. J. Mellon of Challenge and H. Brittain and J. Ebert of Marysville are interested in gold-bearing gravels in the Clarence Humphrey place, near Oroville, which they are preparing to work, says the Mercury. The ground is being prospected. It is too shallow for dredging, but will be mined with a machine which is said to combine the principles of the dredger and hydraulic elevator. There are two kinds—one with a grizzly that can be worked with a 3 H. P. engine and 8 inches of water and handle thirty tons of dirt an hour; the other with a 3-foot circular screen, requires a 5 H. P. engine and 8 inches of water and will handle sixty tons an hour.

### Calaveras County.

The Panama mine at Washington ranch, north of Murphys, has been sold to Woodward & Fuller. Work will be started this week.—At the Sentinel mine, at Washington ranch, men are sinking to open the ore body.

Six men are sinking and others are grading for a mill at the Phillips mine in Washington ranch district, north of Murphys.

Arrangements are being made to start up the Boston mine, formerly the Esperanza, at Mokelumne Hill.

The New Pennsylvania placer mine, 3 miles from Mokelumne Hill, adjoining the Rooney mine on the southwest and covering the holdings of the Werle, Whitfield & Campbell claims, consolidated, is under bond to Richardson et al. of Oakland. Sinking a working shaft is under way. Bedrock was struck last week and 6 feet of gravel reported at depth of 135 feet.

### Contra Costa County.

The Iron Mountain C. Co., operating a smelting plant at Keswick, has bought fifty-five acres of water front land near Martinez for \$60,000, as a site for its works, which, it is said, will be built on the newly acquired property as soon as the removal from Shasta county can be effected. The site is on Bullshead Point, 1½ mile east of Martinez, and includes one-half of the water frontage in the Ertz 140-acre tract. Because of the deep water at the point the site was selected. Vessels can easily be handled there, as there is 30 feet of depth available at high tide. It is said work on the removal of the Iron Mountain C. Co. plant will be started this summer.

### Inyo County.

E. McGrath of Reno, Nev., is building a concentrating plant at Keeler to work 5000 tons of slag (the "Syauc" slag pile), the average assay of which is said to be \$25 per ton and the concentrates average \$120 per ton.

### Kern County.

The 130 stamps of the Yellow Aster mine at Randsburg continue in steady operation.

Havilah reports to the Californian say the owners of the King Solomon mine at Havilah have struck a 2-foot ledge carrying high-grade values.—The Big Four is still working with encouraging prospects.—The Kern River M., Dev. Co. has tunneled 250 feet and will go 200 feet more to tap the ledge. It is waiting for machinery.—Latham's Extension, on the east side of the road to Kernville, shows copper values; the walls on the west side are granite with serpentine on the east.

Bakersfield reports say the Standard

Oil Co. is making arrangements for laying a 12-inch pipe line from the Midway field to the Pacific ocean at Port Harford, a distance of 115 miles, across the Cuyama and Carisa districts, where land has been taken up, but little work done. Surveys for pipe lines over this second district have been projected by an independent company without result, but it is said the Standard has already made contracts for hauling supplies for the line.

### Nevada County.

B. Williams of Boston, Mass., of the company preparing to reopen the Idaho-Maryland mine at Grass Valley, says it is intended to increase the capacity of the mill so that 250 tons of ore can be treated daily. They also intend to put in a cyanide plant to treat the tailings from former operations.

### Placer County.

Men are at work at the Baltimore mine, near Forest Hill.—Superintendent R. Jones is increasing work at the Cash Rock mine, near Forest Hill. This is a river claim and can be worked only in the dry season. They are already down to pay.

A new concentrator and six machine drills have been put in at the Gold Blossom mine, near Auburn, and sixty men will be put to work.

### Plumas County.

The owners of the See & Jolly mine in Granite basin and the Malloy mine on Bucks creek, near Quincy, have put up a 10-stamp mill on the See & Jolly mine, which is running on \$10 ore, says Superintendent See. The company is preparing to build a similar mill on the Malloy mine.

In Genesee valley, near Genesee, the Five Bears M. Co., G. H. Goodhue superintendent, reports opening up a 6-foot vein of ore assaying \$15 per ton. The property has a 10-stamp mill, and to this is being added a Kinkead mill, cyanide plant and concentrators. The company is extending and connecting tunnels and doing other development work. The ore will be conveyed to the mill by gravity. The same company has stopped work on its quartz mine below Shooft temporarily and is devoting attention in that section to the cement gravel proposition at Iron Bar. This was equipped with machinery last year, but high water of last winter damaged the ditches, etc.

E. W. Perkins, foreman of the Jamison mill, says the Jamison mine has fifty men employed, and is mining and milling steadily. S. W. Cheyney of San Francisco, manager of the Jamison and Keystone mines, near Quincy, says he is preparing to build a 10-stamp mill.

### San Bernardino County.

(Special Correspondence).—At Daggett and Borate mining operations are practically suspended for the hot season. About twenty-five men remain at the Pacific Coast Borax Co.'s mine at Borate, but the reduction works at Marion are closed. The Clark road, which strikes across the desert from Daggett, is practically completed, 80 miles to Ivanpah, where it crosses the Barnwell branch of the Santa Fe running north from Goffs. The line is expected to do much for Death Valley and the mining interests of the desert generally.

Daggett, July 10.

(Special Correspondence).—The producing companies at Camp Rochester, in Bagdad district, are the Bagdad-Chase G. M. Co. and the Roosevelt M. & M. Co. The former has been operating three years and has two miles of workings. It is producing 200 tons of ore per day. The low-grade is worked by a 10-stamp mill at the mine and the high-grade is taken to the 50-stamp mill at Barstow and treated by amalgamation and cyanide. At the mine ten gasoline engines, ranging from 5 H. P. to 12 H. P., supply the power, and the 10-stamp mill is operated by a 40 H. P. engine.

The Roosevelt has been developing the past two years. The company is putting up a 10-stamp mill, with arrangement for twenty additional stamps when required. The process contemplates saving of copper values in the ore. Leaving the stamps the pulp will pass to sizers and the slimes separated, after which the copper will be leached by a 5% solution of sulphuric acid and the residue cyanided. The copper will be precipitated on scrap iron. An 81 H. P. gasoline engine will operate the mill, and one of 14 H. P. runs the hoist. The shaft is an incline following the vein, 450 feet deep, with a vertical depth of 304 feet below the collar of the shaft. The ore body is developed with 1531 feet of workings, vein running from 12 feet to 45 feet in width. The vein matter is porphyritic. Average values throughout the mine run \$10 to \$12 gold, with some silver and copper. On the 400-foot level a heavy lead of red and black oxide of copper has been struck, through



which is copper glance. This occurs in the vein, but does not carry much gold values. The vein dips west at an angle of 45° and the copper lead pitches at an angle of 24° to the northwest in the vein. It varies from 2 to 8 feet wide. As yet it has not been developed enough to determine its significance. The company ships to the smelters. Hitherto all water used in the camp was brought from Newberry, on the Santa Fe, via Ludlow, and its scarcity hindered operations. Recently the Roosevelt Company struck water in quantity in a well and will pipe it 9 miles to the camp. It will be pumped to the summit through a 6-inch line, thence by gravity through a 4-inch and finally reduced to 2-inch to camp. The summit is 1300 feet above the well and the fall to camp will be 672 feet. About 300,000 gallons per day will be supplied at first. The Roosevelt's ore body is a contact between a porphyry footwall and a granite hanging wall. There are several other companies developing in the district, among them being the John Suter G. M. & Co., adjoining the Bagdad on the east; the Ludlow Belle, on the north, and a company on the western extension of the Roosevelt. This district is 8 miles from the main Santa Fe line and connected with it by the Ludlow & Southern Railroad Co. With transportation and a good water supply it will be free from the more serious hindrances to desert mining.

Camp Rochester, July 11.

#### San Diego County.

V. V. Angel of Mesa Grande, foreman of the Himalia M. Co., reports the mines are working ten men and are producing gems. To the present all work has been done within 20 feet of the surface, but the company has started to drive a 200-foot tunnel to strike the ledge lower down.

#### Shasta County.

F. H. Dakin, Jr., of Berkeley has a driller at work prospecting the Dakin tract, consisting of 400 acres lying along the river within the corporate limits of Redding. He says the entire tract will be prospected for auriferous gravel preparatory to dredging.

#### Siskiyou County.

The Railroad & M. M. of Colorado has bought the Williams Point, Sunnyside, Old Channel, Anona, Indian Girl and Native Daughter mines and mining ground at the Big Bend of the Klamath river, near Nolton, and the Minetta B and adjacent mines and mining ground 6 miles up stream. With the Minetta B. they acquire the ditches, flumes and water right to Thompson creek. The R. & M. Co. will extend the upper ditch down beyond the Happy Camp divide and work with 3000 inches of water the gravel deposits. Later on the ditch will be extended to Happy Camp, covering another tract of mining ground owned by the company, making in all about 2000 acres. The water of the lower ditch (3000 acres) is taken across the river on a suspension bridge to work the Minetta B. mine. A lighting plant has been put in at the Minetta B. and work will be continued.

G. G. Mullins, for the Ricoro M. Co. of Los Angeles, has bought the Classic Hill mine on Indian creek, 14 miles above Happy Camp, and is preparing to start work.

The work of sinking shaft on the Lucky Jack ledge of the Headwaters group on North Fork of Humbug creek, near Hawkinsville, was stopped last week on account of foul air 70 feet down. The men are at work on the tunnel in the hill lower down, which is supplied by air through a winze made several weeks ago, and expect to tap the Lucky Jack at a better point; to then start a raise in taking out quartz. Manager Johnston has thirty-eight men at work. He is preparing to build a 20-stamp mill, for which the sawmill is turning out lumber.—Humbug creek at and above the fork is active this season, says the Journal, about 200 men being employed, with prospective addition of more as development work progresses in the several mines being opened.—The Etna Advance says machinery is arriving for the Morrison & Carlock mine at Quartz Valley. It has put in an electric plant and is lighting mine and mill with electricity. Two 5-stamp batteries will be added to the milling plant, also an air compressor and machine drills. Superintendent J. M. Morrison has added an assaying laboratory.—Work has been shut down for the season at the Spengler mine at mouth of Humbug, near Hawkinsville. The water has not yet run out, but there is sufficient to work to advantage.

#### Trinity County.

Work is under way on the Lappin mine at Deadwood. The water was pumped out of the winze and two men are stopping there. Men are clearing the stopes, and as soon as there is room more men will be put to work. The richest ore will be

shipped and the lower grade crushed at the Brown Bear mill. H. Blaney is superintendent.

Graves & Co. have begun work on the Maple mine, 8 miles above Dodge's, near Dedrick. They have men at work drifting on and crosscutting the ledge.

#### Tuolumne County.

J. S. Kuns of Los Angeles has bought an interest in the Phillips group of mines on the Tuolumne river, near Groveland. The debts have been paid and the mill will be completed. The group consists of the Los Angeles, Antioch, Half Breed, George and Phillips claims, says Superintendent Phillips.

B. A. Jeffery of San Francisco has a bond on the Free Lance quartz mine, near Tuolumne, for \$7000, and will pay 20% of the gold extracted during the life of the bond.—The Whitto interests in the Stanley quartz mine and millsite, together with improvements, on Kanaka creek, 1 mile east of Jacksonville, have been sold to C. A. Fitzgerald.

The miners, 150 in number, of the Jumper Gold Syndicate's mines at Stent went on strike last week, due to an order posted by the management that "all underground workmen would be required to strip to the naked body before passing through the change room in going on and off shift"—a measure intended to prevent specimen stealing.

Work at the Longfellow mine, near Groveland, is progressing and the mill is in operation. The grading for the addition is complete and wall building begun. The cable from mill to pump is in place. Drifting continues on the 400 and 500-foot levels.

### COLORADO.

#### Boulder County.

The Mogul tunnel, near Eldora, is again in operation and power is being furnished to several parties who are operating through the tunnel.

#### Chaffee County.

Near Buena Vista the Paywell G. M. Co. is reported shipping this week a carload of ore from its Brittle Silver group that averages \$75 per ton silver. A car per week will be sent out. The lower tunnel is nearing the ore shoot of the upper tunnel.

#### Custer County.

Custer reports say at the Ben Eaton mine the engine and machinery have been put in working order and the pump started unwatering the mine. Manager Bassett says the shaft will be unwatered and sunk 100 feet deeper before drifting is started.—The contract let by the Custer M. & R. Co. on the Dolomite mine is progressing. A station will be put in at the 100-foot level and a drift run.

#### Fremont County.

The tailings dumps of the National mill south of Florence have been leased by D. Myers of Cripple Creek. The dumps will be equipped with cement sluice boxes.—The Colorado F. & I. Co. is cleaning up the Rockvale coal mine, near Florence, which has been idle for nine months, preparing to hoist coal.

#### Gilpin County.

Smelting ore is being shipped by the Gold Dirt M. Co. of Rollinsville to Denver over the new Moffat railroad. The company is making preparations for building a 50-ton stamp mill.

Eastern people have leased and bonded the Atna mine on Quartz hill, near Central City, with G. E. Wrockloff of Canon City as manager. The machinery is being overhauled and the shaft and level workings will be put in repair, when development will be resumed. The property is west of the California mine. Its deepest workings are 400 feet.—E. R. Fouts, D. Davies, M. A. Harris, G. Miller and T. Turner have formed a pool for the operation of the Grizzly mine at Russell Gulch, which they have under lease and bond. The main shaft is reported down 200 feet. The shaft will be retimbered and cleaned out to the bottom.

During the month of June the shipments from the Quartz hill properties of the Kansas-Burroughs Co., near Central City, amounted to 145 cars, or 1235 tons. The shipments were made over the lines of the Gilpin tramway, the bulk of the ore going to the stamp mills and concentrator at Black Hawk.

#### Gunnison County.

The Bowerman Citizens' Dev. M. Co. has been incorporated by Bowerman, Pitkin and Gunnison parties to develop a group at head of Box canyon. The directors are F. G. Kress, J. Chapman and W. J. Nourse of Bowerman, P. Dice of Loraine, S. Dickinson and D. C. Mason of Pitkin, S. L. Whipp of Gunnison and G. G. Witzke of Pueblo. The company has a lease and bond on the Baxter, Alexander and Wilbur lodes, west of Bowerman, on the Quartz creek side. The company

will drive a tunnel from 600 to 800 feet, to cut the vein at depth. The vein crops on the surface for several hundred feet and the tunnel will be a drift on the same.—The Gunnison & Cripple Creek G. M. Co. has been incorporated at Bowerman by M. Mullen, J. Mitchell, J. R. Hilton and R. Blanchard. The company owns the Blanchard claims south of the camp.

The Bowerman-Home M. & Dev. Co. has been incorporated by Bowerman and Pitkin men, with D. C. Mason, J. Chapman, F. G. Kress and W. J. Nourse. The company has bought two claims, Baxter and Baxter No. 2, on the Quartz creek side of Copper mountain, 2 miles below Pitkin, and will begin work this week. A 5-foot vein of ore assaying \$8 is exposed on the property.

#### Lake County.

The output of Leadville district for the month of June is reported at 66,000 tons of ore. The zinc production of Leadville mines during June amounted to 8000 tons, the average production of this mineral during the first six months of the present year. The production of manganese ore has been restricted by market conditions this year. At present the only manganese being shipped comes from the Star, from which Manager Dickerman is shipping four carloads a week.

Preparations have started to sink the Coronado shaft at Leadville. The breaking of ore has stopped and the necessary changes are being made to begin sinking. The main Coronado shaft is 4½ feet by 10 feet in the clear. The shaft will not be interfered with down to the present bottom level. From that level as far down as it becomes necessary to sink, the shaft will be enlarged to 4½ feet by 15 feet in the clear, in order to accommodate the sinking pumps which will be put in. The shaft will be sunk to a depth to draw off the water from the Penrose. The idea is to divide handling the water between the two shafts. The Penrose has relieved the Coronado of about 400 gallons. When the Coronado has been sunk deep enough so that 300 gallons of the Penrose water can be drained into it the two shafts will be sunk simultaneously and into the horizon below.

#### La Plata County.

(Special Correspondence).—The May Day mine is working two shifts with air drills in the tunnel and one shift in the mine, where they are taking out high-grade ore. The shaft is 300 feet in depth and the vein continues strong and of good quality. This is the only shaft in the La Plata mountains over 160 feet deep, except that of the Neglected mine at Oro Fino, which has been a steady producer for two and a half years, and is milling sixty tons of ore per day.

The Empire M. Co. is pushing work in the tunnel and making headway toward the vein.—The Chief M. Co. is drifting in a body of high-grade ore and preparing to install a milling plant.—Manager Deming will increase development work on his mine at the head of Boren gulch, where he has a large body of low-grade ore.

A strike has been made by Cripple Creek prospectors on the hill south of Burnt Timber gulch. The vein is 12 inches wide and has been opened for 100 feet on the outcrop, a channel sample taken the entire length running \$134 per ton in gold, silver and lead.—Brown Bros. are increasing development of their group at the head of Bedrock gulch, where they have a vein of galena carrying gold and silver values.

The Bonnie Girl Co. is excavating for its mill and cyanide plant and the machinery will be set up this month.

Durango, July 10.

#### Montezuma County.

(Special Correspondence).—The Old Kentucky M. Co. on the East Mancos river has been opening up a body of ore in the lower tunnel. The tunnel is 100 feet in length. The ore body is 12 feet in width and averages \$34 per ton in gold, silver and lead, with 2% to 5% copper. The company proposes building a mill. It is owned by Cripple Creek men, with D. H. Franks as manager.—Satisfactory showing is being made by the Silver Falls mine across the river from the Old Kentucky, the vein being 4 feet wide and carrying \$9 per ton in free gold. A blanket vein which crosses this group has been opened on an adjoining property and shows values of \$5 per ton. It is 3 feet in thickness.—M. L. Bentley, who has been drifting on a claim at the head of the East Mancos river for a year past, to cut the Timberline vein which crosses the Doyle property, reports he has reached ore. It is 4 feet in width.

Mancos, July 10.

#### San Juan County.

J. B. Patterson, J. Bordeleau and A. Johnson are making ore shipments from the Champion mine, on Sultan mountain,

below Silverton. The ore is of copper, carrying values in gold and silver. The ore being shipped is taken from the drift. No stoping as yet has been done. The vein is 7 feet wide.

#### San Miguel County.

Pending installation of additional machinery in the mill and completion of development in the mines, the Caribou-Montezuma at Ophir is temporarily closed down. Slimes tables to handle the tailings a second time are being set up. New batteries are being put in and the concentrators are being overhauled. The mill has a capacity of thirty tons daily and the concentrate shipments amount to four carloads per week. In addition to this output, three carloads of high-grade ore as it comes from the mine is shipped direct to the smelters weekly. The development in the mines is in driving drifts and levels and making a raise for ventilation. O. Erickson is manager.

Operations have been started on a group of seven claims in Gold King basin, near Telluride, by E. M. Titus of Telluride and R. S. Morrison of Denver. They have a lease and bond on the claims. Manager Titus is cleaning out the old workings preparatory to shipment of ore. The first work has been started on the Bohemia in the upper tunnel.

#### Summit County.

So far this season the Gold Pan M. Co. has worked out an acre of ground in the pit near the south end of Breckenridge, says the Times. With from two to three hydraulic giants playing on the 70-foot high bank of the breast of the pit the gold-bearing gravel has been kept steadily moving through three sluices on the bedrock of the pit, to the intakes of the three hydraulic elevators. While probably two-thirds of the placer gold remains between the interstices of the steel riffles of the three sluices on the bedrock, last week the west sluice of the elevated flume was cleaned up, to see how the ground was running, and a 193-ounce gold bar resulted—this at the end of one month's run. As the ground being washed is rich and the water supply abundant, the cleaning up of the bedrock sluices will be delayed until the water supply is only sufficient to operate two elevators. Then the sluices will be cleaned up alternately. The placer ground of the Gold Pan Co. extends from the right-of-way of the South Park branch of the Colorado & Southern railway, south, and up the Blue River valley for 5½ miles to the mouth of McCullough gulch.

The placers in Hoosier gulch, near Breckenridge, owned by W. Benrose, will be operated by the Hoosier Gulch G. M. Co., incorporated by Massachusetts men. They will also develop lode mines. The company will sink a shaft to depth of 200 feet on a vein that is a part of the 250 acres controlled by the company. The outcrop of the vein shows assay values in gold and silver and is expected to make a producer of smelting ore with depth. T. A. Brown, of Breckenridge, will have charge of sinking the shaft. The directors of the Hoosier Gulch G. M. Co. for the first year are E. Loring, G. Purrington, J. E. Bartlett, J. W. Churchill, O. B. Cole, of Massachusetts, and W. Benrose, of Breckenridge. The property is 12 miles south from Breckenridge, in Hoosier pass, which is crossed by the county road leading to Alma and Fairplay.—The Mecca G. M. Co., organized by W. Lennox and T. W. Giddings of Colorado Springs, N. B. Scott, of West Virginia, and M. G. Evans, of Denver, to operate the Mecca and French Gulch companies' placers, near Breckenridge, made a cleanup last week after a few weeks' run in the hydraulic elevator pit and report satisfactory results, \$5000 worth of placer gold and nuggets being taken out. This is said to be about 70% profit over the cost of extraction. This company is putting in a drain and working sluiceway which, when completed, will be 2600 feet long and will tap the elevator or Kingsbury pit at bedrock and facilitate the economical operation of the property.

#### Teller County.

Manager H. M. Gilbert, operating the Hoosier mine on Tenderfoot hill, Cripple Creek, for the Milwaukee Mutual M. Co., resumed operations last week after a close down of several weeks. Six men were put to driving a drift from the shaft at a depth of 675 feet from the surface. The breast of the drift is in 30 feet and it is thought with another 20 feet they will reach the ore shoot.

At Cripple Creek the Denver & Southwestern R. R. Co. is pushing work of grading to the mines on the west slope of Beacon hill, and indications are that all of the new shippers will be connected up by switches with the main line by August 1.

The Mint property, owned by the Index Co., has resumed operations under management of B. Pullin, who has a lease



on it. Extensive development work is planned. He will sink the shaft 300 feet, giving it a total depth of 1045 feet from surface. Royalties range from 15% to 30%. C. Ridpath is superintendent. The company owns a total of twenty-seven acres and is equipped with a plant of machinery to hoist from depth of 1200 feet, and besides this has an air compressor.

The work of washing and sorting over the old El Paso dumps at Cripple Creek is about completed by D. Bernard, who has been working there for several months past. He has been making 240 tons of ore a month from the dump. The rock has been of low grade.

H. H. Hand of Denver has bought control of the Prince Albert M. Co., operating on Beacon hill, Cripple Creek, for \$75,000. A plant of machinery will be put on the property and deep mining engaged in, says Hand.

The following figures by the Gazette show the tonnage and production of Cripple Creek district for the first six months of the present year:

	Tons.	Total Value.
January.....	51,500	\$ 1,753,000
February.....	54,500	1,030,000
March.....	54,300	1,746,000
April.....	58,800	1,851,400
May.....	60,500	1,805,500
June.....	52,700	1,007,000
Totals.....	332,300	\$10,522,800

## IDAHO.

### Idaho County.

(Special Correspondence).—The ore from No. 4 tunnel of the Jumbo mine is run direct to the mill, 75 feet. Value, \$17.

The Colonel mine will be on full time when piping and fan arrive. The ore body is 16 feet in width, with \$28 in values.

W. S. Brown, manager of the Concord M. Co., will put in a large compressor for the Mother Lode No. 2.

Drifting south on the Atlas is being pushed in ore \$18 in value. The shaft is down 200 feet, with 15 feet of sump. The drift is from the 200 level.

The Oro Fino tunnel is in 850 feet and ore is being blocked out. This work is all on the ledge and will tap the old workings on the Big Buffalo 700 feet in depth. The tunnel will be 4000 feet long.

The Crackerjack mill, ten stamps, is pounding \$17 ore.

The Live Boy mine is still blocking out good ore and E. Kelley, manager, states their mill will be in operation August 1st. Hump, July 6.

L. C. Van Riper of Boise says he is arranging to put in machinery at the Wordenhoff mine in Big Creek district.

J. E. Jewell, superintendent of the Thunder Mountain G. R. Co., operating near Roosevelt, says arrangements are being made for a 5-stamp mill to be put in at the Confidence mine, formerly the Mayflower. More men are being put to work.

### Shoshone County.

Monthly shipments from the mines of the Cœur d'Alenes are approximately 21,000 tons of ores and concentrates consigned to the smelters.

The Bunker Hill & Sullivan mine at Wardner is shipping 5000 tons of concentrates a month. The four properties of the Federal M. & S. Co. send out between 7000 and 8000 tons a month, the largest amount coming from the Last Chance mine at Wardner—approximately 3500 tons. The Morning mine at Mullan, owned by Larson & Greenough, ships 3100 tons of concentrates. The Hercules and Hecla consign about 1000 tons each every month. The Gold Hunter mill at Mullan is turning out concentrates after an idleness of six months, and the shipments from the Snowstorm are increasing. The ores from the Cœur d'Alenes are treated in many parts of the country—California, Washington and Colorado, and some even in Perth Amboy, N. J. At times the concentrates have been sent to El Paso, Tex., Omaha, Neb., and Salt Lake, Utah.

Ten men are at work at the Morning compressor plant, at the mouth of Grouse gulch, 3 miles west of Mullan, grading for a transformer plant. This additional power will provide for forty more drills. The present power supplies one hundred. An addition is also being built to the Morning mill. The new vanner house is being connected with the mill and eight vanners will be added.

It is said construction has begun on the leaching plant to be built at Larsen's spur, east of Mullan, by the Waterbury Metal Extraction Co. The plant's capacity will be 400 tons per day. While the plant is primarily for Snowstorm copper ore, it will handle custom ore.

## MICHIGAN.

### Houghton County.

(Special Correspondence).—Lake Superior copper production is heavier than ever before. During the past three and a half years the Lake mines have greatly

increased their output, as is shown by the following figures of production:

Year	Output, Pounds.
1900	142,151,371
1901	155,691,145
1902	170,355,508
1903	192,326,191
1904	218,000,000

The production given for the current year is necessarily an estimate, but under a continuance of normal conditions will closely approximate the actual figures of output. In 1894 the production of refined copper was 114,308,870 pounds, the largest ever secured to that time, with the single exception of 1892. The output of the district did not reach 100,000,000 pounds in any year previous to 1890. In 1884 the production was 69,353,202 pounds, which was 10,000,000 pounds in excess of any previous year. In 1874 the output was but 34,334,389 pounds—a production that is less than half that of the Calumet & Hecla alone at the present day, and which will be approximated this year by the Copper Range group of mines alone, and considerably exceeded by the Bigelow group of mines. Relatively the Lake mines have lost, for new and important sources of copper supply have been developed during the past two decades in Arizona, Montana, Utah, California and elsewhere. In 1869 the Lake mines made 95% of the copper produced in the United States, but under the influence of Western competition the proportion of Lake copper to the total American supply decreased to 47% in 1884, 32% in 1894, and 26% in 1902. The output of 85,949 long tons of refined copper made by Lake Superior mines last year was greater than the production of all copper mines of the entire United States in a year so comparatively recent as 1887, and nearly as large as the average annual production of the entire world for the decade 1861-1870. The impression, prevalent in some quarters, that the Lake Superior copper district is a played out field, is not supported by the figures of production. The only copper district in the world that produces more metal is the Butte district of Montana, though Arizona, as a whole, with its four great producing districts, promises to rival Michigan in total output within two years. During the first half of the present year the Calumet & Hecla has completed the rebuilding of the first section of its Hecla mill and has begun work on the second section. The work of rebuilding the old mills, or rather, of tearing them down in sections and replacing the parts destroyed with new steel mills, will require three years for completion, at the end of which time the productive capacity of the company's milling plant will be greatly increased. Explorations on the Kearsarge lode upon Calumet & Hecla lands are highly encouraging, and a diamond drill has been at work on the lands lying west of the mine. Houghton, July 9.

The June production of several of the Lake copper mining companies indicates a falling off from the output of the previous months, and also from the returns for the corresponding months last year. Approximate figures reported are:

	June, Tons.	May, Tons.	Jan. 1, Tons.
Isle Royale, Houghton.....	100	100	552
Mass, Mass. City.....	100	140	920
Oscuela, Opechee.....	1,225	1,270	7,095
Tamarack, Calumet.....	540	565	3,585
Calumet & Hecla, Calumet.....	3,225	3,250	19,450
Adventure, Greenland.....	40	60	405
Wolverine, Kearsarge.....	528	502	2,989
Atlantic, Houghton.....	206	308	1,797
Michigan, Rockland.....	161	165	811
Baltic.....	797	744	3,810
Champion.....	715	754	3,778
Trimountain.....	760	741	3,561

## MONTANA.

### Deer Lodge County.

Anaconda reports say a strike has been made in the Long Spring mine, near Moose lake. The mine is owned by M. Johnson, J. Long and J. J. Harper. The ore carries galena, with values in silver, and Johnson says there is a lead 80 feet in width. The mine is 6 miles from Moose lake, near the Senate property.

## NEVADA.

### Elko County.

G. D. Wheeler of Tuscarora, having bought the Grand Prize mine for \$12,000, is preparing to put up a 40-ton concentrating plant, including a Huntington mill and table, with which to handle the ores from his ground and also the dump of the Grand Prize mine. The distance of the property from the railroad, as well as the high freight rates, made concentration a necessity. The values are gold and silver.

R. P. Hunter, president, and J. J. Carmichael, manager, of the Aura King G. M. Co., operating near Mountain City, are preparing to increase equipment for the mine and mill. The mill, with which the mine is equipped, consists of a battery of five stamps of 800 pounds each and a Frue vanner. The machinery is driven by water power.

### Lincoln County.

Manager P. Thacher of the Iyanough M. Co., near Searchlight, is taking in supplies and materials preparatory to increasing development. Drifts and crosscuts will be run. The shaft is down 100 feet.

The supply of water in the Good Hope mine at Searchlight is reported increasing. As the west drift on the 400-foot level advances a greater volume is developed. The presence of so much water has made it necessary to stop drifting until the drift has been timbered up. The pump is run constantly. The face of the drift is in 200 feet and shows values. Eighty feet is the estimated distance yet to be run before cutting the ore shoot. —The Cyrus Noble M. Co. has an option on the Good Hope water supply and proposes to build a mill. —At the Quartette mine at Searchlight, Superintendent F. J. Harrington is preparing to add ten stamps, which will give the Quartette Co. twenty stamps at the mine. As work progresses on the 700-foot level the water supply is increasing. The winze between the two lower levels is completed.

Controlling interest in the Providence mine of Cedar canyon, near Davenport, has been sold to the Houghton-Thurston Co. of Boston, Mass., for \$150,000 cash. The property has been transferred and is being developed under Superintendent M. A. Lathrop. The ore is said to carry high-grade silver values.

The Good Hope mine at Searchlight has been taken over by a company organized by F. F. Oster et al. of San Bernardino, Cal. The mine is between the Quartette on the southeast and the Searchlight group on the northwest and consists of four claims. T. L. Henderson, of Searchlight, is manager. The present equipment and workings of the company consist of a 22 H. P. hoisting engine, capacity for sinking (shaft is sunk 375 feet) to 700 feet. The workings consist of main shaft and three drifts. Work is going on in a drift on the 375-foot level. A water supply of 20,000 gallons a day, sufficient to run twenty stamps, has been developed in the mine. The main shaft is double compartment, on an incline of 65°, and is furnished with a Cornish pump. As soon as sufficient ore has been blocked out a mill will be built.

Superintendent Ross of the Empire mine, near Searchlight, says the tunnel is in 420 feet, and at 20 feet more connections will be made with the main shaft. On the completion of this tunnel the company will be ready to put in milling machinery.

### Nye County.

The railroad into Tonopah will be ready for running operations this week, says Manager A. Tripp. Passenger fare will be 10 cents per mile. Under the new freight rates Manager Tripp says that \$40 ore can be transported to the smelter at a profit. It will cut the cost of teaming fully two-thirds.

The Reveille district, in Nye county, 25 miles south of Ely on the road to Tonopah, is being reopened, says the White Pine News. Lynch & O'Meara, of Tonopah, have a bond and lease on the Last Chance mine in the Reveille district for \$150,000. They have begun work on the mine. They have two 14-horse, three 12-horse and six 6-horse teams hauling the ore from Reveille to Tonopah, where it is piled up waiting the completion of the railroad. Sixty men are at work in the mine taking out ore which is principally silver with a small percentage of lead.

## NEW YORK.

### New York County.

The discovery is reported made at Columbia University, New York City, that the rocks of the heights on which the university campus stands contain a material percentage of copper. The discovery has led to the presentation to the faculty of the school of applied science of a plan to open a mine under the campus, in which students shall receive practical work in tunnel driving, shaft sinking and other departments of practical mining.

## NEW MEXICO.

### Rio Arriba County.

A. E. Young et al., who hold a lease and bond on the Buckhorn mine in Bro-mide district, near Tres Piedras, are drifting on the vein, which is over 3 feet wide. The ore is a sulphide averaging \$30 per ton, and is being sacked pending arrival of mill supplies. As soon as mill supplies arrive, sinking will be resumed.

### San Miguel County.

The copper reduction mill of J. L. Matt has been bought by the Blake M., M. & I. Co., and will be removed to the Tres Hermanos mine of the company. It is expected by additions to the machinery and to the tank capacity to make a 50-ton mill of it. Water will be supplied by gravity. Wood is close at hand. A down grade of

5 miles is between Tres Hermanos and the Santa Fe railway at Bernal.

### Socorro County.

The New Mexico School of Mines at Socorro is reported to have added to its equipment, for practical training of its students in mining operations, the Torrance gold and silver mine in the Socorro mountains, 2 miles from the college campus.

## OREGON.

### Baker County.

A one-half interest in the Cartwright placer mines at Rye valley, near Baker City, has been sold to J. Drew for \$16,000. The other interests are retained by R. A. and D. L. Cartwright. Operations will be increased.

Mining operations are reported improving in Pocahontas district, 8 miles northwest of Baker City. The Albert Creighton Co. of New York has taken over the Carpenter Hill group, consisting of five claims, for \$75,000, and has increased the number of men at work. The 10-stamp mill will be put in operation as soon as sufficient ore is taken out to justify. —The Young America is showing up well under new management.

A body of ore is reported opened up in the Ornamet group of claims near Greenhorn. Assays give returns of \$40. The ore contains silver and gold. The property is under management of F. Warren.

### Jackson County.

H. Schaeffer, superintendent of the Gold Hill Dev. Co. at Gold Hill, says work will be resumed and 200 men employed on the new electric power and smelting plants.

### Josephine County.

The Oscar Creek hydraulic mines have been bought by Foster & Gunnell of Grant's Pass for Eastern men and initial payment made. The Oscar Creek hydraulic mines are on Applegate river, 10 miles from Grant's Pass. They comprise 226 acres of mineral ground, 108 of which are patented. The diggings are of creek bed bars, bench and rim channel. The placer are equipped with two No. 1 giants and several thousand feet of flume and piping and 3 miles of ditch. The new owners will increase the length and width of the ditch, add to the water supply and increase equipment.

## SOUTH DAKOTA.

### Lawrence County.

Deadwood reports say operations are resuming on the property of the Ivanhoe M. Co., and during the season the main shaft will be sunk to 500 feet.

With the restoration of railroad communication between Deadwood and the Bald Mountain mining country, after being cut off over three weeks, there is a general resumption of mines and mills, says the Black Hills Review. The mining companies took advantage of the suspension to improve their properties and to make repairs at the plants.

The Golden Elk M. Co. has been incorporated at Deadwood for development of mining property near Bear gulch, in western Lawrence county, by E. B. Sager, L. Dickinson, B. Mills, G. Sager and G. Dickinson.

The plant of the Hidden Fortune G. M. Co., on Whitewood creek, near Deadwood, is running again after a three weeks' suspension on account of the flood damage to the railroad between the mine and mill. Ore is arriving regularly again. During the idleness work was in progress at the mine and the ore bodies were further opened up and blocked out and improvements added to facilitate mining and loading. The ore is being crushed in a weak solution of cyanide and passed over plates for amalgamation. The plates are heavily silver-plated and are said to resist the action of acid more effectually than copper.

### Pennington County.

The Black Hills Anaconda M. & M. Co. is operating on 250 acres of mineral land 6 miles south from Rochford. The principal development is a two-compartment shaft, which is down 100 feet on a ledge that may be traced across the property. The ore is said to average \$5 per ton in gold. G. A. Karr, manager of the company, says he is preparing to put in a grinding mill of fifty tons daily capacity.

Men are at work on the Ethel M. Co.'s property, 5 miles west of Rochford. A working shaft is being put down.

It is reported that J. Craig has found a body of free milling gold ore on his mine, north of Rochford.

## UTAH.

The production for the first half of the year 1904 in the mines of Utah, as shown in the settlements made in the open market, aggregates \$10,979,000, says the Salt Lake Herald. While the figures are not yet available, it is estimated the product



of the copper smelters operated by individual companies has been worth, owing to the gold and silver values accompanying the copper, at least \$5,625,000. The ores and bullion sent out of the State for sale and not accounted for in the figures secured locally will increase the latter amount to about \$6,000,000, so the total production from all sources should approximate \$17,000,000. These figures indicate that last year's record of between \$26,000,000 and \$27,000,000 will be passed this year. In Utah mines practically all of the dumps are connected by rail, while many of those which are not, carry ores that permit of hauling by team to loading stations and marketing at a profit. In addition to these natural advantages, there is no friction worthy of mention on the labor question.

The ore and bullion settlements in the open market for the half year ending with June 30 attained a total of \$11,267,540, compared with \$11,219,200 for corresponding period last year, says the Salt Lake Tribune. This aggregate does not, however, include the value of bullion that has been drawn from the furnaces of the copper plants in the valley during same period, which latter has a valuation of at least \$4,000,000. Data from these sources are accessible but once a year. In the open market returns are made from day to day as sales of bullion and of ore are certified to the banks. That the increase over the corresponding period in 1903 is not more marked, the reason is, says the Tribune, there has not been an increased furnace capacity, although the management of the American's plant at Murray has made requisition on the company for two more blasts, on which construction will be started this month. To supply these, and more, the diggings are ready. The installation of lead blast furnaces at the United States smelter will create a market for an additional volume of that class of ore. The output for the six months follows:

January.....	\$ 1,790,100
February.....	1,793,500
March.....	2,013,600
April.....	1,899,140
May.....	2,004,700
June.....	1,776,500
Total.....	\$11,267,540

The shrinkage in June—although it shows increase of \$171,990 over June, 1903, was due to refusal of the producer to rush onto a low market with his silver bullion.

#### Utah County.

The Bullion-Beck Tunnel Co. and La Reine M. Co. have filed for record deeds and assignments which transfer the property of each to the Beck Tunnel Con. M. Co., the property involved being the East Bay mine, Montana, Protection and the Big Eastern of the Bullion-Beck Tunnel Co., and Mahogany, Narrow Gauge, Independence and Flagstaff of La Reine Co., in Tintic mining district, near Eureka. The Beck Tunnel Con. Co. has also taken over the Cyrus Oliver lode for \$6000.

During month of June, 577 carloads of ore were shipped from the mines of Tintic district, distributed as follows:

Ajax.....	13
Bullion-Beck.....	24
Carissa.....	22
Cornucopia.....	1
Centennial-Eureka.....	209
Brown, R. A.....	2
Eagle & Blue Bell.....	4
Gemini.....	86
Grand Central.....	91
Laclede.....	2
Lower Mammoth.....	2
Mammoth.....	62
Salvador.....	2
South Swansea.....	6
Tetro.....	6
United Sunbeam.....	1
Uncle Sam (crude).....	4
Uncle Sam (concentrates).....	12
Victor.....	7
Yankee Con.....	21

#### Salt Lake County.

Superintendent A. O. Jacobson says the Columbus Con. M. Co. electric power plant near Alta was put in operation last week, and also the compressor plant. The compressor has capacity for 700 cubic feet of air per minute, and is driven by a 100 H. P. motor. The Alta-Quincy mine will receive power from the Columbus compressor. The machine drills, pipe and other equipment for the air line for the South Columbus Co., which is also to buy power from the Columbus Con. Co., are being put in. The grading for the Columbus Con. mill is completed and the lumber and machinery are on the ground, says Superintendent Jacobson.

The Bingham Con. C. Co., which controls the Eagle & Blue Bell, reports the hoist set up over the shaft and that there is now a direct connection between the surface and the 600-foot level. With the starting of the hoisting plant, miners were lowered to the 600-foot level and open up the body of gold, silver and copper ore which has been made easier of access by the improved equipment, says Manager MacVichie.

Chicago, Ill., men have organized the Kessler's Peak M. & M. Co. to absorb the

Wheeler & Wilson M. Co., in Big Cottonwood district, near Alta. W. F. Gray, manager, says it is intended to drive a tunnel lower down and that it will require at least 1000 feet of tunneling to tap the ore bodies showing above and will give a depth on the vein of 3000 feet, whereas, the upper tunnel cuts the ore only 800 feet under the surface. The Kessler property is a mile from the Maxfield mine. There are twelve claims in the group and the ores carry lead and silver values.

Manager Channing of the Highland Boy smelter at Bingham says the reverberatory roasters are in full operation.

#### Utah County.

C. W. O'Donnell, of Vernal, of the American Asphalt Co., says his company is working six men at its property 6 miles from the Colorado line and producing all the gilsonite which teams can be found to haul. Mack, near Fruita, on the Rio Grande Western, is the present shipping point, but the new railroad being built to the gilsonite mines will reduce the haul of the American Co. to 6 miles. O'Donnell says that the road has been graded for 40 miles and that 30 miles of steel have been laid.

The Acme Ozocerite Wax Co. of Salt Lake City has been organized by G. F. Culmer of Chicago, Ill., H. C. Bailey of Akron, O., H. L. and G. C. Culmer and H. E. Culmer of Salt Lake City to mine mineral wax, ozocerite, earth wax and other hydrocarbons in Uinta county.

#### Utah County.

The Tidal Wave M. & M. Co. has been organized at Provo to develop the Buffalo Hump and nine other claims in Utah county. The officers are J. & W. A. Pierce, J. N. Christensen, J. M. Pierce and G. Elliott.

#### Tooele County.

At the Herschel Co.'s properties at Mercur operations will be resumed this month, says Director Keifer of Salt Lake City, the intention being to sink from the surface to a connection with the gold-bearing ores that were opened up through a drift from the Sacramento mine. To make this connection, 60 feet of sinking will be required.

G. Dern, manager of the Con. Mercur, reports work progressing satisfactorily in the company's Golden Gate mill. A. H. Brown, with W. T. Janney, has a lease on the old Mercur mill and will begin treatment of the tailings of the old mill. The tailings contain, on an average, \$2 per ton in gold. The mill has been idle for the past year.

### WASHINGTON.

#### Okanogan County.

A strike of free gold ore is reported near the Poland China mine, 4 miles northwest of Chesaw, owned by W. H. Lilley. The claim is at the headwaters of Mary Ann creek—a placer stream.

#### Stevens County.

The Turk M. Co. has started to put in a 100-ton smelter in the canyon below its mines, says W. D. Martin of Spokane. The company expects it will be running by September 15th. The Turk M. Co. has eight claims in the Cedar Canyon district, 25 miles west of Springdale. Sufficient work has been done on them to show the merits of several of the claims, and some ore has been shipped. Other mines in the district are shipping ore, among them the Providence and the Queen and Seal. Ore is hauled to Springdale, Davenport or Creston for shipment. The smelter will use wood and coke for fuel, and the coke will be hauled by team for 25 miles. The Turk Co. is composed of Davenport men, the officers being A. W. Turner, H. J. Davis and H. A. P. Myers.

### WYOMING.

#### Albany County.

The New Rambler mine, near Holmes, has been merged into a new company, known as the Rambler M. & S. Co. F. M. Wooten is president and W. H. Weber superintendent. The covellite (a copper sulphide), which forms part of the ore of the New Rambler mine, is noted for containing values in platinum and palladium.

#### Carbon County.

Saratoga reports say a gold discovery has been made on Jack creek, near Saratoga, by C. P. Clemmons. Beds of gravel of unknown depth, and extending along the creek valley for several miles, have been located. The gravel is said to run \$2 in gold per ton and can be handled with a scraper.

Grand Encampment reports say 120 tons of blister copper is the weekly output of the North American Co.'s smelter there, valued at \$30,000. Every available team owned by the company and all that can be secured in the district are hauling bullion to the railroad at Walcott for

shipment to the Eastern refineries. The blast furnaces produce 50% matte, while the product of the converters is from 99.3% to 99.6% copper. The blister copper is shipped in bars weighing 250 pounds. The aerial tramway is in daily operation and is working satisfactorily. Throughout the district there is renewed activity this year.

#### Uinta County.

The Kemmerer Coal Co. has started work on construction of a coke camp at Willow Creek, a few miles west of Kemmerer, and is building houses, coke ovens and putting in a plant of machinery. This is said to be the second coke deposit in the State to be developed, the other being at Cambria in eastern Wyoming.

Kemmerer reports say the Globe Oil Co. has struck a spouter on its lands in the Fossil oil fields, and at regular intervals it throws out a large volume of water, sand, oil and gas.

## FOREIGN.

### AFRICA.

#### Transvaal.

The Board of Trade Journal of London gives the following statistics of the mineral production of the Transvaal for the year 1903:

Articles.	Total, 12 months.
Gold.....	\$61,454,439
Silver.....	178,820
Coal.....	4,272,671
Diamonds.....	1,166,754
Chemicals.....	119,570
Stone, lime, brick, etc.....	1,261,865
Total.....	\$68,454,119

The figures of the gold output since the resumption of mining operations subsequent to the war are as follows:

	Value of gold.
May to December, 1901.....	\$ 5,339,617
January to December, 1902.....	35,532,755
January to December, 1903.....	61,454,439
Total.....	\$102,326,811

A comparative statement of the production of gold, coal, diamonds and silver during the first quarters of 1904 and 1903 is also given as follows:

Articles.	Jan. 1 to Apr. 1, 1903.	Jan. 1 to Apr. 1, 1904.
Gold.....	\$12,745,758	\$18,370,960
Coal.....	966,365	1,024,861
Diamonds.....	26,392	868,617
Silver.....	41,078	52,223
Total.....	\$13,779,593	\$20,316,660

### AUSTRALIA.

#### New South Wales.

It is reported diamonds in matrix have been found in Oakley creek, which flows through the diamond-bearing belt of New South Wales.

### BRITISH COLUMBIA.

G. O. Buchanan, superintendent of Dominion lead bounties, says that up to March 31, 1904, the Canadian lead producers, who are confined to British Columbia, had earned \$121,000 in bounties. The production of metallic lead to that date was 8000 tons, as compared to 9000 tons for the whole of the fiscal year 1902-3. The bounty year closed June 30, and by that time Superintendent Buchanan estimated, the production of metallic lead would reach 15,000 tons. The last quarter of the year is thus credited with a greater average production, largely due to starting ore shipments from the St. Eugene mine at Moyie.

#### Boundary District.

The Granby M., S. & P. Co. is equipping the No. 3 and the No. 4 tunnels at the mine at Phoenix, says J. P. Graves, manager. The company has one crusher of 1000 tons capacity and is putting in two more of 1000 tons each, which will be ready for work in the fall. New ore bins are also being built to take care of the ore brought from these two tunnels.

The British Columbia C. Co. has put on a train of pack mules to take out ore for test shipments from the Rhoderick Dhu mine, in Long Lake camp. It will be placed on the cars at Eholt.

#### East Kootenay District.

The Crow's Nest Pass Coal Co. will build a branch railway from Fernie to connect its Coal Creek mines with the Great Northern R. R. extension from Morrissey to Fernie. The surveyors are at work, says Vice-president Lindsay.

Work has been resumed on the Watson group of mines on Victoria gulch, a tributary of Wild Horse creek, near Fort Steele. It is a silver-lead producer. The tunnel is being extended to open the 40-foot vein.

C. Sweeny of Spokane, Wash., says the lead smelter at the Sullivan mine at Marysville will be completed by September 1. The smelter will start with a capacity of 250 tons. It is being built for the Sullivan mine, and whether they take custom ore or not depends on the output from the Sullivan mine being suffi-

cient to keep the smelter running to full capacity.

The Fort Steele Prospector says on Wild Horse creek five companies are engaged in placer mining and 100 men, mostly Chinese, are employed. Four ditches carrying from 800 to 1500 inches of water are in use. Twenty-inch steel pipes convey water to the giants.—On Perry creek three companies are working. Near Old Town the Theis Co. is sinking another shaft to bedrock, work on the old shaft having been profitable. The Perry Creek Hydraulic M. Co. is building a flume 2 miles in length and will work bench diggings by hydraulic, commencing near the falls; while the East Kootenay P. M. Co., farther up the creek, has taken in a railway steam shovel with which to raise the gravel from bedrock, and is arranging machinery for handling the gravel between steam shovel and flume.

#### Nelson District.

For the Mount Alamo M. Co., E. J. Stratton of San Francisco, Cal., has bought the Pingree group of claims on 49 creek, near Nelson. There is said to be six claims and three ledges—two of copper-gold ore 5 feet wide and one of free-gold ore 2 feet wide. The copper-gold averages \$17 and the free-milling ore \$17.50. Men are being put to work on development.

#### Roseland District.

Concentrators at the Velvet-Portland mine, 20 miles southwest of Roseland, started July 15, says W. Thompson, consulting engineer of the company. The plant will handle fifty tons of ore a day. The ore will be concentrated and piled up to be smelted later by a small smelter which the company will put up when the concentrator is seen to work satisfactorily. This smelting plant will handle seventy-five tons a day and will be put in this fall. The ore is high-grade copper and gold, and the company formerly shipped direct to a smelter, but on account of the 12 miles of wagon haul this was found too expensive.—The Roseland-Kootenay mine at Roseland is shipping seventy tons of ore a day to the smelter. It is used for fluxing. The mine is working twenty men.

#### Vancouver Island.

G. H. Robinson of Salt Lake City, Utah, is preparing to build a 500-ton mill for the Britannia copper mine on Howe Sound, of which he is manager.

## CANADA.

The following is a summary of the mineral production of Canada in 1903:

Metallic:	
Copper.....	\$ 5,728,261
Gold, Yukon.....	12,250,000
Gold, all other.....	6,584,490
Iron ore (export).....	922,571
Pig iron from Canadian ore.....	707,838
Lead.....	762,660
Nickel.....	5,003,204
Silver.....	1,700,779
Zinc.....	48,600
Total value.....	\$33,707,403
Non-metallic:	
Arsenic.....	15,420
Asbestos (exports).....	891,038
Coal.....	15,957,946
Coke.....	1,663,725
Graphite.....	23,745
Limestone for flux.....	256,344
Mica.....	159,478
Natural gas.....	168,900
Petroleum.....	922,672
Pyrites.....	126,133
Salt.....	384,088
Miscellaneous.....	679,683
Total value.....	\$21,202,062
Total structural materials and clay products.....	8,017,945
Total non-metallic.....	\$29,219,107
Total metallic.....	33,707,403
Estimated value of mineral products not returned.....	300,000
Grand total.....	\$63,225,510

Increases over the figures for 1902 are shown by copper, gold (other than Yukon), zinc, coal, coke and salt. The principal decreases are in Yukon gold, iron and iron ore, lead and silver. As usual, gold, together with coal and coke, constitute Canada's most valuable mineral assets and account for 57.66% of the value of the whole mineral output of the country.—According to customs returns, exports of nickel in 1903 were as follows: To Great Britain, 1,335,677 pounds; United States, 11,363,470 pounds; and other countries, 80 pounds.

#### Ontario.

Deposits of cobalt were found in Ontario while projecting the new Temiscaming railway, writes U. S. Consul General Holloway at Halifax, Nova Scotia. W. Hutchinson, Canadian Commissioner, sent men to procure samples and several tons of the ore have been sent to the St. Louis Exposition. Cobalt usually occurs associated with nickel, arsenic and sulphur, and is frequently an incidental product in the working of copper, bismuth and nickel ores. Along the Temiscaming route, where the metal was discovered by chance, there were none of the usual indi-



cations of the presence of cobalt. A. E. Barlow of the Geological Survey has made investigation into the qualities of the mineral.

### MEXICO.

#### Chihuahua.

The Cia. Metalurgica de Torreon at Torreon has bonded the Diaz lead-silver properties, near the Cuchillo Parado, in eastern Chihuahua. The mines are near the Stillwell Railroad, as it is being graded eastward toward the Concho river.

Long Bros., for the Hidalgo M. Co. and other mines with which they are connected, are reported shipping 6000 tons of ore monthly out of Parral district. Parral and Santa Barbara continue to ship 20,000 tons of ore monthly to the smelters.

#### Lower California.

(Special Correspondence).—The Mendoza Con. Copper M. Co. is shipping high-grade ore from La Paz direct to San Francisco, Cal. In June were sent 125 tons, besides the free gold extracted on the plates. The July shipments will be 300 tons.

Triunfo, June 30.

#### Sonora.

(Special Correspondence).—There is little activity in mining in western Sonora at this time, though indications show that much will be accomplished the coming year. The Greene placers at Santo Domingo, near Magdalena, will increase operations; the Zubiate G. M. Co., west of Magdalena, will be worked more extensively; the San Xavier mines in eastern Hermosillo district, now idle, will resume, and with the rainy season prospectors will be in the field. Two companies, the Chas. Butters & Co., Ltd., and the Creston & Colorado Co., are operating at La Colorada (Minas Prietas), 13 miles east of Torres, where it connects with the Sonora railway by a branch narrow-gauge line, owned by F. H. Seymour, who also owns the Grand Central mine, being worked by the Butters Co. at La Colorada. The Creston-Colorado Co. has worked continuously for twenty years. The shaft is down 1100 feet and the ore from it is conveyed 1 mile to the mill by an aerial tram. A 50-drill compressor supplies power for the drills and miscellaneous work about the shaft. The company is putting in a cyanide plant designed to supersede the continuous amalgamation process. It will be ready by Sept. 1st and will have capacity of 300 tons per day. The present plant handles 200 tons per day from the mine and the tailings are cyanided. There is a battery of thirty stamps, from which the ore passes to the eight Huntington mills before going through the amalgamation tanks and settlers of the Boss process.

Adjoining the Creston-Colorado is the property of the Grand Central Co., being operated on a share system by Chas. Butters & Co., Ltd. This company employs thirty stamps and ten Huntington mills in the reduction of its ore, and the extraction is by straight cyaniding, values being precipitated from solution by electric current. About 6500 tons per month are treated. The values are silver principally, there being only a small percentage of gold. The Butters Co. originally worked the tailings dump, and when the mine was abandoned by the old company took that also, and while running on a comparatively low-grade ore reports satisfactory results. According to contract with the Minas Prietas Water Co., the company buys water at 75 cents per 1000 gallons, although at present the mine is making about 100,000 gallons per day, which goes to waste. As yet the mine has only between 500 and 600 feet depth in its double-compartment shaft. There is a hoisting plant and the ore is conveyed by aerial tram 1200 feet to the mill. The Grand Central Co. is sinking a new shaft to cut what is believed to be an extension of the Creston ledge of the adjoining company.

Magdalena, July 9.

H. P. Griswold, of Magdalena, with Sherman & Diaz, is reopening the Caballo Rosio mine, 20 miles east of Imuris.

The Lexington and Belmont claims in Moctezuma district have been sold to M. H. Speer of El Paso, Texas, for \$20,000.

#### Durango.

At Chacala, the Amazon G. M. Co. has its 100-ton smelter in full operations. The ores are said to contain, besides silver, values in gold and bismuth, with copper and lead.

Laveaga Bros. and V. Gomez, owners of mines at Animas, are building a 30-ton cyanide plant, as a change from pan amalgamation.

#### Zacatecas.

The Mesquite G. M., Ltd., an English company, has been organized to take over the mines of the Mesquite M., Ltd., near Zacatecas. J. F. McNabb is manager and is preparing for operations.

## Personal.

B. PULLIN is manager of the Mint mine near Cripple Creek, Colo.

H. K. WHEELER of Los Angeles, Cal., is reporting on Mexican properties.

V. C. OSMONT has returned from Chihuahua, Mexico, to San Francisco, Cal.

E. M. DOUGLAS, of the United States Geological Survey, is in San Francisco, Cal.

S. G. KNOTT, formerly of Boulder, Colo., is examining mines at Searchlight, Nev.

T. CLARK, manager of the River Hill mine, at Placerville, Cal., is in San Francisco, Cal.

H. BLANEY is superintendent of the Lappin mine at Deadwood, Trinity county, Cal.

B. PULLIN is manager and C. Ridpath superintendent of the Mint mine at Cripple Creek, Colo.

W. H. BREVORT, of New York City, N. Y., interested in Western mines, is in San Francisco, Cal.

JESSE SCOBEEY has gone from Guadalajara, Mexico, to report at Richmond, Va., on properties examined.

L. H. OUTZEN of Richfield, Utah, has gone to the mines of the Shasta G. & C. Co. in Shasta county, Cal.

J. A. MCINTIRE, superintendent of the South Keystone mine, near Amador City, Cal., is in San Francisco, Cal.

H. SCHAEFFER, superintendent of the Gold Hill Dev. Co., has returned to Gold Hill, Or., from Milwaukee, Wis.

W. A. SHERMAN returned to Salt Lake City, Utah, last week from a trip to Indian Territory, examining mines.

L. H. PAIGE, part owner of the Mountain Lion mine near Shasta, Cal., is at the mine from Fargo, North Dakota.

P. P. BUSH, Western manager of the Vulcan Crucible Steel Co., has returned from Aliquippa, Pa., to Denver, Colo.

F. DAVIS, manager of the Yaqui S. & R. Co. plant and properties at Toledo, Sonora, Mex., is visiting in California.

H. L. SLOSSON of Henshaw, Bulkeley & Co. has returned to San Francisco, Cal., from a trip to the mines of Virginia City, Nev.

M. D. MCCREERY has been appointed superintendent of the electric power plant of the Columbus Con. M. Co., near Alta, Utah.

HAROLD T. POWER, manager of the Mountain Gate mine, Placer county, Cal., has returned to the mines from San Francisco, Cal.

J. A. COMER, general manager of the mines in Trabucco canyon, near Santa Ana, Orange county, Cal., is in San Francisco, Cal.

F. M. GALLOWAY, of the Goldstake M. Co., returned last week to Deadwood, S. D., from Columbus, O., where he spent the winter.

W. A. PRITCHARD, manager for Bewick, Moreing & Co., at Kalgoorlie, Western Australia, has gone to London, Eng., on business.

HERMAN DAVIS, president and manager of the Nevada Reduction Works at Dayton, Nev., has returned from San Francisco, Cal.

GEO. W. MYERS, representing the Chrome Steel Works, has returned to San Francisco, Cal., from an extensive trip in Alaska.

D. W. RECKHART, formerly of Salt Lake City, Utah, has been appointed manager of copper properties near Lordsburg, New Mex.

T. H. SCHIEMANN, for the past two years underground foreman Rawhide mine, Tuolumne county, Cal., has resigned that position.

J. L. GIROUX of Los Angeles, Cal., manager of the Giroux Con. M. Co., is at the Sultana mine of the company at Copete, Sonora, Mex.

R. J. COLEMAN, president of the Lluvia de Oro M. Co., is at the gold properties of the company near El Fuerte, Sinaloa, Mex., from Denver, Colo.

J. McKINTY is superintendent of the Con. California & Virginia, Ophir and Mexican mines at Virginia City, Nev., vice J. R. Ryan, deceased.

M. A. LATHROP is superintendent of the Houghton-Thurston Co. of Boston,

Mass., operating the Providence mine, near Davenport, Lincoln county, Wash.

D. A. LYON, superintendent of the New Jersey and Zero mining companies, returned to Prescott, Ariz., last week from Duluth, Minn., where he had been on company business.

CHAS. P. POLLAK has resigned his position as Eastern representative of Wickes Brothers, Saginaw, Mich., and will enter the employ of Fairbanks, Morse & Co., Chicago, Ill.

C. B. SMITH, JR., resident engineer at Phoenix, B. C., for the Granby C. M. & P. Co. for several years, has been appointed superintendent of mining operations of the company.

E. H. STAGG, who has been manager of the Bagdad-Chase G. M. Co. at Bagdad, San Bernardino county, Cal., for five years, and also manager of the Ludlow & Southern Railway, has resigned both positions.

J. DRUMMOND, who has been in charge of the Good Hope mine at Searchlight, Nev., has gone to London, Eng., en route to Obuassi, West Africa, for the Ashanti Goldfields' Corporation, Ltd., of London.

J. K. ROMIG of Baker City, Or., has accepted the position of president and manager of the newly organized Virtue M. Dev. Co., retaining his position as general superintendent of the Sanger G. M. Co.

F. HIGGISON has been appointed acting superintendent of the Hale & Norcross mine at Virginia City, Nev., pending further action by the directors of that company to fill the vacancy caused by the death of J. R. Ryan.

W. Y. WILLIAMS, having resigned as superintendent of the Granby mines at Phoenix, B. C., has moved to Spokane, Wash., where he will make his headquarters, being retained at the same time in a consulting capacity by the Granby Con. C. M. & P. Co.

CHAS. C. CHRISTENSEN will, on the 27th inst., celebrate his twenty-fifth anniversary as mechanical engineer with Fraser & Chalmers, of Chicago, and their successors, Allis-Chalmers Co. "C. C. C." has a month's vacation and is on a pleasure trip through the West.

## Commercial Paragraphs.

THE Fulton Iron Works of San Francisco, Cal., have received orders for a 200-ton smelter, a 150-ton cyanide plant and a stamp mill for Mexico; also a stamp mill for Idaho and a hoisting and pumping plant for Arizona.

THE Gutta Percha Rubber & Manufacturing Co., 26 Fremont street, San Francisco, Cal., have placed seven of their extra heavy dredger conveying belts in the Oroville, Cal., dredging district within the last three months, none of which weighed less than 2000 pounds.

G. W. MYERS of the Chrome Steel Works, Chrome, N. J., has returned from a trip to Alaska, and reports closing a contract with the Alaska-Treadwell M. Co. for 3000 chrome steel shoes and a large tonnage of steel mill parts, which he claims is a record sale. S. C. Myers, representing G. W. Myers, is in Sierra and Nevada counties, Cal., and reports good business.

THE De Beers M. Co., Ltd., Kimberly, South Africa, have cabled an order for a third Westinghouse-Parsons steam turbine generating outfit of 1500 K.W. capacity for their power plant at Kimberly. The new turbine unit will operate at 150 pounds boiler pressure, 35° superheat and 23 inches vacuum. Taking into account the altitude of Kimberly, this would be equivalent to about 27 inches vacuum at sea level.

THE Rubber Vitalizing Co., 121 Geary street, San Francisco, Cal., has in successful operation a process to treat all rubber goods against decay and hardening from age and climatic conditions, and to vitalize old rubber goods that have lost their elasticity, thus saving users of rubber vexation and money, and giving reliability and staying qualities to all rubber commodities. They state that by the use thereof new rubber goods that have been vitalized may be kept in stock indefinitely without fear of deterioration.

A PROMINENT FEATURE of the machinery exhibits at the World's Fair is the Allis-Chalmers engine coupled to a Bullock electric generator. The engine is capable of developing 8000 H. P. when operating, condensing at 150 pounds pressure of steam, and running at seventy-five revolutions per minute. It furnishes the

electric current for the decorative lighting of the buildings and grounds, for which about 200,000 incandescent lights are required, and the Exhibition authorities often employ it for operating the cascades and general power purposes. The St. Louis Transit Co., which operates the larger part of the street car system in St. Louis, has found itself short of power ever since the World's Fair began to attract large numbers of visitors. The traction plant was working at an almost constant 50% overload, and at rush hours the excess reached extreme proportions. The railway company have now applied to the World's Fair authorities for additional power, with the result that Governor Francis and the Fair administration have, by contract, put at the service of the railway company during the day from 2 P. M. to 7 P. M., when the loads are heaviest, the service of the Allis-Chalmers engine.

## Books Received.

"The Evolution of Climates," Marsden Manson, Berkeley, Cal. This considerable contribution to what may be called the cosmic evolution of the physical world constitutes an advanced study of a branch of science that has long engaged the attention of the author, or, in other words, is an extension of several previous essays of his on correlated subjects that need not be enumerated at this time. The habit of mind that enables an investigator to delve beneath the crust and search for primary causes as well as to consider current phenomena may be called the "engineering habit," and to this fact we can attribute in the present case a careful and sequential treatment of the extensive and obscure causes and conditions that have evolved what we call climate, or to give it a broader term, the physical conditions of human environment—because climate is the ruling physical factor in our existence. Mankind exists in a narrow range of natural temperature (100° or so), but can by agencies at his control produce temperatures varying, plus and minus, fifty times as much, and such enormous changes even have a part in the industrial arts of our age. Such phenomena being therefore of an engineering nature naturally leads up to thought and investigation in the line of the present treatise. The subject lies so wholly outside of what may be called popular science, or even accepted science, that a review or criticism of the learned author's views can have no proper place in a notice such as can be given where the principal interest will center in the fact of the extended evidences of glacial action and other peculiar features afforded by the physical phenomena of the Pacific coast. Among these phenomena, those that can be especially seen and appreciated are the effects of scouring glacial action and fossiliferous remains disclosed to a considerable extent by mining exploration and also by certain active and observable or even measurable changes that indicate beyond doubt remote but unmistakable conditions. We mean the recession of glaciers and resultant alteration of the earth's surface. Such evidence is presented by the author in a graphic way by a section showing changes in the Mendenhall glacier in Alaska.

Two serious impediments for the ordinary reader limit interest in subjects such as that discussed by Mr. Manson. One is the difficulty of adapting our conception of time to the enormous periods disclosed by geological and climatic evidence. The other impediment is in connecting such research with the practical affairs of our age, a view commonly taken by those who see the utilitarian or practical side of life. The first impediment disappears by some logical effort and an examination of the elementary foundation of geology, respecting which there is no longer doubt except in branches like that treated in the present essay, such as lie outside the field of conclusive physical evidence, but it must be remembered that the views and conclusions such as here presented are not the emanations of personal opinion or conjecture, but propositions submitted to a tribunal as wide as civilization and one that comprises the highest learning to which we can attain. As to the second impediment, we seldom consider the relations of climate to industrial, economic and social affairs of life. It governs the distribution of population, the producing power of the earth, to a large extent the migration of people, and on this coast, or so much of it as lies within the "cool belt," is so important a matter as to be esteemed a basis for all that is claimed in material advancement, so that whatever gives promise of the causes that lead up to climatic phenomena should have here a special interest.



## Latest Market Reports.

SAN FRANCISCO, July 15, 1904.

## METALS.

**SILVER.**—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58c, refined (1000 fine); San Francisco, 58c; Mexican dollars, 47½c San Francisco, 45½c New York.

Copper shows no change since last week, either at home or abroad. The market is quiet and production steady and heavy. Labor troubles and litigation are at present having no influence on the output, though at times these are important factors in production, and then consequently effect the market.

**COPPER.**—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.87; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £57 5s spot per ton.

**LEAD.**—New York, \$4.25; Salt Lake City, \$3.50; St. Louis, \$4.25 San Francisco, \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 9s 6d long ton.

**SPELTER.**—New York, \$4.95; St. Louis, \$5.00; London, £22 ½ ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

**TIN.**—New York, pig, \$25.25 @ 25.50; San Francisco, ton lots, 28c; 500 lbs., 23½c; 200 lbs., 29c; less, 29½c; bar tin, ½ lb., 30@32½c. London, £119 15s spot.

**PLATINUM.**—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

**QUICKSILVER.**—New York, \$44.50 @ 45.50, large lots; London, £8 San Francisco, local, \$43@43.50 per flask of 75 lbs.; Denver, \$46.00. Export, \$43.00@43.50.

**BABBITT METAL.**—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

**ZINC.**—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c. **NICKEL.**—New York, 40@47c per lb.; ton lots, 40@47c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

## STRUCTURAL MATERIALS.

**IRON.**—Pittsburg, Bessemer pig, \$12.60 @ 12.85; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @ 23.00; San Francisco, bar, 7c to 12c per lb.

## CHICAGO CURRENT QUOTATIONS.

Bessemer .....	\$14 75@15 00
Foundry Northern 1.....	13 75@14 00
Northern 2.....	13 25@13 50
Northern 3.....	12 75@13 00
Southern 1.....	13 15@13 65
Southern 2.....	12 65@13 15
Southern 3.....	12 15@12 65
Forge .....	11 40@11 90
Charcoal .....	14 50@15 00
Billets, Bessemer.....	24 00@24 00
Bars, iron .....	1 30@ 1 35
Bars, steel .....	1 51@ 1 51
Rails, standard.....	28 00@30 00
Rails, light .....	24 00@26 00
Plates, boiler .....	1 91@ 2 01
Tank .....	1 76@ 1 81
Sheets, 27 store .....	2 26@ 2 31
Angles .....	1 76@
Beams .....	1 76@
Tees .....	1 81@
Zees .....	1 81@
Channels .....	1 76@
No. 1 railroad wrought.....	10 00@10 50
No. 1 cast, net ton.....	10 00@10 50
Iron rails .....	14 50@15 00
Car wheels .....	11 00@12 00
Cast borings .....	3 00@ 3 25
Turnings .....	6 00@ 6 50

**WHITE LEAD.**—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

**LUMBER.**—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @ 5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @ 35.00.

**NAILS.**—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

**LIME.**—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

**CEMENT.**—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.45 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

## GENERAL SUPPLIES.

**ANTIMONY.**—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

**CAPS.**—3x, \$5.50 per 1000; 4x, \$6.50; 5x, 8c; Lion, \$9, in lots not less than 1000.

**FUSE.**—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

**CHEMICALS.**—Cyanide of potassium, 98%—99%, jobbing, 23@24c per lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

**OILS.**—Linseed, boiled, bbl., 54c; cs., 59c; raw, bbl., 54c; cs., 52c; Lucol oil, boiled, bbl., 48c; cs., 53c; raw, bbl., 46c; cs., 48c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Spermin, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 68c; Spermin, crude, 63@68c; Natural White, 70c; Bleached, do., 80c; Whale Oil, cs., 52@57c.

**BONE ASH.**—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

**RED LEAD.**—500 lbs. and over at one purchase, ½ lb., 7c; less than 500 lbs., 7½c. **LITHARGE.**—Pure, in 25-lb. bags, 8@9c per lb.

**BORAX.**—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

**MOLYBDENUM.**—Best, \$2.00 per lb.

**CHROMIUM.**—90% and over, ½ lb., 80c.

**PHOSPHORUS.**—American, ½ lb., 70c.

**SILVER.**—Chloride, ½ oz., 90c@\$1.00; nitrate, 55c.

**MERCURY.**—Bichloride, ½ lb., 77c.

**MAGNESIUM.**—Pure, N. Y., 60c.

**MANGANESE.**—½ lb., \$2.75.

**SODIUM.**—Metal, ½ lb., 50c.

**BISMUTH.**—Subnitrate, ½ lb., \$2.10.

**ALUMINUM.**—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

**URANIUM.**—Oxide, ½ lb., \$3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

**ELECTRIC TROLLEY.**—No. 764,224. J. Q. Brown, Oakland, Cal. July 5, 1904. This invention relates to improvements in overhead current collecting devices for trolley cars, and particularly for heavy multiple unit electric trains for interurban service. Such a trolley must be capable of taking a heavy current and of operating at high speed on curves as well as on a straight track, and be strong enough to withstand a tremendous lateral strain under such circumstances. It must accommodate itself to the low head room in passing under subways and must be capable of passing under crossings with regular trolley wires while the train is at full speed. The invention comprises a double diamond shaped structure made up of four pivotally connected rectangular frames, a trolley roller supported by the frames and curved lateral trolley guards disposed in a substantially vertical plane and having their upper surfaces substantially continuous with the top edge of the roller. This trolley is in use on the trains of the Key Route operated between San Francisco and Oakland and Berkeley.

**SAFETY APPLIANCE FOR SIDEWALK ELEVATORS.**—No. 764,236. M. Griffin, San Francisco, Cal. July 5, 1904. The object of this invention is to prevent accidents by reason of the operator being crushed between the elevator and the hatches which usually close the shaft of an elevator of this character. The invention consists of means operated by the opening and closing movement of the hatches to start and stop the elevator so that while

the hatches are closed the elevator cannot be moved.

**AIR SHIP.**—No. 764,198. J. D. McFarland, Fruitvale, Cal. July 5, 1904. This invention consists of a cigar-shaped body with skeleton frame work, braces and supports therefor, and an exterior covering, propeller means at the ends, and one or more propellers located on stationary shafts vertical with relation to the apparatus, these propellers having adjustable blades, engines revolvable within the propellers and connected directly with the shaft, means for supplying a propelling medium to the engines, and means for adjusting the propeller blades so that they will act to raise the apparatus into the air, or to permit them to act as aeroplanes.

## SITUATIONS WANTED.

**EXPERIENCED ASSAYER DESIRES POSITION.** Thoroughly competent in bullion, control and analytical work. Best of references. Address "Bullion," care of this office.

**EXPERT MINE FOREMAN WANTS POSITION.** Competent to handle extra difficult conditions underground. Address "Limestone," Room 602, 330 Market St., S. F.

**MANAGER OR SUPERINTENDENT FOR A** gold, silver or copper property; 20 years' experience in different parts of the country. Address "Can furnish any bond. Mexico preferred. Address D., this office.

**POSITION DESIRED AS SUPERINTENDENT** to develop or operate mine and small mill; will do own assay work; would accept part salary in stock; experienced all round man; excellent references. Address "Dividend," care of this office.

**WANTED, POSITION AS SUPERINTENDENT** of mine and mill; amalgamation and concentration; competent assayer and analyst; good references. Address "Vanner," care of this office.

**THE CALIFORNIA DEBRIS COMMISSION** having received applications to mine by hydraulic process from E. A. Moody, in Good Luck Mine, near Gold Run, Placer County, Cal., draining into Squires Creek, which reaches Bear River, and from Eagle Bar Placer Mining Co., Limited, in Eagle Bar Placer Mine, near Forest Hill, Placer County, Cal., draining into Middle Fork of American River, gives notice that meeting will be held at Room 96, Flood Building, San Francisco, Cal., Aug. 1, 1904, at 1:30 P. M.

**CYANIDE TANKS ERECTED.**—Having been engaged in erecting steel Cyanide Tanks for the past six years, and having erected tanks at the following well-known plants—Ymir, B. C., San Sebastian of C. A., Octave of Arizona, Seal of Gold of San Bernardino, Cal.—which in each instance have given perfect satisfaction, always using the labor at hand and thereby making a great saving to the company in traveling expenses for skilled labor, I am prepared to make engagements for further work. Can furnish the best of references as to ability and workmanship. Address Box 25, this office.

## New Patents.

**DEWEY, STRONG & Co.'s Scientific Press** PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING JULY 5, 1904.

764,266.—TEMPORARY BINDER—J. W. Ameath, S. F.  
764,102.—LOOSE LEAF BOOK—H. W. Ayers, Los Angeles, Cal.  
764,034.—AGRICULTURAL MACHINE—G. L. Bradley, Mayview, Wash.  
764,418.—TROLLEY—J. S. Briggs, Los Angeles, Cal.  
764,224.—TROLLEY—J. Q. Brown, Oakland, Cal.  
763,956.—INDICATOR—G. A. Browne, Tacoma, Wash.  
764,117.—PIANO SOUNDING BOARD—A. Dodd, Los Angeles, Cal.  
764,283.—IMPLEMENT—C. Ehrenfeld, Pasadena, Cal.  
764,285.—SAFETY ELEVATOR—M. Griffin, S. F.  
764,464.—ROTARY ENGINE—C. Hendricks, Riverside, Cal.  
764,465.—ROTARY ENGINE—C. Hendricks, Riverside, Cal.  
764,181.—HEATER—H. F. Hoesman, San Jose, Cal.  
763,937.—ROTARY ENGINE—J. Jahn Jr., Riverside, Cal.  
764,581.—GENERATOR—J. M. Kroyer, Stockton, Cal.  
763,989.—POWER APPARATUS—H. Laughlin Jr., Los Angeles, Cal.  
764,060.—PENHOLDER—L. Lemos, S. F.  
764,249.—LOCK—A. F. Mayer, S. F.  
764,037.—ROTARY ENGINE—C. A. McCallister, Seattle, Wash.  
764,198.—AIRSHIP—J. D. McFarland Jr., Fruitvale, Cal.  
764,197.—CONCENTRATOR—C. H. Muhleman, Los Angeles, Cal.  
764,000.—DOOR SCREEN—Newell & Schuyler, Los Angeles, Cal.  
764,072.—KINDLING—Perry & Dickson, Tacoma, Wash.  
764,205.—HARVESTER—A. D. Reynolds, S. F.  
764,500.—MATTRESS FILLING MACHINE—F. A. Rice, S. F.  
764,150.—DRIER—J. A. Ridings, Marquand, Or.  
764,305.—SASHHOLDER—J. L. Rivers, S. F.  
764,083.—PRINTING PLATES—W. G. Thorpe, Los Angeles, Cal.  
764,165.—RAILROAD SWITCH—Troutman & Gonzales, Los Angeles, Cal.  
764,403.—WATER MOTOR—M. H. White, Everett, Wash.  
764,092.—LEVEL—J. L. Wilcox, Seattle, Wash.

## HELP WANTED.

**WANTED—MINING SUPERINTENDENT,** M. E. preferred, to take full charge of a California gold mine. Must be capable of installing a 40-stamp mill, and be familiar with the Mother Lode ores. Liberal salary to right man. Address, giving references and full particulars as to ability and experience, Box 2427, Boston, Mass.



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## Treatment of Cripple Creek Ores.

In the Cripple Creek, Colo., district there are few mining companies owning their own reduction plant. The ores of the district are mostly gold, and are shipped either to smelters or to one of the several cyanide or chlorination mills in the cities of the district or to those lying but a few miles distant, as at Florence, Colorado City, or Canyon City. A large amount of the rock hoisted from the mines of the Cripple Creek district is washed and screened, the finer material in many cases carrying the higher values, the coarse rock being low grade or worthless. This process

cost of mining and transportation. The capacity of the plant is 325 tons per day. It is at present treating the ores of the United Gold Mines Co., the Gold Coin and other properties under that management, and also the ores sent in by the lessees on those properties. Railroad spur tracks are now run to convenient points at the works, and by the extensive system of switches and sidings ore can be delivered from a large number of mines in the district.

THE description of the rock formations and the physical conditions under which the gold deposits of Kalgoorlie and Coolgardie in Western Aus-

AT Bisbee, Ariz., the ore deposits are very irregular in size and shape, and as they have none of the characteristics of fissure veins, the extralateral right is a matter of serious consideration. In view of the difficulty in arriving at a satisfactory adjustment of this problem, and to avoid possible expensive and interminable litigation, the mine owners of that district some time since by mutual understanding agreed to waive the privilege of following their ore bodies beyond the boundaries of their claims extended downward. In Leadville, Colo., during the long continued and expensive litigation in that district during the early period of its history, the juries



Mill of the Economic Gold Extraction Co., Near Victor, Teller County, Colo.

greatly reduces the tonnage to be treated in the reduction works, as compared with the ore hoisted from the mines. The highest grade ore is usually shipped to the smelters, the lower grade going to the works employing wet processes. Among the latter mills is that of the Economic Gold Extraction Co., which is shown in the accompanying illustration. It is the largest reduction works in the Cripple Creek district. The plant is so arranged as to operate, as far as possible, automatically, and consists of crushers, rolls, roasters, coolers and filters. Crude petroleum is used in the roasting furnaces. The chlorination process is being employed, the cost of treatment being such that ore carrying but \$8 per ton is said to be worked at a profit, including the

tralia occur, and which appears elsewhere herein, should interest those whose conception of a gold-bearing lode is "a mass of white quartz with well defined walls." In the Western Australia region the gold-bearing ore is greenstone, more or less altered to chlorite schist—a rock which on the Bendigo fields is known as mullock (waste), and is thrown away. This indicates how necessary it is for those who search for mineral veins to cast aside all prejudice and to critically examine everything in the way of a rock which they find.

A JURY at Rossland, B. C., has found a verdict for damages in the sum of \$12,500 against the Western Federation of Miners, on the ground that the Federation employed illegal methods in the conduct of a recent strike at the Center Star mine at Rossland. This is said to be the first verdict of the kind ever secured in the Dominion, and is looked upon as probably assuming international importance.

before which the cases were tried invariably found that there were no "lodes" in the district, and, consequently, no extralateral rights, as an apex is a pre-requisite to the exercise of this privilege. This became the unwritten law of Leadville district. As far as known, these two districts, Bisbee and Leadville, are the only ones in the United States in which the mines have no extralateral rights.

THE falling of the market price of a mining stock in a prominent stock exchange under the influence of dividends regularly and continuously declared is a peculiar feature of one Western stock. That this is due to the cool calculation that each dividend paid from the proceeds of mining means that one less remains to be paid, can scarcely be believed. Those who do their mining in the stock exchanges are rarely credited with this amount of practical sense in valuing mining stock. Evidently the stock is considered as having only speculative value.



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IN discussing the large capital expenditure now necessary in the equipment of the deep-deep level mines of the Rand in South Africa, where an investment of from two to three millions of dollars is necessary, and extending over a period of five to seven years, an English engineer made the statement a short time since, that this could scarcely be considered an important factor in the economics of any of the very deep mines. That large capital expenditure and interest charges were matters of really small consideration owing to the fact that in few instances those who first subscribe for the stock of these mines, making the great expense in development and equipment possible, "rarely stay in to the finish," their places being taken by those who pick up the stock in the open market after the enterprise has been in existence for several years, and when the original investors are usually anxious to get out at almost any reasonable sacrifice.

IN view of the prevailing low price of crude oil at the wells in the Kern county field in California, independent producers are arranging to unite in an effort to secure a better price. It is said the Standard Oil Co. has been paying 15 cents per barrel and the combination known as the "Associated" has paid 17½ cents when compelled to, in order to fill contracts they are unable to meet from the output of their own wells. The price of crude oil on the Pacific coast has had a wide range, although the fall of price in the region of production has not seen a correspondingly low price to consumers in the cities and at the mines. Whether the proposed pool of the independent producers will result in raising the price to the consumer should it go into effect remains to be seen.

## Practice as Necessary as Theory.

The State School of Mines of New Mexico has made somewhat of an innovation in securing a mine, the Torrance, in the Socorro mountains, in Socorro county, New Mexico, for the purpose of giving the students of that institution an opportunity for practical experience in mining. The mining schools usually advise their students to go into the mines during the summer season, and this has been the custom with the greater number of universities and mining colleges, but the New Mexico School of Mines has adopted a plan which will insure each of the students of that institution having an opportunity to gain the desired experience in actual mining, whether the result proves a financial success or not. While the profit and loss aspect of the proposition is a consideration of importance, it is overshadowed by the result to the student in the gaining of a practical as well as a theoretical knowledge of his chosen profession. Most other mining schools are obliged to take or send their students to mines at a greater or less distance to acquire the practical experience which cannot be gained at home. The only advantage which this course possesses is in the variety of mines the student has an opportunity to see and to work in, but a similar opportunity is open to the student from the New Mexican school, while the fact that the school owns a mine makes it possible for the students to work under instruction, which is not usually a condition of their employment in mines where they go singly or in pairs to take their chances in securing employment, and in doing whatever may be required to be done in the best manner suggested by their good sense, and without any particular instruction or advice. The superintendents and foremen of the mines where students are given employment rarely take a greater interest in their welfare than in that of any other men about the works, and in fact, in some places students are placed at a disadvantage, owing to petty jealousies and other unreasonable causes. For this reason some students conceal the fact that they are from a mining college, preferring to take their chances with the majority, and in this way they get along quite as well, if not better, than they would otherwise. A man who starts to work at any trade can make better progress under competent direction with an advisor who takes a kindly interest in his advancement than if he were left wholly to himself. Of course, this cannot continue always, for the young miner must be taught self-reliance, and must be required to take the initiative in many things before he has been many months in the mine. However, in a case where the mining school controls the property and the commercial phase is subordinate to result to the students, opportunities are afforded which do not obtain under the usual conditions about mines. This is particularly the case in regard to mine surveying, timbering, track laying, and the numerous small things in mining which, though insignificant as compared with the whole, are important and should be well done. The New Mexico Mining School has set an example which may be followed by other similar institutions with advantage.

IN the surface equipment of mines it is not an uncommon thing to find the hoisting machinery and head frame over the shaft all under a single roof, and occasionally the mill also is located in the same building. Without doubt this is economical and convenient, but there are other important considerations than those of economy, and mine surface equipment arranged as described may eventually prove to be a disadvantage. This is particularly pronounced in case of a fire, when if it is not promptly extinguished it is almost inevitable that the entire surface plant will be consumed. This was evidenced a few days since at Virginia City, Nevada, when the Union shaft building took fire and was completely destroyed with its machinery. Within this building, which was constructed in the form of a right-angled cross, and of large dimensions, was the hoisting machinery, the pumps, carpenter shop, timber frame room, change room, compressor, and in fact the entire elaborate surface mine equipment. The structure stood directly over a vertical shaft 2000 feet or more deep. Had these buildings been built of steel, with iron roof and sides, the fire would not have been so destructive. At many mines the cost of steel struc-

tures is considered too great, and the mine buildings and head frames are built of wood throughout, and in such cases the most efficient means to avert complete disaster in case of fire is the separation of the several buildings, containing hoist, compressors, etc., and particularly is it desirable to keep the head frame apart from all other structures, as there lies the danger of communicating the fire to the mine timbers, which may result in damage more expensive and troublesome than the reconstruction of surface plant. Every mine should be well supplied with apparatus to extinguish fires, as often it is difficult to raise men from a mine when the surface works are burning.

## The Cost of Power.

The cost of power is one of the principal items of expense in mining regions. A mine having a hoist on a shaft 1000 feet deep, with air compressor for say six drills, and a mill equipment of forty stamps and accessories, usually requires not less than 300 H. P., and often more, though in dry mines considerably less is permissible. The cost of this power ranges from the relatively low price of \$1 per horse power per month to over \$8, and in isolated regions to even more than \$10. In the first instance, to secure the low cost of \$1 per horse power the company must own a water right, and then the cost is merely that of maintenance; but if power must be purchased from a distributing company, whether water or electric, the price is likely to be regulated by the cost of generating power by other means—for instance, by steam, with either wood or coal for fuel. In such cases the cost of power from the distributing company will be slightly less than the cost of power by steam. In some regions competition is an important factor in favor of the miner, but in these days of centralization of interests competitive companies quickly arrange any condition detrimental to their interests. There is still abundant power available in the mountain region of the West—in Colorado, Montana, Idaho, Washington, Oregon, Nevada and California—all that is necessary being its appropriation. The mountain streams may be used again and again. The impact wheel under high head, and the turbine under low head, may be found in many regions, operating successfully and inexpensively. Crude petroleum has become an important factor in the power problem in some districts, but as the petroleum fields are usually at a greater or less distance from the mines, the cost of transporting oil is considerable. Still, with oil at \$1.50 per barrel laid down at the mine, and with a proper oil-burning equipment, the cost should not exceed \$5 per month per horse power, and in some plants is even less than this amount.

ONCE more miners have shown the staunch material of which men who follow that fascinating pursuit are made. At the Union mine in Virginia City, Nev., the hoisting plant of which burned last week, several miners entered a drain tunnel on the 20th inst., which had been bulkheaded at the time of the fire, and removed the bulkhead. Some of the workmen ventured beyond the bulkhead to examine the workings with a view of ascertaining the amount of damage done to the shaft and were overcome by carbon dioxide, the result of the recent fire. The miners remaining near the portal of the tunnel, hearing a faint call, rushed into the deadly gas to rescue their comrades, one of whom, at least, was completely overcome and was dead when they reached him. The other survived, but is still in a precarious condition. The rescuers are also very sick men as the result of their experience. They knew what to expect before entering the mine, though this knowledge did not deter them a moment, but such instances of self-sacrificing heroism are not uncommon in mining experience.

A NOVEL FEATURE was introduced into mining a few days since when a professional diver was employed by the management of the Draper mine at Soulsbyville, Cal., to go down into the mine and, under 100 feet of water accumulated in the shaft, make repairs on the pump, which had been submerged and could not be started. The diver successfully accomplished his mission and when he reached the surface the pump was in operation.



## CONCENTRATES.

THE intensity of an electric current is measured by the "volt," which is the unit of electro-motive force. It is a word derived from the name of a noted electrician—Volta.

GRIZZLIES, constructed so that the spaces between the bars are somewhat wider at the lower end than at the top, will clear themselves much more readily than those spaced a uniform distance from top to bottom.

ORE deposits in massive rocks, such as granite, diorite, andesite, felsite, quartz porphyry, or in heavy-bedded sedimentary rocks, are not extensive unless these rocks have been fractured and crushed, and the mineralization is usually co-extensive with the zones of crushing.

REELS have several advantages over drums, in that the flat rope can be run direct to the sheave and is relieved of the travel incident to drums; the reel hoist occupies less floor space, and starts the load from depth with the minimum of power required.

THE occurrence of garnets near the contact of limestone is not an uncommon feature in connection with copper deposits, but the occurrence of garnets, tremolite or the other minerals which are the result of contact metamorphism, are not a reliable index of the amount of ore which may be discovered, for these minerals occur abundantly where there is no ore of any kind.

JUDGING by the past action of the courts, it is not likely that an attempt to forfeit a claim for failure to record notice of assessment work would be sustained, but to guard against such contingency the claim owner should comply with the local or State laws requiring such record, otherwise it may result in giving him much subsequent trouble, particularly if the mine prove to be a rich one.

THE rocks in which copper deposits occur are of many kinds. The deposits of Butte, Mont., are in granite; those of Bisbee, Ariz., are in limestone; those of Cananea, Mexico, are in limestone and eruptive rock; those of Iron Mountain, Shasta county, Cal., in quartz-porphyry; those of central California are in amphibolite schist. Many copper deposits are found in mica schist, and some in sandstone and others in quartzite.

IN shaft sinking it is always advisable to make a "cut"—that is, drill a double line of holes which are pointed toward each other. This blasted first removes a "Y" shaped rock section and greatly facilitates the blasting of the remainder of the rock in the shaft. This applies with equal force to drifting. The stratification and general "lay" of the rock in place must determine the proper location for the cut holes, their direction and depth.

THE State laws of California do not require the owner of a mining claim under bond to an individual or a company to post a notice disclaiming all responsibility for debts contracted by the operators, but this method is usually resorted to by the owners of property which is bonded to others, to prevent the attachment of the property in case debts are incurred by the operators of the claim.

IN only a few instances has it been found possible to treat successfully auriferous pyrite from concentrating machines by the cyanide, though numerous cases are of record where the slimed pyrite, such as that obtained from canvas tables, has been treated with a high percentage extraction. In the treatment of raw sulphides the chloro-cyanide or bromo-cyanide solutions appear to give more satisfactory results than those obtained by straight cyanide.

COPPER ORES not infrequently occur in quartzite, and the usual indication is an iron outcrop when no copper ore is seen in the croppings. The fact that copper ore is found in sinking is a favorable indication, but it would be unwise to declare it a positive indication. It would be well to test the dike in one place—the most favorable that can be found. A very little copper will stain a large surface of rock, and these copper blossoms are sometimes misleading.

WHEN running a tunnel through bedrock to cut an ancient river channel, or to drain a modern stream, it is most important that the tunnel be located sufficiently low to be at least as low as the bedrock, and it is preferable to be below it, to equalize any inequalities in the bedrock grade. A great many tunnels run to open and drain ancient gravel channels in California have been found, too late, to have been run too high for the purpose for which they were intended.

PLACER LOCATIONS must conform to the lines of the United States surveys where the land has been surveyed. For this purpose a tract of land may be subdivided into squares containing ten acres each, two of which constitute a single claim or location. A ten-acre tract measures 660 feet on either side, making a twenty-acre placer claim 660 feet wide and 1320 feet in length. In some districts the local laws reduce the size of a claim

to less than this amount, but no local laws can make a claim larger than twenty acres.

THE discoloration of amalgamated plates in mills is sometimes due to the minerals in solution in the battery water. Mine water is sometimes used in batteries, and there are numerous soluble mineral salts in the water which affect plates. Arsenic is one of the most objectionable. An ore which did not readily amalgamate in a mill where the mine water was used, being taken to another mill where pure water was available, was found to yield its gold readily to the ordinary method of plate amalgamation.

IN the case of A, who owns all of one claim and having a half interest in A. B. 2 and A. B. 3, A has the extralateral right on the 500 feet of branching vein, extending from the end line between A. 1 and A. B. 2, or to the point where this branch passes out of the side line of A. 1. This right would be defined on the south by a plane drawn downward and in the direction of the dip (in this case west) along the end line between A. 1 and A. B. 2., and on the north by a plane parallel to the first and passing through the side line of A. 1 at the point where the vein crosses the side line.

SILVER can best be recovered from gray copper and similar ores by smelting. The argentiferous gray copper is fused with three times its weight of lead, and pouring this alloy into moulds, forms flat cakes. These are subsequently treated in a reverberatory, the heat being so regulated that the lead, which melts first, flows away as a molten liquid carrying with it the silver which was originally associated with the copper ore, leaving the latter as a porous mass having the form of the original cake, but devoid of the silver—the lead and silver being separated by cupellation.

WHERE chromic iron occurs disseminated in grains in serpentine, and for this reason is too low grade to work, the ore may be crushed by rolls and the chrome concentrated in the usual way, on any one of the numerous concentrating devices now on the market. If water is abundant it may be rudely concentrated in sluices, the chrome being heavy will settle in the riffles and the gangue will be carried away by the current of water. By this latter method there is always considerable loss, as the water current which will wash out the coarse gangue will also carry away finely divided chromic iron.

FOR the purpose of carrying electric wires the most economical tower construction is one in which the spread of the legs at the ground is about one-quarter to one-third the height of the tower. If a less spread is used, the weight of the legs becomes excessive and with a greater spread the cross-bracing must be much increased in size. For a single circuit the common windmill tower construction in which the legs are locked together at the top has the advantage of reducing the strains to a simple compression of the legs on one side and tension on the other, the only function of the cross-bracing being to prevent the legs buckling when in compression.

THE function of the "bridge" in mine timbering is to admit of driving lagging in loose ground without too much waste of time, and the cutting away of an unnecessary amount of ground. By the use of the bridge ground may be drifted, crosscut and sunk through, which cannot be very well handled in any other manner at anything like the same cost. The placing of bridges in shaft sets is not warranted if the ground will stand well without driving lagging. In loose, soft ground which stands fairly well, lagging may often be driven without the employment of the bridge, by inserting the forward ends of the lagging between the ends of the last set of lagging and the timbers of the drift or shaft set.

DIP and strike in veins are terms employed to denote the direction of the vein downward, or its departure from a horizontal position, and strike is the direction along its course. These two directions are theoretically at right angles to each other, though both strike and dip of a vein may change frequently. The outcrop of a vein may not represent its true strike; but when a claim is located, it must be laid out along its outcrop, and not in the direction of its "true" strike. Judge Beatty has thus defined strike and dip: "The strike or course of a vein is determined by a horizontal line drawn between its extremities at that depth at which it attains its greatest longitudinal extent. The dip of a vein is its course downward at right angles to its strike."

NO PERSON can legally hold mining locations year after year without doing the annual assessment work required by law, and the repeated relocation of claims on each succeeding January 1st is only a subterfuge and will not be upheld by the courts. The timely resumption of work may prevent the relocation of the claim by another, but having been commenced, the claim holder must complete the assessment work without delay to protect his claim against relocation. He cannot go upon the claim and work a day or two, then wait a week or a month to resume operations, and in this leisurely manner perform the work. The Federal statute requires that \$100 worth of work be performed within the year following the first of January next succeeding the date of location, and \$100 worth each year thereafter, until patent is obtained. If a located a claim January 1, 1901, the law (in the absence of State or local laws re-

quiring certain work and other acts to be performed as part of the act of location) permits him to allow the claim to remain idle throughout the year 1901, and he may allow the work to remain unperformed until the night of December 31, 1902, practically two years. If he has not commenced work at that time the claim is subject to relocation. If he does the work at that time it will hold the claim until December 31, 1903, and so on from year to year.

NO PARTICULAR mineral formation is without its ore deposits and mineral veins. From the Archæan to the recent, every geological formation is mineral bearing. The Homestake mines of South Dakota are in Archæan schists, the Lower Silurian (Cambrian) in the Black Hills carries valuable gold and silver ores; in Utah the Devonian carries rich silver-lead deposits; in numerous places Carboniferous limestones are ore bearing; the Permian formation in many places carries ores of silver and copper, notably in Russia; the Triassic is also gold bearing in Colorado; the mother lode of California is associated with the Jurassic; the Cretaceous is not without its ore bodies, and the Tertiary rocks also carry ores of gold, silver and lead. The andesites, trachytes and rhyolites of Tertiary age are noted as bearers of rich mineral veins. In the late Tertiary are the ancient golden rivers and in the recent formations are found the gold placers. No formation should be condemned as unproductive without investigation.

IT has been held in a uniform line of decisions by the United States Land Department that mineral lands do not pass to the State under school grants. Some of the grants expressly stated that mineral lands were excepted. After the surveys of the public domain have been made and approved, the title to the sixteenth and thirty-sixth sections in each township "vests absolutely in the State, by virtue of the survey. The Government does not certify or patent sixteenth or thirty-sixth sections to the States." The status of the lands must be fixed by a survey for identification (as to location, etc.) before title passes to the State. If this takes place prior to the admission of a State into the Union, the grant of the school sections does not take effect till date of admission. If, at date of approval of survey, the lands are not known to be mineral, the State obtains title thereto, and it has been ruled in a number of cases that "discovery of minerals on such lands subsequent to such approval does not defeat the title of the State," nor will the subsequent exhaustion of the mineral values revert title in the State. Lands valuable for petroleum are held to be "mineral," and may be taken up under the placer mining regulations.

IN extracting silver from its ores by amalgamation in either the pan, barrel, or patio process, the loss of mercury is partly due to mechanical and partly to chemical causes; in the former case it escapes as minute globules of metal, in the latter it is stated by most authorities to be in the form of mercurous chloride or calomel (HgCl), but more or less mercuric sulphide is often formed and possibly also some sulphate or oxide. In the pan process, in presence of metallic iron or cuprous chloride, the formation of mercurous chloride is probably reduced to a minimum. According to Dr. Percy (Metallurgy of Gold and Silver, vol. I p. 635), it was assumed at Zacatecas that in the patio process the mercury chemically lost (consumido) was equal in weight to the silver recovered, the remainder being taken as mechanically lost (perdido). The total loss appears from his figures to have been from 1.5 up to over 2 parts by weight of mercury for one part of silver. The chemical reactions involved have been studied by numerous investigators, who differ widely in their conclusions. The results of most of the older workers are to be found in Dr. Percy's Metallurgy of Gold and Silver and in Eissler's Metallurgy of Silver; among the more recent publications on the subject are papers by Ortega & Bustamante in Trans. Am. I. M. E. and by Drucker in the California Journal of Technology, vol. 3, No. 3, p. 150, which was republished in the MINING AND SCIENTIFIC PRESS June 11, 18 and 25, 1904. It is well known that metallic mercury slowly oxidizes when exposed to air, becoming coated with a film of oxide, and this action no doubt goes on with the floured metallic quicksilver in tailings piles, resulting in the formation of oxide and probably of chloride. Mercuric sulphide and metallic mercury are for practical purposes insoluble in cyanide solutions, though the metal does very slowly dissolve in presence of air. Mercuric oxide and chloride dissolve completely in cyanide solutions:

$$\text{HgO} + 4\text{KCy} + \text{H}_2\text{O} = \text{K}_2\text{HgCy}_4 + 2\text{KOH},$$
but when mercurous oxide or chloride is treated with potassium cyanide one-half of the mercury remains insoluble in the metallic state:

$$2\text{HgCl} + 4\text{KCy} = \text{Hg} + \text{K}_2\text{HgCy}_2,$$
potassium mercuric cyanide passing into solution in each case. Therefore in a tailings pile containing mercury as mercurous chloride one could not expect to extract as much as 50% of the mercury by cyaniding, while the sulphide and floured quicksilver would give a less yield. Sweetland (MINING AND SCIENTIFIC PRESS May 21, 1904) states that Comstock tailings only yielded one-third of the contained mercury in six days. If the floured quicksilver and mercurous chloride are separated from tailings by panning the latter may be recognized by turning black when treated with ammonia.



## Mining Conditions on the Comstock Lode, Nevada.

[WRITTEN BY A STAFF CORRESPONDENT.]

The present condition of the mining industry on the Comstock lode at Virginia City and vicinity, in Nevada, shows some signs of substantial improvement. Three or four years ago the lode was dead when viewed from a practical standpoint, almost every mine along its entire length of over 20,000 feet being idle. Since that time, however, a noticeable change has taken place, and there are to-day a number of active mines, with a promising outlook for an increase in the number of operating mines, and consequently the employment of more men. Some of the great old mine buildings which were falling rapidly into decay and perpetual uselessness have been cleaned up, repaired and painted and the machinery overhauled and active work resumed in the shafts. One of the great misfortunes of the lode is the almost criminal carelessness shown in allowing great shafts (down 3000 feet and over several of which cost millions of dollars each to sink) to cave and become complete wrecks, thus destroying every reasonable hope that work will ever be resumed in them, and some of these shafts had most encouraging prospects at the lowest levels. As an instance may be mentioned the new Yellow Jacket shaft, over 3000 feet deep and in good ore, but which was abandoned when a flood of hot water rushing into the levels from the Exchequer north heading flooded the Jacket shaft so rapidly that it was with difficulty the men below escaped with their lives. After that the shaft was abandoned and in time the heavy machinery was removed and sent to Butte City, Mont. The massive masonry foundations still stand, though some of the retaining walls nearest the shaft are toppling over and will soon fall into the conical depression that marks the site of the collar of this once magnificent shaft. This is the result of carelessness, for had a perforated pipe been laid around the collar of the shaft and a small amount of water been allowed to fall upon the timbers they could have been kept wet from top to bottom, and the probability is the shaft would still be open and in good condition to-day. Whether the shaft will ever be reopened it is impossible to say, as it looks now, probably not. Yet two years ago the Ward shaft of the Bullion mine at Gold Hill was caved, the hoist building falling down and the machinery looked as though it was fit for nothing better than the junk pile. To-day the vicinity of the Ward shaft looks as neat and prosperous as in the Bonanza days. The building has been braced up, cleaned and the entire surface works overhauled. The engines were found in good condition despite their years of idleness, and the shaft has been recovered and is now in first-class condition to the 1700 level. A large compressor plant is being put in for operating drills and to raise water from the bottom of the mine to the Sutro tunnel level by the method known as the air lift. What has occurred at the Ward shaft may be the good fortune of any one of the old abandoned shafts on the lode.

Beginning at the north end of the lode a crosscut is being driven in the Utah mine on the 600 level. J. H. Kinkead is superintendent. The Sierra Nevada and Mexican mines are connected with the Union shaft, through which they are to be operated. East of the Union lies the Scorpion, in which prospecting was being vigorously prosecuted on the 1600 level, being also worked through the Union shaft. The Union had been overhauled and placed in good condition and extensive development planned, but the burning of the works on the 14th inst. has put a stop for the time being to all this work. At the Union shaft was at one time some of the heaviest pumping machinery in the world. The great Cornish pump with a stroke nearly 9 feet long and a pump rod 18 inches square and 3000 feet long was one of the heaviest on the Comstock. Previous to the fire referred to, this pumping machinery was being dismantled and broken up to be recast into machinery of modern design. The Sierra Nevada, Union and Mexican are in charge of Superintendent A. J. McDonnell, the operations in the Scorpion are under direction of J. H. Kinkead. The Ophir mine, one of the noted properties of early days, and the one upon which the original discovery which caused the "rush to Washoe" was made, is being worked on the 1800, 1900 and 2000 levels and stoping is in progress on a vein of good ore from which about \$250,000 has recently been paid in dividends. In the Con. Virginia and California the water is down below the 2350 level and is easily held there by the hydraulic lift which raises it to the 2150, from which the large electrically driven Riedler pumps lift it to the level of the Sutro tunnel at 1750 feet. Considerable prospecting work is in progress. It is the intention to unwater the shaft to the bottom, about 2500 feet below the surface. James McKinty is superintendent. The enormous dumps about the various mines of Virginia City and Gold Hill are an attractive and impressive feature of the landscape. These dumps are mostly of light color, a tawny yellow being the prevailing tint. Some of them are gray and a few streaked with light green, where the

"propylite," as the meta-andesite is called in that camp, has been thrown out. Some of these dumps contain over a million tons of rock, and in a few of them are many thousands of tons of low-grade ore. Others represent the waste taken from the deep shafts sunk through the barren hanging-wall country. Of such is the Combination or Requa shaft, sunk jointly by the Chollar-Potosi, Hale & Norcross and Savage Cos. This is one of the few shafts still open to the Sutro tunnel level. Among the dumps containing values are those of the Con. Virginia & California. Upon these J. H. Kinkead has a lease, and he is milling about seventy-five tons daily in Kinkead mills, concentrating the sulphides, which are shipped to Selby. Custom ores are also treated at the Kinkead mill. The mill has six heads and six 6-foot vanners. Ores from the surface workings are amalgamated on plates and concentrated subsequently.

Recently the Best & Belcher Co. built a 75-ton plant equipped with Kinkead mills, five of which are set to 20 mesh, the pulp passing from these to two similar mills with 40-mesh screen. The mill has been leased to the C. Butters Co.

At the Gould & Curry nothing is at present being done. The intention is to reopen the Savage, Gould & Curry, Chollar-Potosi, Bullion, Alpha and Exchequer through the Ward shaft of the Bullion mine, to which reference has previously been made. This group of mines is under the general direction of Leon M. Hall.

The Imperial, Challenge, Confidence and Yellow Jacket are operated in a small way through the old Yellow Jacket shaft. Some prospecting is also being done in Belcher and Crown Point through the Belcher shaft. W. E. Sharon is superintendent. He also has charge of the Overman and Caledonia. These two mines are worked through the Overman shaft and ore is being broken on the 1200 level. American Flat, once a prosperous little city of several thousand inhabitants, has been absolutely dead for years. The heavy machinery and buildings have all been removed, the shafts allowed to cave and the outlook for a prosperous future is not bright.

On the Silver City branch of the lode there is considerable activity, though mostly in a small way. The most important mines on this branch are the Justice, Silver Hill, Dayton and Kossuth. The Justice and Silver Hill are working and several small properties are being exploited for rich surface ores in the vicinity of Silver City, mostly under the leasing system. The methods are primitive both at the mines and works, where the ore is treated. These methods are the lingering customs of bonanza days, when expense was not given the consideration it now receives. It is strange that if a leaser can make money by mining in a "hand-to-mouth" fashion handling the ore with shovels half a dozen times, and sometimes even a greater number, that he does not more closely observe the trend of the times toward lessening labor and cheapening production in every possible way, but this is not the way of the average old-time Comstocker.

In Six-Mile canyon the large plant built by the Charles Butters Co. of London to treat the tailings pile near the mill is idle. It has been found, so it is stated by representatives of the company, difficult to get a satisfactory extraction of silver, and as the values in the tailings are largely silver, the proposition has not proven a success as yet. The most recent installation at this mill is a large electric plant, to be used in connection with electrolytic deposition of the values from the solutions, but unless the values can be extracted from the ores this process cannot be employed more successfully than the ordinary zinc precipitation. The plant is extensive and contains seemingly every essential device for the successful operation of the process, but on investigation one is led to the conclusion that the mistake of insufficient preliminary testing has been made.

Several small cyanide plants were seen in Six-Mile canyon and in Gold canyon and the remains of one on the Carson river. Generally speaking, these plants have not been successful, probably partly due to the fact that the tailings which most of them treat have been worked and reworked until the values contained are too low to afford a profit under the existing metallurgical difficulties. Near Dayton a plant is in operation in which the chloro-cyanide process is said to operate satisfactorily. This plant is run for most part on ores and not on tailings.

### The Freakish Assay Balance.

TO THE EDITOR:—I have just read with interest the letter from John Randall in the MINING AND SCIENTIFIC PRESS of the 2nd inst., giving an account of the erratic behavior of an assay balance and the results of his experiments that tended to indicate the influence of magnetic currents.

I first observed this "freakish trait" in a balance in southern Arizona twenty years ago, and have met with it a number of times since, but after the second encounter it had no terrors. There is no necessity for leaving the balance alone and waiting until the next day for it to come out all right. The cause of the trouble is static electricity in the case, and this may be readily or quickly discharged by passing a wet or damp cloth over the outside of each piece of

glass in the case, including the base, if of glass. The cloth should be held in the hand with the wet part in contact with the fingers at the same time as with the glass, the discharge taking place through the body. The same result is attained by passing the wetted finger tips over the glass, but obviously the use of a clean cloth or sponge is preferable.

It is probable that a brisk rubbing of the glass in the case with a dry cloth will produce the condition referred to; but, as many an assayer can testify, it will occur at times without any such encouragement or assistance. When this condition occurs the balance may be otherwise in perfect order, but will positively refuse to work; generally the pointer will swing a short distance to one side or the other and then stop and refuse to swing back, and if the rider be moved several divisions on the beam the pointer will still swing to the same place and remain there. There are other manifestations, but I think this is the most general.

As the experiment described by Mr. Randall was made after the balance became "calm," it is evident that the slight polarity noted in the pointer was not the cause of the previous freakishness. I have never known the wet cloth remedy fail to put a balance right at once when it exhibited the traits referred to by Mr. Randall. G. H. B.

Ymir, B. C., July 8.

### Zinc and Lead Deposits of North Arkansas.

A lead and zinc producing region of increasing economic importance is described in Professional Paper No. 24, recently published by the United States Geological Survey for gratuitous distribution. The author of the paper, which is entitled "Zinc and Lead Deposits of Northern Arkansas," is G. I. Adams, who was assisted by A. H. Perdue of the University of Arkansas, and E. F. Burchard and E. O. Ulrich, who spent two weeks in the field collecting fossils and studying the rocks, adds a chapter on "the determination and correlation of formations."

This report covers the whole of the Yellville quadrangle, of which a geologic folio is in preparation, together with portions of three adjacent quadrangles. It embraces Marion county and parts of Searcy, Boone and Newton counties. The stage of development of the field is such that the report is in a sense a preliminary one, as few of the ore bodies have been worked sufficiently to determine their extent. There are many openings and prospects, but few producing mines. Besides describing these mines and prospects, Dr. Adams discusses in detail the geological occurrences and origin of the various deposits, so that the paper will be of interest to both miner and geologist. Twenty-seven illustrations add to the value of the report.

The principal ores of this district are zinc sulphide (sphalerite), and lead sulphide (galena). The zinc sulphide, which is commonly called blende or "jack," is composed, theoretically, of 67% of zinc and 33% of sulphur. By analyses, specimens of this ore from northern Arkansas averages close to 66% of metal, but the ore as marketed is not always this pure, for when it is cleaned it is impossible to completely separate from it all other mineral matter. Lead sulphide occurs in well-defined crystals showing cubic form or as crystal aggregates. Pure galena contains 86.6% of lead and 13.4% of sulphur. When smelted it yields about 80% of lead, since a portion is volatilized and lost. The northern Arkansas product contains practically no silver, which is sometimes a constituent of galena.

The completion of railroads projected will afford facilities for shipping this ore, so that mines which could not be operated will probably begin work. Although few of the mines are situated near the railroads, the distances which the product must be hauled will be so lessened that the ores can be marketed profitably. With the development of the mines railroad spurs and branch lines will probably be built, and the field can assume its true commercial importance.

### Magnetic Alloys of Manganese.

Recently Dr. F. Heusler of Dillenburg, Germany, while experimenting with an alloy of manganese and tin, noticed that it was attracted by a magnetized tube, says the London Electrical Review. Upon melting the alloy with an equal weight of copper, he found the resulting combination also distinctly magnetic. He later succeeded in making magnetic alloys by adding tin to commercial copper manganese containing only 1.2% iron, the alloy being non-magnetic before the addition of tin. Experiments with other metals showed that arsenic, antimony and bismuth each had effects similar to tin, but aluminum gave the best results of all. Dr. Heusler, conjointly with Herren Richarz, Starck and Haupt, has made a thorough investigation of the whole subject. It was found that the most magnetic alloys are those in which the manganese and aluminum are present in direct proportion to their atomic weights. The temperatures at which these alloys lose their magnetic properties are comparatively low. One containing 16% of magnesium and 8% of aluminum becomes non-



magnetic at 160° C., and remains so if plunged in cold water. It becomes magnetic again if kept at a temperature of 110° C. for a day or two. By adding small quantities of lead, the transformation points may be brought down to still lower temperatures. It is interesting to recall in this connection the work of Barrett upon magnetic iron-aluminum alloys. It was suggested that these alloys may find applications in various directions, such as for fire alarms or some form of thermoelectric generator. The new alloys are strong, easy to work and not easily oxidized. In the latter respect they have an advantage over iron.

## Mining and Ore Treatment in Western Australia.\*

NUMBER II.

Written by DONALD CLARK.

**GOLD DEPOSITION—THE GREAT BOULDER.**—It is the common custom to make comparisons with other States in order to show the latest gold producer off to the greatest advantage, but such comparisons are not fair. Take, for instance, the Victorian case. Victoria in the early days was rushed by a gold-seeking population who had very little experience in searching for alluvial, and none when it came to extracting small particles of gold from hard rock. Reef after reef was left in the early days because the material was looked upon as too difficult to work; the evolution of quartz mining was slow, the work proceeded cautiously, and even now, owing to this original policy, any change of machinery or method is viewed with the greatest suspicion. Contrast this with the West. Thousands of trained miners flocked to the newly discovered fields; money poured in for development purposes; machinery of the most extravagant type was rapidly run up, and mines were opened up at a rate almost unparalleled. Had Victoria been a new field with modern facilities, modern knowledge and with modern men, then the world would have been astounded with the wealth produced year by year. Western Australia will be a great gold producer for years to come, but it may take another jubilee for her to catch up to the long lead Victoria has given with regard to gold production.

One cannot help contrasting the comparative small amount of alluvial—or so-called alluvial gold—won in W. A. in comparison with that obtained from reefs, with that of Victoria. Nor can one get over the remarkable fact that while the great bulk of the

material surrounding these outcrops should, in a field such as Kalgoorlie, have amounted to millions of ounces, and not the few thousands which have been won. The matter is well worthy of investigation, and it may throw some light on the poverty of some outcrops and their richness down below and vice versa.

One of the most noticeable features at Kalgoorlie

day and night, Sunday and Monday; it must be confessed that with work proceeding at such a rate, the greatest efforts have to be made to keep development work well ahead, and it is probable that the limit of production has been reached in most of the mines, and perhaps over-reached in a few of them.

It has often been stated that Victorian mining men were at a loss when called upon to deal with the



Public Condensers, Kalgoorlie, Western Australia.

is the enormous plants dumped down on such small areas; coincident with this is the hurry and bustle that goes on. "We are anxious to work the place out and get away from it," jocularly remarked one prominent mining man. "The gold is better in the bank than in the ground," was another excuse given for running out 30,000 ounces per month, and causing many sanguine shareholders to fall in. Victoria

lodes of Kalgoorlie. The matrix which contained the gold was not quartz, neither were the lodes, so-called, contained in a channel with defined walls. A hard blue rock, specked with pyrites here and there, which on Bendigo would be called mullock, carried the gold, and this material was called a lode wherever it was payable. Many of the mines contain little or no free gold; in others veinlets of telluride of



Method of Handling Tailings at Coolgardie, Western Australia.

gold obtained from the reefs is as fine as flour that very little of this gold has been won from the alluvial. It seems to be feasible that surface solutions may have had solvent action on this gold and carried it to spots where it has been reprecipitated. A certain amount of denudation has gone on all over the fields, and even if this only amounted to a couple of hundred feet during the time the present reefs were exposed, then the amount of gold shed into the brecciated ma-

in the early days sent shafts down a few hundred feet and appointed a Royal Commission to decide whether gold would probably go down to 1000 feet. At Kalgoorlie they sink to 1000 feet almost in one act and start off straight away for the second thousand. There can be no husbanding of resources with leases containing only twenty-four acres, where the small "hoppy-go-hop" batteries have been displaced by the hundred head of heavy stamps, with their long and rolling hum. Work progresses at a rapid rate,

gold, or blotches of the same mineral, barely distinguishable from pyrite, permeate the rock.

The rock which contains the gold is locally known as a diorite or greenstone, but it has been proved by examination to be a diabase. The lodes themselves are portions which have been fractured and fissured, and through such channels the auriferous solutions have flowed, leaving some of their valuable metals crystallized through the disturbed areas. On some parts of the field vast chambers have been hewn out

\*Abstract Australian Mining Standard



in removing payable ore; in others, such as the Boulder, the values are sharply defined to within a few inches one way or another of the width of material taken out. Appearance counts for little or nothing where no gold nor telluride veins are visible. It is only by a continuous system of sampling that the mining manager is guided as to values; not the slipshod assaying and sampling done on some of our Victorian mines, which have brought the practice into discredit.

Hundreds of assays, taken at regular intervals, broken down from wall to wall, are separately pulverized and sieved, and the sieved sample handed to the assayer. "How often do you take your samples?" "Every 6 inches in this mine," was the reply obtained from a manager who was not even then satisfied that he could speak with absolute certainty as to values. Certainly he erred on the right side, and his mine was as well mapped out as to values as the stock in a merchant's shop. This system, so necessary here, has been of such assistance to managers that it has been adopted almost universally; and it has been stated by most reliable men that even with patchy reefs, having coarse gold, their battery values followed their assay values very closely.

At times there are great discrepancies on this field between estimated and actual values, but if the origin of these were sought it would be found either in the incompetence of the men connected with the work or else be the result of market manipulations. It may be a difficult matter to value a mine to within a few per cent, but there is no excuse for values of a mine well opened up being declared to be hundreds of per cent over actual values.

Another indispensable method of development lies in the use of the diamond drill. This work is so important, and can be carried on so cheaply, that the best managed companies have made full use of the system, and have bored their properties from boundary to boundary, thereby gaining valuable information, and in many cases making important discoveries.

The Great Boulder property consists of four leases, the first two having an area of twenty-four acres each, the third twenty-one, and the fourth sixteen acres. The main workings are carried on in the first two leases, whose length in a northwesterly direction is nearly 3000 feet, and whose width is one-fourth of this, or 750 feet. The lode runs tantalizingly close to the western boundary, and dips towards the Ivanhoe property on the northern end. These last two properties, each having a lease of twenty-four acres, together with the Boulder, produce nearly half a million ounces of gold per annum. In the Boulder property a belt of rock classed as felsitic schists and slates, varying in width from 200 to 500 feet, runs along the whole length of the leases. On the western side is the Boulder, Horseshoe and Ivanhoe; on the eastern the Lake View, Perseverance, and other properties. The lodes on the Boulder mine are known as the east lode, the west lode, and a lode which forms a loop with the west lode, known as the west branch lode. The last outcropped close up to the western boundary, and dipped into the Golden Horseshoe property, thereby helping to make that mine one of the richest in the world.

The west lode, after a westerly dip, which brought it up to within 50 feet of the Horseshoe boundary, commenced to dip the other way, so that at the 1400-foot level it is farther away from the boundary than it has been for some time. Down to the 900-foot level the general trend of the dip is westerly.

In going down a mine such as the Boulder a casual observer cannot form any opinion as to values, other than that apparent from the quantity of stone removed, the absence of a mullock tip and the presence of barren material from other sources filling the stopes depleted of their ore. The ore removed must have been of wonderful value, for up to the end of 1900, 198,248 tons were treated for 449,944.7 ounces and \$175,000 paid in dividends. For the year 1900, 54,887 tons were treated for a yield of 115,908 ounces, and at the end of 1900 it was estimated that down to the 1000-foot level there were 143,800 tons, containing 211,324 ounces of gold, an estimate which has since proved to be considerably under the mark.

At the 1200-foot level the lode is 8 feet in width, and had been driven on at the date of my visit for over 500 feet, the values averaging at least two ounces per ton for this distance—none of that stone had been broken out. Although this level does not make the mine any more than one swallow makes summer, yet it has raised the hopes of the local people, who anticipated better yields from the lower than from the upper levels in other mines as well. This may prove so, but, taken as a whole, it would prove contrary to all other Australian experience.

The Great Boulder mine is one of the best developed on the field. The work done for a single year is suggestive:

Shafts.....	Feet.....
Levels.....	2,872
Crosscutting.....	1,389
Rises.....	789
Winzes.....	677
Air passes.....	180
Total.....	6,797
Diamond drilling.....	6,977

(TO BE CONTINUED.)

## Notes on Mine Sampling.

Written for the MINING AND SCIENTIFIC PRESS.

No commission that falls to the lot of the mining engineer brings greater responsibility than that of a call to examine and determine the value of a mine. He may be requested to furnish plans for a mill, smelter or concentrator, or to devise an economical method of mining a low-grade body of ore, or to suggest other practical ideas and plans, all of which he may do with confidence, but when requested to give a professional opinion on the value of a mine he is placed in a position of trust upon which much more may depend than is at first sight apparent. He cannot afford to report adversely and have the mine prove a bonanza for the next fellow who comes along, and most assuredly he cannot afford to give a favorable report when the property does not justify such an endorsement. Necessarily he must make a careful, painstaking and thorough investigation of the surrounding country, giving attention to the transportation problem, the fuel and power problem generally, making comparisons between steam, water and electric or other power, if each is available, or, if not existent, state under what conditions and at what cost power may be obtained. If it is a smelting proposition the question of fuel, fluxes and water is important. Shall the smelter be located at the mines or at a distance? This he must determine. The title to the property is all important. He must be sure that if a valuable mine is developed his clients, should they purchase the property, or their assigns, may work it uninterrupted by adverse claimants. Where improvements are possible in the future, as to transportation, power or other conditions, these should be stated.

As to the mine itself, he must inspect the workings and decide about what quantity of ore will probably be available, and determine whether the shaft or tunnel is sufficiently large to handle the desired tonnage of ore, besides waste, handling men, timbers, supplies and water. It may be advisable to sink a new and larger shaft, or to drive a tunnel, and the site of either of these must be selected with reference to the distribution of known ore underground, and also with a view to surface transportation to mill or other works. In sampling, he will carefully sectionize the entire workings, measuring and sampling from wall to wall, if a vein of moderate size, or dividing it into blocks if a large vein, zone or ore body. The samples taken must represent, as nearly as possible, the ore as it occurs in the vein. Rich streaks may be measured and sampled separately if desired, and in many places it is better to do this, for a streak of rich ore an inch or two in thickness will create a false idea of the value of a vein 5 or 6 feet wide, if mixed with the low-grade rock, and particularly of the expense of mining, for the low-grade portion of the vein may be too poor to pay the cost of mining, which, together with other costs, must be borne by the small rich streak. There are various ways of arriving at the value of mines, and the taking of the samples is usually the easiest part of the operation. Any one who knows anything of practical mining, with a little instruction—if a novice at the business—can take mine samples, but it is very essential to know that the samples represent what nature, and not man, has placed in the ore. The experienced mine examiner quickly learns that he cannot afford to take any risks of being salted, and it is remarkable the various safeguards he must throw about himself in order to prevent this. When there is any considerable sum of money at stake on a mining deal, the engineer who samples the mine has many extraordinary precautions to take. These may be set down in his diary or field notebook in something like the following, and may be entitled, "Rules for Mine Sampling:"

1. Provide a box of nitro-powder directly from the manufacturer.
2. Take as assistants only sober men, whom you know to be above suspicion and who cannot be bribed.
3. Arrived at the mine or town in or near which the mine is situated, keep your business to yourself.
4. Have a sufficient number of new canvas sacks to accommodate all the samples you will take.
5. Have a good-sized, heavy canvas sack to hold small samples in sacks.
6. Have a heavy leather mail sack, into which the large canvas sack may be slipped when full.
7. Provide yourself with abundant tough check tags for marking number of sample.
8. Take no samples from ore found broken in the mine.
9. Pick—and, if necessary, "shoot"—away every face where it is proposed to take a sample, exposing a fresh surface which it is safe to assume has never been "fixed."
10. Politely, but firmly, request all persons to leave the mine except your assistants. This may hurt fine sensibilities of some persons, but it is safer.
11. Break all samples down at some convenient place underground. Quarter down and sack samples on the spot.
12. Do not work up your samples in a timbered stope or under a raise. Select a place in a drift where the solid rock is not over 7 or 8 feet from the floor of the level. This prevents industrious and opti-

mistic persons from helping out on the general average.

13. Occasionally put a piece of solid ore or a handful of fine stuff from the quartering cloth in your pocket to guard against future possible great discrepancies.

14. Never allow the samples to leave the level until you go, and do not go out and leave them behind, to be brought up by some of the obliging men about the place.

15. When you have reached the surface with them don't allow them out of your sight for a moment. It looks a good deal like a "tenderfoot," but tenderfeet are "easy."

16. Still keep your sample sacks in sight until you reach the assay office, and, if possible, let no one know to whom you intend to trust the assays.

17. Better still, make the assays yourself, if possible.

18. Test your fluxes and crucibles.

19. Whoever may make the assays, keep duplicate samples, for check.

20. In many cases it is a good plan to wash off several pieces of rock and assay the clean hard rock. This may not give correct values, but it affords a check against salting.

21. It is a good idea to have an associate who takes a line of samples wholly independent of yours, but at the same places. This will afford one of the most reliable checks upon the work, as it is improbable that anyone attempting to salt the samples of either or both could hope to have them tally.

There are other things in the art of mine sampling besides wielding a pick and cutting channels with hammer and maul, the measurement of vein widths and the mathematical selection of sample stations.

W. H. S.

## Lead and Zinc Deposits of Illinois.

Lead and zinc are found and have been mined in Illinois in two widely separated districts. One of these is in the extreme southern portion of the State and includes portions of Hardin, Pope and Saline counties. The other is in the extreme northeast corner of the State and includes a portion of Jo Daviess county. The deposits of these two areas are briefly described by H. F. Bain in a recent bulletin (No. 225) published by the United States Geological Survey under the title of "Contributions to Economic Geology, 1903."

The southern Illinois district has not yielded zinc in commercial quantity. The lead found there, which has been mined more or less steadily since 1842, is produced at present in connection with the mining of fluorspar. The maximum production of lead was in 1866-67, when there was a yield of 176,387 pounds, from the Fairview mine. Within the present year prospecting near Jonesboro, in Union county, west of the fluorspar district, has developed the presence of galena, whether in paying quantities or not it is too early to say.

The northwestern Illinois area forms a portion of the upper Mississippi Valley district, which, up to the middle of the nineteenth century, was the principal source of American lead. With the opening of the silver-lead mines of the Western States attention was diverted from the district. About the same time the mines reached a depth at which pumping became a serious burden, and the lead ores gave place to zinc ore. The producers of zinc blende in this district are at a disadvantage in competition with those of the Joplin (Missouri) district, for the Wisconsin-Illinois ores carry a higher percentage of iron. Until recently no convenient method of separating the iron from the zinc has been known, and the northern ores have accordingly lacked a market.

The principal product now obtained from this district is zinc sulphide. The Mineral Point Zinc Co., the chief buyer of the ores of the district, has equipped its plant for the manufacture of sulphuric acid, and is now able to economically handle the sulphide ores. The development of the process of roasting and magnetic separation has made it possible to build plants in small units adapted to the wants of individual mines. When cleaned by this process the ore has a wide market. Experiments with static electricity, operating on unroasted ores, have also been made with encouraging results, and it seems probable that the district as a whole will gradually become a large producer of zinc ores.

There is at present no important producing mine in northern Illinois. A considerable amount of development is under way and an increased output may be expected. There are thirteen properties upon which work is now going forward with a view to zinc production. On a few of these ore is being hoisted, but none are yet down to the horizons at which large bodies probably lie. The mines now operated are clustered mainly around Galena and Elizabeth. An area covering probably 150 square miles, occupying the northwestern portion of Jo Daviess county, may be considered within the proved ore-bearing district. With a less degree of probability, the whole of the county may be included. Mr. Bain believes that the upper Mississippi district may produce large quantities of zinc ores, and that the portion of the district lying in Illinois gives promise of developing with the rest.



## Gold Milling.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by  
ALGERNON DEL MAR.

As the object of stamp milling is the extraction of the precious metals from its ores, so the object of amalgamation is to obtain these metals as quickly as possible and to hold them at the pleasure of the operator. Mercury is used because its affinity for the precious metals is so great and the ease with which it is volatilized and condensed, leaving the three metals in a marketable state.

Gold exists in some ores in such a free state that the mere contact with mercury is sufficient to form an amalgam and thereby hold the gold, while the gold in other ores needs prolonged and repeated contact with mercury to accomplish the same purpose. Mills that treat the former class of ores need only be pulverizers, the gold being amalgamated on plates outside of the battery, while mills which treat the latter class must not only crush the ore, but amalgamate it as soon as possible, so as to allow no chance of the gold escaping, and to accomplish this end amalgamated copper plates are used both inside and outside the mortar.

Amalgamation in a stamp mill is governed by the amount of mercury used, the amount and temperature of the water, the fineness of crushing, the height of discharge, the physical and chemical nature of the ore, and the character of the amalgamating surfaces.

The amount of mercury used varies as the amount of metals amalgamated, and is regulated as explained later on. The loss of mercury due to chemical and physical causes varies from  $2\frac{1}{2}$  to  $14\frac{1}{2}$  dwts. per ton of ore crushed, and will average about 6 dwts. This may be reduced somewhat by the employment of concentrating devices and mercury traps.

Enough water should be used to carry the pulp off the plates, but no more, and it should be as clean as possible. The battery water tank should be kept under a constant head, and to insure greater uniformity of temperature should be protected from the weather. These two requirements will save the millman the trouble of constantly regulating his water supply, and will keep the amalgam at a more even consistency. From  $50^{\circ}$  to  $60^{\circ}$  F. is a good temperature. Slimy water should never be used, for it will carry off fine gold that would otherwise have settled on the plates.

The degree of fineness to which an ore is crushed affects amalgamation principally in a physical way. As far as we know (except in rare instances) gold exists in its ores as a mechanical mixture, and to be freed must be ground to that degree of fineness that will allow the gold to separate from the worthless material, usually quartz. If this degree of fineness is not attained small pieces of quartz or iron, with adhering pieces of gold, may often be seen on the plates, and as the amalgamating surface is only a portion of the whole, these pieces of gold quartz gradually get washed down the plate until they are lost in the tailings. The remedy is a finer screen.

The character of the amalgamating surfaces has undergone some modification in late years and now usually consists of two inside plates, a lip plate, sometimes a splash plate, and the tables proper. The inside "back plate" extends the full length of the mortar, is about 6 inches wide, is bolted to the mortar and is protected from the falling ore by a projecting lip or a false lining in the mortar opening. The "front plate," or chuck-block plate, is screwed to a curved block of wood extending the whole length of screen opening, which in turn is bolted to a block which extends across the screen opening, and is wedged against the mortar along with the screen frame, the screen frame resting on the chuck block. These two plates are made of soft copper and are simply rubbed bright with quicksilver. Under favorable conditions they catch about half the gold set free by the stamps.

Immediately outside the mortar, on the cast-iron lip, is usually a lip plate, made of copper, the full width of the lip, which may be supplemented by or used in conjunction with the splash plate, which is placed in front of the screen, inclining toward it, and which can be removed at will. These two plates nearest the battery can be used as indicators for the inside plates and need not be touched except to scrape on cleanup days, or when they become overloaded. The outside plates are the full width of the mortar, are of copper,  $\frac{1}{2}$ -inch thick, electroplated with from one to two ounces of silver per square foot, about 12 feet long, and given a fall of  $1\frac{1}{2}$  inch per foot. It is well to have them in three sections, with a drop of  $\frac{1}{2}$ -inch between each. A greater drop will cause scouring. This will give a chance for the pulp to turn over and may prevent the escape of float gold. The upper section is sometimes made movable, sliding over the next lower plate, so that it can be removed from in front of the mortar while making repairs or cleanups. At the end of the lower plate should be a mercury trap to catch any amalgam or quicksilver washed off the plates. The tailings then go to the concentrators, and maybe to the cyanide plants,



Pennsylvania Mill of the Ohio Mines Co., Argentine, Colo.  
Wagon Road Over Argentine Pass in the Distance — Elevation 13,500 feet.



Rathbone (Argentine P. O.), Summit County, Colo.  
Ruby Mountain on Left.



Montezuma, Looking North, Summit County, Colo.  
(See Page 61.)

which subjects come under the head of "Concentration and Cyaniding."

Mercury is fed into the mortar, the amount depending upon the state of the amalgam on the outside plates, and consequently upon the richness of the ore. Two objects must be attained, first, the inside plates must be kept hard enough to hold its amalgam; and second, the outside plates as sensitive as possible for amalgamating the gold passing over them. The appearance of small masses of amalgam on the plates indicates the inside plates are being scoured or are too soft. If globules of mercury or "tears" appear on the plates then the outside plates are too soft. If the amalgam feels hard then more mercury must be added. The inside plates must be hard enough to retain all the amalgam, and the outside plates soft, putty like and bright.

Rubbing and complete amalgamating of a plate is of more benefit than chemicals. No acids should be used at all and cyanide of potassium or other chemicals only when necessary. The careless scratching of plates is often the beginning of a spot that will sooner or later get fouled by verdigris, due to the exposure of the copper to oxidation. On copper plates, well electroplated and well taken care of, verdigris will seldom appear; but cheap electroplating will soon wear off in spots. The usual remedy is to treat the spots with caustic soda or cyanide of potassium; but a better method is to cover with silver or gold amalgam, and when cleaning up not to remove this coating entirely. This will lock up a small quantity of amalgam, but will keep the plates in better condition. I have found that to change the positions of the plates is a benefit. It will be observed that this fouling does not occur so much near the mortar, because more amalgam covers the plates there; so if the plates below are shifted up, they will soon get well coated, while the former upper plate will be in good condition. The plates, in any event, should not be rubbed dry, but a sufficient amount always left to form a good amalgamating surface—a precaution which many mill men are obliged to omit, by reason of the demands of the management.

Black spots on plates may be due to grease or to

chemical reactions between the constituents of the ore and the plate, also in conjunction with the iron or steel from the shoes and dies. A good remedy is to rub with a mixture of nitrate of silver, cyanide of potassium and a caustic. If it is grease, the cyanide of potassium or caustic soda will remove it and the nitrate of silver will leave a covering of silver amalgam. Simply rubbing the plates well with a whisk broom will often remove the spots without the use of chemicals. If the spots are due to antimony, use a salt solution. Sodium sulphide also removes antimony.

At every shift the plates should be rubbed up with a whisk broom and as often as necessary to keep them bright. It is better to amalgamate the crushed ore and lose a little time than to run it to waste. The procedure of cleaning up varies in detail in different mills and has been so often told that only a mere outline is deemed necessary. The amalgam taken off the various plates should be weighed separately. If the daily clean-ups from the outside plates are proportioned with the total clean-up at the end of the month, it furnishes a ready means for the superintendent to approximately estimate how much the mill is recovering each day, so he may know from day to day whether to supply richer ore or to curtail his force to meet expenses at the end of the month. I have an instance in mind where every ounce off the plates per twenty-four hours' run means \$12.50 for the total clean-up; so that one could tell each day just what the mill was doing.

(TO BE CONTINUED.)

U. S. CONSUL-GENERAL RICHARD GUENTHER at Frankfort, Germany, reports that aluminum is now being substituted for wood in the machinery of spinning mills. Aluminum bobbins are replacing the old wooden bobbins. For this purpose the metal is better, as it is not only lighter, but is not affected by variations in temperature nor humidity. As the bobbins are lighter than the wooden ones—five aluminum bobbins weighing no more than two wooden ones—the machines carrying them are able to operate at an increased speed.



## THE PROSPECTOR.

The prospector should remember that there are laws regulating the taking up of mine locations, and these laws for the most part are simple and easily understood. One of the first things with which the prospector should equip himself is a knowledge of the laws governing the location of claims—not only the Federal Statutes, but also the State and local laws of the district in which he is prospecting. While the laws permit him to take up as many claims as he sees fit to locate, the plan followed by some of appropriating a score or more of locations is not a good one, for in most cases the prospector has all he can attend to do the assessment on two or three claims, particularly if the claims are low grade and require a large amount of development to make them valuable. Rarely does the prospector who appropriates all the ground he can locate in a new district sell these claims or any of them to advantage. Generally out of the entire lot there are not more than two or three good ones, and often none of them prove to be valuable. His best plan will be to develop one of the lot—the most promising—and usually this may be determined by the surface appearance of the ground. Most good mines carry an index of the fact in the outcrop. Another point worth remembering is not to scatter the development work too much. Select a promising place at the start and confine work to that place. This need not be at the point of discovery, but anywhere on the claim where the mineral indications are most encouraging. A most important matter is to stake the claim properly and completely, and, if possible, have witnesses to the corners, for, in the event of the property becoming valuable, it is very necessary that the claim be completely staked and that every requirement of the law be observed. This should be done just as soon as it can be decided in which direction the lode strikes, then lay the claim out along the line of outcrop, locating in such a manner that the apex shall lie as nearly as possible along the center of the claim. These things are important in order to secure perfect title to the property and to enjoy the privilege of the extralateral right.

The rock samples from Crown King, Arizona, are: Nos. 1 and 2 greenstone, probably diabase. The dark bisilicate is wholly altered to chlorite, which renders their identification difficult. No. 2 contains considerable finely disseminated pyrite. No. 3 is a siliceous rock, presumably eruptive, though possibly metamorphic sedimentary. The peculiar yellowish green mineral which colors it is epidote, which is derived from the decomposition of chlorite. None of these rocks are ores or have any value. Rarely epidote rocks contain gold when in the vicinity of rich veins, or occur in mineralized zones containing gold.

The small rock sample from Barstow, Cal., is perlite, a variety of volcanic glass. Considerable of this material is found in dikes in the Calico hills northeast of Barstow, particularly near the head of Wall Street canyon, where it occurs in the form of dikes cutting the rhyolite breccia. It is of no value. Numerous crystals of black mica (biotite) are seen in the specimen.

The mineral specimens from Fresno, Cal., numbered 1, 2 and 3, are mica schist, a country rock and not properly vein rock or "matter." These rocks contain a large amount of silica (quartz), and No. 2 exhibits a few scattered crystals of pyrite and may be gold bearing. In Madera and Fresno counties the micaceous schists and slates, from the vicinity of Grub Gulch southward, form the country rock through a large portion of the gold district in that section, and the schists are often found gold bearing in the vicinity of the veins.

## The Sulphur Industry.

The report of the twelfth census of the sulphur and pyrite industry has been completed by the census bureau. The statistics for both sulphur and pyrite have been united in this report in order not to disclose the individual operations of one company engaged in producing sulphur. The following table presents a summary of the combined statistics for these minerals in 1889 and 1902. The expansion of domestic production to meet the increased demand for sulphur and sulphuric acid is clearly indicated:

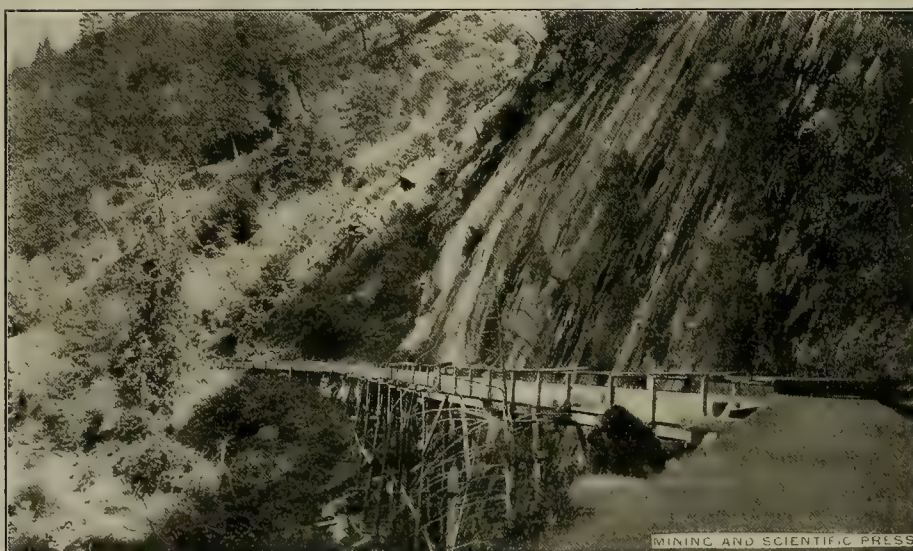
	1902.	1889.
Number of mines.....	23	2
Number of operators.....	18	*
Salaried officials, clerks, etc.....	54	*
Salaries.....	\$49,890	\$5,512
Wage earners.....	970	249
Wages.....	\$398,870	\$64,789
Contract work.....	\$3,587	\$23,103
Miscellaneous expenses.....	\$39,118	\$30,262
Cost of supplies and materials.....	\$217,262	\$43,700
Product:		
Quantity, long tons.....	207,874	105,100
Value.....	\$947,089	\$209,969
* Not reported.		

The table shows an increase in production of over 100% since 1880, and in value of nearly 190%. When the total amount of sulphur consumed (as sulphur, not including pyrite) is taken into consideration, the amount of the domestic production in 1902 was not relatively large, but the steady increase indicates the

substantial nature of the industry. In 1880 the industry was small, only one pyrite mine, with a product valued at \$5000 being reported, but in 1889 the value of the production of sulphur and pyrite was \$209,969. This increased to \$947,089 in 1902. The growth from 1880 to 1889 was greater proportionally, but that from 1889 to 1902 was larger in absolute amount.

## The Rio Vista Copper Mines.

The old Cosumnes copper mine, now owned by the Rio Vista Copper Co. of San Francisco, Cal., is in El Dorado county, Cal., near the village of Fairplay and not far from the Cosumnes river. The company owns forty acres of patented mineral land. The ore is associated with a tongue of limestone, which is included in the granite which forms the greater part of the country rock of the vicinity. The vein is about 30 feet in width at one place, the ore being chalcocite, bornite, and as the secondary products of the alteration of the sulphides, malachite, azurite, etc. The best ore will average, it is said, 15% to 20% copper and about \$10 in gold and silver per ton. The mine is opened by three tunnels, each about 150 feet in length, also a shaft 150 feet deep. The equipment consists of an air compressor and machine drills. The motive power is supplied by water. The Cosumnes river has been dammed and the water flumed for  $\frac{1}{2}$  mile to the mine. The accompanying engraving of the flume illustrates some of the disad-



Flume of Rio Vista Copper Co., El Dorado County, Cal., Showing Contact of Limestone and Granite.

vantages of construction of water power installations in mountain regions. The picture was taken near the contact of the granite and limestone, the differing character of the rocks being plainly evident. The limestone occurs for most part as a series of abrupt cliffs in terraces, the granite disintegrating more readily, forming comparatively smooth slopes, covered with brush and pines. It is the intention of the company to sink a shaft at the end of the lower tunnel and to install a hoist to be driven by compressed air. A. C. Morrison of Fairplay is superintendent.

## Unscientific Geology.

There may be said to be three kinds of geology—scientific, unscientific and judicial. Concerning the last mentioned, G. F. Becker of the United States Geological Survey, in discussing the court decisions in certain mining litigation, remarked, "the difference between scientific and judicial geology has long since been recognized." It may be said that the difference between scientific and unscientific geology is also easily recognized. The following issued by a firm of New York mine promoters is a sample of the unscientific kind. The paragraph is but one of a number that are equally absurd and misleading:

**FISSURE.**—A crevice in the earth's crust, formed originally by the upheaval of a molten mass containing the minerals, which was thrown from the center to the surface. This molten mass, working up and down in the fissure, generally worked the granite walls smooth, and by contraction in cooling a small space was left between the mineralized portion and the wall on each side; this space filled in with sand and other foreign substance, which is called "slickensides," and whenever this is found it is an indication that the vein is a "true fissure" and will widen with depth and also grow richer, on the principle of gravity—the metals being of greater gravity than the balance of the vein matter. Many veins are only a crevice from the surface reaching downward but a short distance, the space having been filled largely by infiltration, consequently liable to end at any point—or, to use a mining term, to "pinch out." A contact fissure is one formed between two different walls; for instance, one wall might be diorite and the other granite.

A definition of a fissure vein, and an explanation of the genesis of ore deposits, more absurd than the above, would be difficult to conceive.

## The Ore Deposits of Bisbee, Arizona.\*

NUMBER II.

Written by F. L. RANSOME.

**COPPER.**—In the native state this metal was not an uncommon constituent of the lower portions of the great oxidized ore bodies worked a few years ago in the Copper Queen mine. According to James Douglas, it was abundant just above the third level at the bottom of the great ore body southwest of the Czar shaft, occurring in masses, some of which weighed several hundred pounds. Native copper is now, however, rather rare in this mine. In the course of the present investigation the metal was observed as small particles in stope 33, just above the third level and about 750 feet northeast of the Holbrook shaft. The ore body at this point is a rich mass of chalcocite and pyrite enveloped in a soft white clay that is evidently derived from altered limestone, and is in part taken down as ore. The native copper occurs as small hackley particles in this clay, associated with occasional specks of cuprite and little streaks of chalcocite. Native copper occurs also in partly oxidized ore, containing residual bunches of chalcocite, in a rich stope between the fifth and sixth levels, about 400 feet east of the Spray shaft. In the Lowell mine it was observed on the 1000-foot level in oxidized ore

near pyrite, and on the 1100-foot level, just north of the shaft, embedded in a ferruginous clay near a body of chalcocite ore which immediately overlies a mass of pyrite.

At the present time native copper is found most abundantly in the Calumet & Arizona mine, particularly on the 950-foot and 1050-foot levels. It is usually closely associated with cuprite, and occurs as a rule in proximity to sulphide ores. On the 950-foot level, about 400 feet southeast of the shaft, the bulk of the ore of a large, rich stope consists of crystalline cuprite bound together into a tough mass by an irregular web of native copper. With the cuprite and copper are associated some limonite and other earthy oxides and a little fibrous malachite, chiefly in vugs.

On the 1050-foot level native copper is abundant as tough, spongy aggregates of small crystals, sometimes encrusting chalcocite and sometimes enveloped in ferruginous clay or earthy oxide ores. It also occurs as thin layers along fissures in clayey, oxidized ground as small, loose crystals, up to 2 or 3 millimeters in diameter, showing the usual modified cubes and octahedra embedded in a soft, earthy mixture of cuprite, limonite and kaolin.

**GOLD.**—This metal occurs free in the Easter Sunday mine, rather irregularly distributed through some beds of light-colored quartzitic sandstone. The bulk of the ore occurs in a bed about 4 feet thick dipping about 55° to the north-northeast, but the mineralization is not entirely confined to this bed. The sandstone has been irregularly fractured, probably during the post-Cretaceous folding, and the resulting small fissures have been filled with veinlets of quartz and calcite. No gold was seen at the time of visit, but it is said to be occasionally visible, usually in little calcite vugs stained with oxide of iron. It appears to have been introduced into the beds subsequent to the fracturing.

Small quantities of placer gold have been obtained from the upper part of Gold gulch. This gold has been derived from the Glance conglomerate, and concentrated in the sand and gravel of the present arroyo. It is not present in sufficient quantity to be of economic importance.

**PYRITE.**—Although not, strictly speaking, an ore,

\* Abstract Professional Paper No. 21, U. S. G. S.



pyrite is here included with the ore minerals on account of its intimate chemical, physical and genetic relationship with them. It is the most abundant and ubiquitous sulphide in the district, and the one of which all the ore bodies, however varied may be their present constitution, originally in greater part consisted.

In the form of small crystalline grains, disseminated through masses of altered rock, pyrite is abundant in the intrusive porphyry mass of Sacramento hill and in the adjacent schists which partly inclose that mass on the east. Associated with the great bodies of copper ore disposed about the porphyry mass in the limestones south of Bisbee pyrite occurs in large quantity. In the upper levels of the mines, where oxidation has been active, it is sometimes found in isolated masses inclosed in envelopes of chalcocite and oxidized ore. In the lower levels it forms extensive bodies, which pass somewhat gradually into altered limestone, in which the pyrite occurs disseminated in small grains, usually of rather irregular outline, and in little bunches and stringers. Of these pyritic bodies only those portions that contain chalcopyrite or chalcocite have proved workable.

With the object of gaining insight into the problem of the genesis of the ore bodies, the pyrite disseminated through the limestone has been studied with some care. Microscopical examination of thin sections shows that its occurrence is nearly always associated with the development of silicates in the limestone, particularly tremolite, diopside, garnet and vesuvianite. In some cases the calcite has been entirely replaced by silicates and pyrite, with usually more or less quartz. In other cases the silicates are lacking, and the limestone has been altered to a mass of quartz and pyrite. The pyrite is contemporaneous with and intergrown with these minerals, and to this fact is perhaps largely due the general absence, in all but the smallest individuals, of that sharpness of crystallographic outline common in pyrite that has been introduced into rocks by processes subsequent to the development of their general texture and mineralogical composition; as, for instance, the cubical crystals of pyrite disseminated through the slaty rocks in the vicinity of many of the mother lode veins in California. The essential contemporaneity of the pyrite and the amphibole, pyroxene and other metamorphic minerals is a very important fact, and will be again referred to in discussing the genesis of the ores.

**CHALCOPYRITE.**—So far as observed in the Bisbee quadrangle, this mineral occurs only in massive form, never in distinct crystals. It is apparently confined to the limestones. Unlike the pyrite, it is rarely met with in a disseminated condition, but when present at all is likely to be accompanied by pyrite and to constitute fairly solid masses of ore. An excellent example of such an occurrence is found in the body of chalcopyrite ore on the seventh level of the Spray mine. Mr. Douglas, in his interesting account of the Copper Queen mine, refers to this mineral as disseminated with pyrite in fine grains through the rock. But of mineralized limestone collected in 1902, only two specimens—one from the third level, about 700 feet southeast of the Holbrook shaft, and one from the face of a new northeast crosscut on the sixth level, which at the time of visit was about 150 feet northeast of the Gardner shaft—show this mineral in disseminated form associated with pyrite, chlorite, and a little sphalerite. It undoubtedly occurs elsewhere in a similar state, but it is certainly not abundant throughout the mass of the pyritized limestone. As an ore-forming mineral, too, it is much less common in the present workings than chalcocite and the various oxidized ores. In addition to the occurrences just mentioned, chalcopyrite was noted on the sixth level between the Spray and Gardner shafts. Here a small body of sulphide ore has been taken out alongside the main drift. A little left adhering to the walls showed minute bunches and veinlets of chalcopyrite in a mass consisting chiefly of pyrite and chlorite. It is also reported in the old Dividend stope on the fourth level of the Holbrook mine.

A little chalcopyrite occurs with chalcocite and pyrite on the 1100-foot level of the Lowell mine and is reported to have been found in bunches within a mass of pyritic ore cut by the shaft at this level. In the Calumet & Arizona mine a little chalcopyrite with pyrite was noted on the 1050-foot level, and the mineral is said to have been met with in the shaft about 50 feet below this level.

**SPHALERITE.**—Sphalerite, or zincblende, is of rare occurrence in the Bisbee quadrangle. In the course of the present investigation it was noted at two places only. One of these is near the Cogswell stope on the third level of the Holbrook mine, where it occurs in little specks with pyrite and chalcopyrite in silicified limestone. The other is in the sixth level of the Gardner mine, where, in a new crosscut northeast of the shaft, small particles of sphalerite are associated with pyrite in altered limestone. Sphalerite also occurs in small quantities with pyrite and galena at the Modern mine, just north of the quadrangle.

**CHALCOCITE.**—This mineral, familiarly known as copper glance, or "glance," is the most important sulphide occurring in the Bisbee quadrangle, since nearly all of the bodies of workable sulphide ore owe their value to its presence. So far as observed, it

occurs only in massive form, distinct crystals being nowhere seen. It is sometimes firm and compact in texture, but is often rather soft and occasionally has almost a sooty character.

In the Copper Queen group of mines chalcocite is found at various depths, but never far from oxidized ore. Its most characteristic place of occurrence is in the irregular zones of rich sulphide ore that usually intervene between masses of lean pyrite and oxidized ores containing cuprite, native copper and carbonates.

In the Copper Queen mine chalcocite was observed on the second level in the Cogswell stope, about 700 feet southeast of the Holbrook shaft. The ore of this stope is a mixture of loosely cohering granular pyrite and chalcocite, the latter occurring in part as dark envelopes about the grains of pyrite. The ore body is surrounded by a soft, white clay which is speckled with pyrite and traversed by little veinlets of chalcocite.

On the third level chalcocite was seen in stope 38,

them, such as lubricators, oil and grease cups, cocks, etc., of all sizes. Neat designs of racks containing various sizes of whistles, injectors, pop valves and a variety of other specialties, lend to make up an exhibit worthy of notice. A new design of water gauge, and oil pump for cylinder lubrication, are features in themselves. Dispersed about the exhibit are pipe fittings of every description, together with whistles, safety and check valves and numerous other appliances.

The large variety of steam goods exhibited by the Lunkenheimer Co., and manufactured by them, necessitates more than a casual glance to thoroughly appreciate the exhibit in all its details.

### A Black Hills Mine and Mill.

The Hidden Fortune M. Co.'s property is 3 miles southwest of Deadwood, S. D., and lies on the west side of the northerly end of the Homestake proper-



Hidden Fortune Mill, Near Deadwood, South Dakota.

about 800 feet northeast of the Holbrook shaft. Here again the ore is a crumbling mixture of pyrite and chalcocite. The country rock, originally limestone, has been altered to a white, clay-like material streaked with chalcocite and speckled with native copper.

(TO BE CONTINUED.)

### The Lunkenheimer Exhibit at St. Louis.

In Machinery Hall building, location, 5 G, block 26, is the unique exhibit of the Lunkenheimer Co. of Cincinnati, Ohio. It is easily identified by a large model of their familiar "valve in hand," which occupies a

prominent corner of their exhibit, as shown in the accompanying illustration. Pyramids of globe, angle, cross, lever and gate valves, of various designs and sizes, both brass and iron, are artistically arranged about the exhibit, and are agreeably offset by a black plush curtain at the side and rear. The glass cases arranged in front of the exhibit contain a smaller class of the goods manufactured by



The Lunkenheimer Exhibit at St. Louis.

Cambrian quartzite occurs wolframite (iron-manganese tungstate), valuable in the manufacture of some varieties of steel. In the search for wolframite O. P. Grantz was disappointed several years ago, but discovered instead a rich pocket of gold, from which he took about \$60,000 in sixty days. This was on the Hidden Fortune claim, and since then considerable development has been done and a mill built 7 miles

prominent corner of their exhibit, as shown in the accompanying illustration. Pyramids of globe, angle, cross, lever and gate valves, of various designs and sizes, both brass and iron, are artistically arranged about the exhibit, and are agreeably offset by a black plush curtain at the side and rear. The glass cases arranged in front of the exhibit contain a smaller class of the goods manufactured by



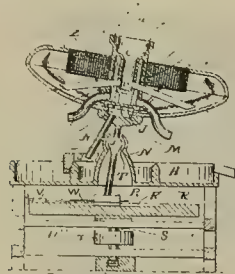
down the canyon and about 3 miles below Deadwood (see accompanying engraving). The ore is treated by cyanide process, the solution being run through the batteries. The mill has a capacity of 250 tons per day. There are several cyanide mills in operation in the Black Hills, but all do not crush the ore in the solution.

## Mining and Metallurgical Patents.

PATENTS ISSUED JULY 12, 1904.

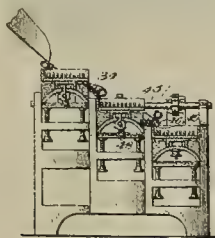
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

CONCENTRATOR.—No. 764,197; C. H. Mubleman, Los Angeles, Cal.



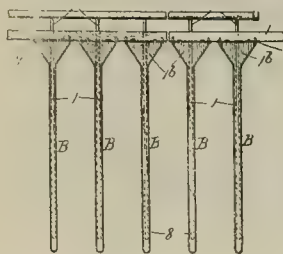
In concentrator, concentrator pan mounted upon shaft; ruffles in bottom of pan arranged in radial rows; and means to give pan rotary gyratory motion comprising bearing for shaft intermediate its ends, in which bearing shaft is revoluble; revoluble wheel having socket into which lower end of shaft projects, socket being at one side of center of wheel.

ORE CONCENTRATOR.—No. 765,042; F. N. Rogers, Denver, Colo.



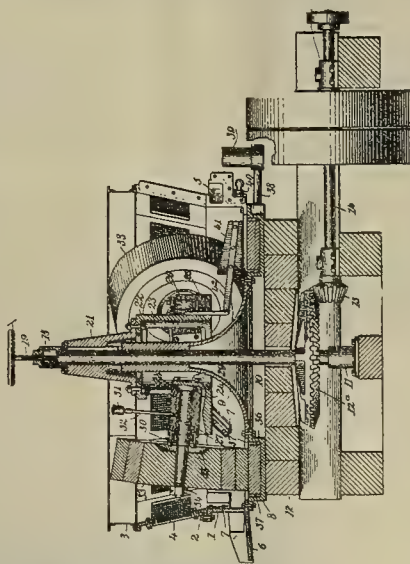
In ore concentrator, combination with independent classifying concentrating surfaces arranged for progressive concentration, of means for imparting impulses to respective concentrating surfaces independently of each other to impart classifying movement to pulp particles, means for taking off desired portions of discharge of more or less classified pulp at every point of discharge thereof in continuous sheet from one concentrating surface and adapted to deliver all of portions of pulp, without intermingling of existing classification thereof, to succeeding concentrating surface so that points of delivery onto succeeding concentrating surface are relatively farther from termination of concentration action on that surface than points of discharge from preceding concentrating surface are from termination of concentration action on that surface, thereby effecting progressive concentration over successive concentrating surfaces.

DEVICE FOR SEPARATING SLIMES IN ORE REDUCTION.—No. 764,973; O. P. Ankeny, Deadwood, S. D.



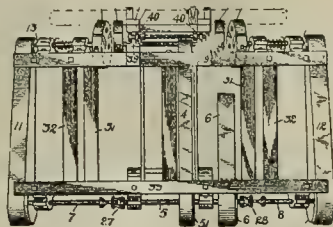
Filtering cell comprising peripheral frame; filtering web folded about one side bar of frame covering two opposite sides thereof and lapped over edges of opposite side bar for inclosing cell; plate outside opposite side bar; bolts which bind it to side bar with edges of canvas grasped between plate and bar for securing them to latter, frame having other bars interposed between opposite sides of filtering web having edges grooved and covered by web; U-shaped clamps striding grooved bars engaging grooves and sinking web thereinto, opposite ends of clamps extending through plate and provided with slots above latter and tapering keys adapted to be driven in slots to force clamps into grooves.

ORE CONCENTRATOR.—No. 764,979; S. Beer, Butte, Mont.



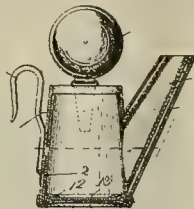
In ore mill, pan, driving shaft extending vertically through pan, hub surrounding shaft, cap on hub, screw operating in cap and engaging top of shaft for moving hub vertically, cylindrical part attached to hub and having side openings, cheek pieces extended outward from sides of openings, bearing boxes mounted to rock in cheek pieces, and rollers having shaft bearings in bearing boxes.

CHAMFERING MACHINE FOR MAKING MINE TIES.—No. 764,820; T. B. Price, Cresco, Pa.



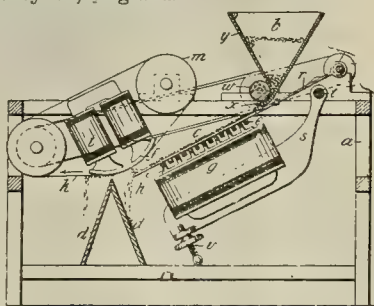
In chamfering machine, pair of cutter heads arranged to cut parallel grooves, and additional pair of cutter heads arranged in oblique positions with first pair of cutter heads, second pair of cutter heads being arranged on sliding shafts, springs arranged on shafts to hold them to outer part of courses, and additional cutter heads arranged to be drawn inwardly in operation of machine.

MINER'S LAMP.—No. 764,700; G. Anton, Monongahela, Pa.



Lamp for burning tallow, wax or like, comprising outer shell of metal having relatively low coefficient of heat conductivity, and inner shell of metal having relatively high coefficient of heat conductivity, each of shells comprising body, bottom and wick tube or spout, bottom of outer shell having flange and raised portion, forming annular groove or recess receiving lower edges of body portions of shells, and bottom of inner shell having depressed portion seated on raised portion of bottom of outer shell, and flange projecting into groove or recess and crowding lower edges of body portions of shells outwardly toward and against flange of bottom of outer shell.

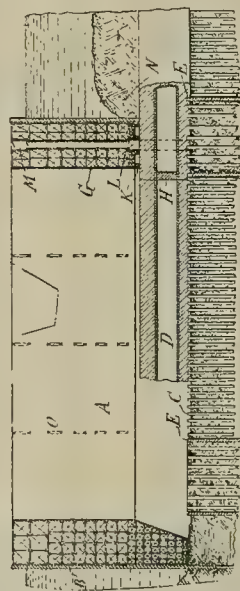
MAGNETIC ORE SEPARATOR.—No. 765,013; F. J. King, Croydon, England.



Magnetic separator comprising set of magnet bars for sorting material, and another set of curved mag-

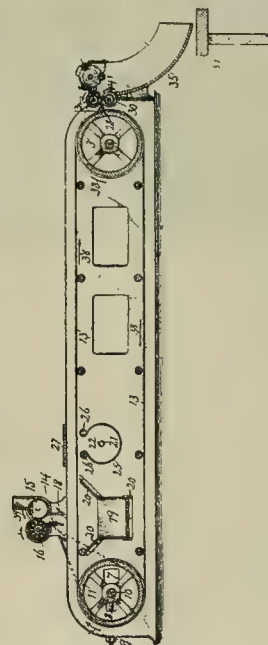
net bars at right angles to first set and overlapping lower end of first set for purpose of separating sorted material.

TUNNEL OR LIKE CONSTRUCTION.—No. 764,797; E. Diebitsch, New York, N. Y.



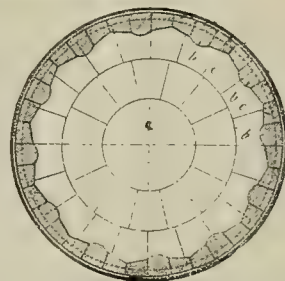
In building of artificially supported submarine tunnel or like, process which consists in sinking caisson, building artificial support from within caisson, and building tunnel on support.

MEANS FOR TREATING PIECES OF MICA TO PREPARE THEM FOR ADHESIVE UNION WITH EACH OTHER OR WITH OTHER ARTICLES.—No. 764,811; C. W. Jefferson, Schenectady, N. Y.



Machine for treating scales or pieces of mica or similar material to prepare them for adhesive union with each other or with other articles, consisting of support for pieces, heating device and means for producing relative movement between support and heating device to enable support and pieces resting on same to be within sphere of heating device but without coming in contact with same, whereby adhesive on surface of pieces may be caused to adhere to surface.

CYLINDER FOR BALL MILLS.—No. 764,715; G. Descamps, Mons, Belgium.



Cylinder for ball mills provided with rows of lining stones having bulged heads and intermediate opposing rows of lining stones arranged in pairs and having straight beveled faces, to form V-shaped valleys.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
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## ALASKA.

The Brown-Alaska Co.'s copper smelter, at Coppermount, on Prince of Wales island, opposite Ketchikan, will blow in about August 1, says S. I. Silverman, part owner. The smelter and mine are being connected by a Bleichert tramway, with capacity of carrying fifty tons an hour. The smelter will have a capacity of 400 tons a day. The company is composed of B. D. Brown of New York, E. H. Morrison of Fairfield, Wash., and S. I. Silverman. The Cleveland, Ohio, people, who own a property on the island, have resumed work and have developed to a depth of 150 feet. They claim to have a ledge 50 feet wide, averaging 6% copper. At Copper mountain, on the opposite side of the island, work is being done by Mellon & Reynolds. A Pittsburgh, Pa., company is finishing a 250-ton smelter, which will be completed this fall, says Silverman.

H. A. Starkey, of Juneau, of the Bauman Gold Dredging Co., has men at the mouth of Gold creek, sampling the bar with a view to putting in a gold dredger. A dredge intended for Windham is enroute, and will be set up at Gold creek, says the Dispatch.

## ARIZONA.

### Cochise County.

D. Collard, superintendent of the Gold Nugget M. Co., which owns property near Bowie, in the Dragon mountains, says he is arranging for a mill to handle the ore from the Gold Nugget on the ground, and to do away with the expense of shipping to El Paso smelters. The Gold Nugget owns seventeen claims in Immigrant canyon and four in Apache pass. The company has 250 tons of ore on the dump, which carries gold. Over 800 feet of development work has been done. The mill will have five stamps, each weighing 1050 pounds, and will be placed below the mine, where there is plenty of water for all purposes. A concentrator will be used. It will cost \$3 to mine the ore and get it to the mill, and \$1.50 more to run it through the mill, says Superintendent Collard. Besides gold the ore carries lead and silver values.

### Maricopa County.

Platt et al., of Prescott, have bonded the Ryland copper property, near Wickensburg, for \$40,000, for eighteen months.

### Mohave County.

W. A. Mensch, at Stockton Hill, manager of the mines of the Enterprise M. Co., says it is intended to put in a steam hoisting plant and pumps. Twenty-five men will be worked.

Hoffman Bros. have completed the wagon road from the Roger Boy mine to the Samoan mine, near Chloride, and are putting in a hoisting plant.

### Final County.

(Special Correspondence).—Development work will be resumed on the Lucky Boy claim in the Saddle Mountain district this week. A strike of gold-bearing quartz was made on this claim. Douglas parties are interested in the claim.

D. W. Guardham is at work on a promising claim in the Saddle Mountain district.—J. Evans is developing a lead property up Gila river, about 10 miles above Dudleyville.

Dudleyville, July 18.

### Yavapai County.

G. D. Mortimer, superintendent of the Rincon mines,  $\frac{1}{2}$  miles from Martinez, says the mines are improving. There are 3 feet of ore in the Dixie ledge which is said to run \$16 per ton. A small pumping plant is being put in. Twenty men are at work. Power drills have been put in. The Welcome is ready to stop. The 1-stamp test mill is running.

Men are at work taking out the steam stamps and putting in five 850-pound gravity stamps in the mill for the Monica G. M. Co., near Kirkland. A 15-ton cyanide plant is also to be put in. The process of treating the ore will be straight amalgamation and cyanide. A gasoline pumping plant to pump water 2000 feet from a well for the works is being put in. Ore is blocked out. T. M. Earnhart is manager of the Monica Co.

## CALIFORNIA.

As soon as the Louisiana Purchase Exposition officials, at St. Louis, Mo., furnish the necessary water and power the stamp mill erected by California in the mining gulch will begin operations. The mill has three stamps. The fair officials have also agreed to supply the gold quartz. This will come from various States. It

will be operated afternoons. California will also show a hydraulic giant in operation. One of these has been set up in the State's outdoor mining space near the mill. It has a 3-inch nozzle. There is no gravel bank for it to tear down, but a stream will be thrown 200 feet from it against a bulkhead. One of the features of this exhibit will be a demonstration of how easily one man can handle the powerful giant, turning it in any direction with ease, controlling it with the use of the hand. A rotary mill and three concentrators are also to form part of the California outdoor mining exhibit. The entire exhibit covers half an acre.

### Alameda County.

The American Magnesite Co., of Oakland, is preparing to develop and work magnesite claims in Alameda and Santa Clara counties. The property of the American Magnesite Co. includes twenty-six claims. The claims in Cedar mountain district in Alameda county are: Stillwell magnesite lode, Virginia magnesite lode, Reed claims, Dassonville, Dead Horse and Virginia claims. Those in the Red Mountain district, Santa Clara county, are: Merchant, Old Man, White Cap et al. The Board of Supervisors of Alameda county is said to have appropriated a sum of money this year to build a road to the magnesite mines.

### Amador County.

The Fremont-Gover (Fremont Con.) mine, near Amador City, which has remained closed for the past three months, due to a strike of union miners, is being reopened with non-union men. The imported miners numbered forty-eight. They were brought into the county within a few miles of Ione on a special car and thence in teams to the mine. At the Fremont-Gover mine, a barb wire fence was put around the entire property after the strike began. Electric lights are used at night and watchmen are employed. No union men are allowed on the premises, while the imported miners are boarding at the mine.

### Butte County.

The Wyandotte M. & M. Co., incorporated this spring, has on the mine a 5-stamp mill, and as development progresses more stamps will be added. There is an abundance of water and timber and it has good transportation facilities, being only 8 miles from Oroville on the railroad, from which a road runs to the mine. In addition to water, electricity can be secured for power, as the Bay Counties Power Co. line is a mile from the mine. The pay streak is being opened up. The board of directors of the Wyandotte M. & M. Co. are: A. Anderson, H. W. Zilmer, J. T. Stanton, J. Loeffler and C. Miller. August 1 the stamps will start crushing quartz and more miners will be put on.

### Calaveras County.

Last week the vein of the Voinich mine at Bear mountain, west of Angels, was cut into by the shaft which is being sunk. The shaft is all in vein matter and the ore carries sulphurets and free gold, said to assay \$20 in free gold, exclusive of the sulphurets. The shaft is down 461 feet, it being intended to sink to 500 feet before crosscutting. At the 500-foot point a station will be cut and stopes opened and the extraction of ore for milling will be started. In the meantime a 30-stamp mill will be built, preparations for which are under way.

### El Dorado County.

Work has been resumed at the South Slope gravel mine, near Placerville, owned by A. S. Bosquit & Sons. The shaft is down 100 feet and will be put down 30 feet farther before crosscutting the channel is started. The mine is equipped with a steam hoist and pump.

The Ida Mitchell mine at Placerville continues work steadily. The 300-foot level has been reached, with a record of 75 feet for the past month. The average made is  $2\frac{1}{2}$  feet per day with a set of timbers put in every other day. The ledge shows a width of 32 feet, says Manager Jackson. A. M. McDonald is superintendent.

### Nevada County.

B. Wilkins, managing director of the Idaho-Indiana mine, at Grass Valley, has men at work repairing the pipe line and machinery, and says he expects to have the workings unwatered in four months. An electric pump will be put in.

The Ben Franklin mine, beyond the Bullion mine, near Grass Valley, is reported increasing developments. White Bros., who own the property, have done considerable work on the ground during the past few months and have taken out high-grade milling ore. They are arranging to put in a pumping and hoisting plant, preparatory to sinking 200 feet.

H. Huckins, owner, says the Quartz Quarry mine at North San Juan has been bonded to D. Nagle of Oakland, represent-

ing a Colorado company, for \$150,000. Operations will start this month and Huckins will have charge of the work. He will reconstruct the bridge across the North Yuba river at the mine, that was carried away by the high water last winter. Then he will resume sinking the shaft and will crosscut to the ledge.

Sinking has been resumed at the Bullion mine, near Grass Valley. The shaft is being sunk 200 feet and Superintendent Mainhart will open up two more levels below the 1300.

### Plumas County.

La Porte advises say that fire destroyed the buildings and machinery of the Bellevue tunnel near La Porte on the 17th inst. and imprisoned four miners who were at work in the tunnel. As no cave occurred, the men were readily brought to safety when the flames subsided. The compressor plant, blacksmith shop and other buildings were destroyed and the loss is estimated at \$10,000. The tunnel has been in course of construction to relieve the mining shafts of water that impeded development. The Thistle shaft filled faster than the pumps could remove the water, and the tunnel—3 miles in length—was run to take off the water. When the shaft was reached the floor of the tunnel was found to be several feet too high and men were lowering it when the fire broke out. The mine is in charge of C. B. Wingate.

### Santa Clara County.

A number of cinnabar and manganese mining claims in the Red Mountain mining district, east of Mount Hamilton, east of San Jose, have been conveyed by the Martel M. Co. to the American Manganese M. Co. of Oakland.

### Shasta County.

The Mariana Marsicana M. Co. proposes to improve its plant at Sunny Hill, near Redding. A quartz mill and cyanide plant are to be built.

J. E. Frick of Berkeley is reported, with San Francisco men, to have appropriated 40,000 inches of water to be taken from Rising river and Crystal lake, both tributaries of Hat creek, at a point 60 miles east of Redding, and used for producing electrical power. Work on the plant will start this summer.

The camps around Bully Hill (De Lamar) are reported active. At the smelter of the Bully Hill C. Co. there are two furnaces going at this time, when there never has been but one before. The second furnace was completed some months ago. After it was blown in the old one was cleaned and repaired. The railroad is being built to the Anchor mine from the smelter at De Lamar. The plans for the road provide for its extension to Copper City, a distance of  $1\frac{1}{2}$  mile from the Anchor mine. It is also said the railroad will finally be extended down the Pit river to connect with the Southern Pacific Railroad at Kennett.

### Tuolumne County.

(Special Correspondence).—At the Draper mine, near Soulsbyville, the 7-inch plunger pump recently got out of order and the water rose above it. Air was then turned into a small sinking pump. This failed to work, and a man sent to repair it dropped the cover into the shaft and the water rose and covered this pump also. A diver was secured from San Francisco who went down the shaft into a depth of 105 feet of water, removed the door, took a chip from the valve and replaced the door. He found the pump working when he came to the surface.

Soulsbyville, July 19.

Folcher & Divoll at the Hiapoo mine, near Columbia, are setting up an air compressor and hoist.

Ten men are kept at work at the Republic mine, near Columbia, and Superintendent Wilhelm has the 4-stamp mill pounding steadily, running through thirty tons of ore per day. He reports he can mill \$1.50 ore at a profit. It is intended to increase the milling facilities.

The Birney Wainwright claim on Bald Mountain, near Columbia, is idle, but operations will be resumed by August 1, says the Banner. Of the raise, started last season, 60 feet remains to be driven.

## COLORADO.

### Chaffee County.

The Turret district is shipping regularly to the Salida smelter, with prospects of an increase in output this summer, says the Post. Climatic conditions permit work the year round. Superintendent E. E. Briggs of the Mascot properties put additional men on the Copper King, the Vesper and other mines. The Copper King is said to contain a large body of low-grade copper ore. Engineer R. W. Huck will begin work on a concentrating mill for the Copper King. He has drawn up plans and specifications.

### Clear Creek County.

(Special Correspondence).—The Colo-

rado Central group on Leavenworth mountain, under supervision of M. Tong, is turning out its usual amount each month. This property has been one of the heaviest producers in the district in the past, and from the ore that is now in sight it is good for a number of years.

Some distance up the gulch from the Colorado Central, and 5 miles from Georgetown, is the Sidney tunnel, which is owned and operated by the East Argentine T. M. M. P. & T. Co. in the Argentine mining district. This company owns 400 acres and several thousand feet of development work has been done. They are laying a 2945-foot pipe line for developing power for their plant. Machinery will be installed for operating the mine, but they have not yet decided on the make of drills to be used.

Two miles from the Sidney is the Kitty Ousley and Tobin tunnels on the eastern slope of McClelland mountain. These properties are being operated by the Waldorf M. & M. Co. The Tobin tunnel is in 1200 feet on the lode. Work is being done under contract by L. Chiara. Electric drills will be added to the plant. This tunnel is 12,500 feet above sea level.—I. H. Stoll has the contract for sinking a shaft on the Kitty Ousley. In the bottom of the shaft he has struck a flow of water and a Cameron pump has been put in to handle the water.—The Waldorf company is putting in electrical power on its property for use in its mines.

The Stevens mine and mill are 8 miles from Silver Plume on western slope of McClelland mountain. This mine has 3 miles in tunnels and has produced \$3,000,000. They are putting 100 tons of ore through the mill per day. This property is owned and operated by the Waldorf company.

The Wilcox tunnel, which is being driven through McClelland mountain to connect with the Stevens mine, is in 3000 feet and being driven under contract by P. Hector at the rate of 6 feet per day. Power drills are used. When completed the tunnel will be 9200 feet in length. Thirty-seven veins have been cut in driving the tunnel the 3000 feet. Twelve of the veins have been developed to show up the ore. This plant is equipped with an eight-drill compressor. All of the property of the Waldorf company in the district is under the supervision of C. L. Tingle.

About  $\frac{1}{2}$  mile from the Wilcox mine is the Vidler tunnel, which is expected to cut through McClelland mountain into Summit county, and to be used for railroad and transportation purposes. It cuts the mountain under Argentine Pass, formerly used as a stage road between Georgetown and Leadville. This pass is 13,500 feet above sea level and said to be the highest wagon road in the world. It is the intention of Manager R. C. Vidler of the tunnel to extend the Colorado & Southern Railroad from Georgetown, a distance of 10 miles, on through the mountain to Keystone, making connection at that point with the railroad to Leadville.

Georgetown, July 17.

Work is being resumed on the property of the New York & Colorado G. M. Co., on Breckenridge mountain, 2 miles above Empire. The company has a tunnel site, in addition to several lodes, all of which will be cut by the tunnel. During the past winter work was suspended. The tunnel has been driven 100 feet and small streaks of mineral have been cut. However, no drifting has been done. The veins show values in gold and copper. C. H. Morris will be in charge of operations.

Work on the Vice-President property on Sherman and Brown mountains, near Georgetown, is being resumed. This mine is operated by a tunnel, the mouth of which is under the Seven-Thirty and running in a parallel direction. It has been closed down for several years on account of litigation.—The New Era M. Co., which has a number of claims in Grizzly gulch, is doing considerable development work. A tunnel has been driven 2000 feet and a number of lodes have been cut, carrying values in gold, silver and copper.

C. I. Burt, interested in the Vulcan group of mines at Silver Plume, states he expects to resume operations this week. The Vulcan is contiguous to the Pay Rock, Snowdrift and other producers.

### Dolores County.

The San Juan Ore Co., lessees of the Pro Patria M. & M. Co.'s mine and mill, near Rico, has millmen at work remodeling the mill and putting in Frue vanners. Work at the mine is progressing satisfactorily and the force of miners is being increased.

Men are excavating and grading for a pipe line from the water supply tank above the Group tunnel, near Rico, to a point 700 feet down the mountain, where a power station is to be built. The vertical fall of the water will be 300 feet. The



pipe used will be 12, 13 and 14 inches in diameter. A 6-foot tangential water wheel will be put in and the power transmitted to the mill by cable. The change from steam to water power will mean a saving of \$25 per day to the lessees of the mill, says C. D. Hooper, who has charge of the plant.

E. A. Thayer of Denver, of the Rio Dolores M. Co., is reopening the Sydney group of mines (formerly the Government group), on the western slope of C. H. C. hill and adjoining the Rio Dolores Co.'s properties on the south, near Rico. J. W. Winkfield is superintendent.

The Intrinsic G. M. & M. Co. owns six claims on Sambo hill, or northeastern slope of Expectation mountain, viz.: The Sambo, Intrinsic, Lake View, Gulch, Mt. Wilson and Trust, covering fifty acres of mineral ground near Rico. Two of the claims are patented. The officers of the company are D. Swickhimer, R. Mylerain, A. V. Gorla, J. H. Goodknight and T. R. Thompson, the last named being superintendent. It is intention of the Intrinsic G. M. & M. Co. to extend the main tunnel on the Sambo claim into the mountain to intersect a known fissure and then raise an approximate distance of 75 feet to the contact ore body in an upper level. This tunnel has reached a horizontal depth of 600 feet and it is estimated the vein will be struck within 400 feet.

#### El Paso County.

The Portland mill, at Colorado City, which treats the ore shipped from the Portland mine, at Victor, is resuming operations after having been closed down for several weeks. Delay was made in starting up the mill, as the management desired to get a reserve tonnage on hand to lessen chance of having to close up the mill again. The Portland mill handles 8000 tons per month, although about 1000 tons more can be treated if necessary. Some of the ore, it is said, goes to the smelter for treatment. The Portland mill is owned and operated by the Portland company, and treats only Portland ore. The Portland mine is employing 480 men, and is producing 325 tons per day, or a total of 9750 tons per month, said to average \$30 per ton.

#### Fremont County.

The co-operative plan of mining coal adopted by the Cuckoo Coal M. Co., near Florence, is reported proving a success, says the Times. This company bought the Cowan mine and sold interests in it to miners for \$100 per share. These certificates run for twenty-five years when they are taken up for cancellation. The mine is worked on a union basis, eight hours a day, 20% increase and no company store scrip. The miners are profit sharers.

#### Gilpin County.

A six-months' option has been given to G. W. Adams on the Hall lode, near Russell Gulch, for \$12,000. The lessee contracts to sink the shaft, at present 130 feet deep, another 100 feet, and to drift 50 feet each way in the 120-foot levels. The milling ores range from two to four ounces gold per cord, while the smelting ores run \$50 per ton.

At Idaho Springs the Jackson concentrating works has been leased for one year to G. K. Kimball, and will be used for the treatment of ores from the Old Town mine in Russell Gulch.

The Jumbo Mountain M. Co. has been organized to enter Rollinsville section by Idaho Springs parties. They have taken up a group of claims and two mill sites on the west slope of Jumbo mountain in Independent district and have started a tunnel to cut the group at depth. F. M. Noonan is in charge. Decatur, Ill., parties are interested in the Pioneer group in Moon gulch, which is being developed through a tunnel, now in 375 feet. It is intended to erect a milling plant before fall. Centerville, Ia., parties are interested in the Mountain Monarch Co., operating in Gambell gulch, and developments progressing under management of F. Augustus. The main tunnel is in 450 feet; work has been temporarily suspended there, but will again be resumed. Drifting is in progress on a blind lead and they are crosscutting from the Chieftain vein for the 12-foot vein. There are 5 feet of the Chieftain ore in sight. The main tunnel of the Swiss Co. in Moon gulch is in 525 feet, and another contract for 50 feet is to be let.

#### Gunnison County.

The Camilla M. Co., with D. H. Moffat et al., of Denver, interested, is carrying on developments 2 miles east of Sherrod, across the divide. A. A. McKnight is superintendent. The company has put in a mining plant and started a 3000-foot tunnel into Pomeroy mountain. It is in 330 feet, and at 1500 feet the manager expects to cut the main vein at a depth of 1000 feet. The company owns twenty-four lode claims.

The compressor from the West Moun-

tain power house and the boiler from the Silver Basin shaft are being transferred to Ohio creek to be placed for running the tunnel through the Gold Links and Demurrers groups, near Pitkin. This tunnel will be 5½ by 7½ feet in the clear, and will be run at least 2000 feet, cutting several known veins before reaching the Sacramento-Corydon vein at a vertical depth of 1000 feet. J. F. Pearson is in charge of the work.

#### Lake County.

One result of the exploitation of the northern and western slopes of Big Evans gulch at Leadville by the Fryer Hill M. Co. through the Harvard and Pride of the West shafts, has been a renewal of interest in the properties lying to the west of those shafts, says the Carbonate Chronicle. Near the Pride of the West and to the northwest is the Cady shaft of the Progressive M. Co. Exploration has been continued there with a few men under Manager Butler. A short distance northwest from this property is the Oolyte M. & I. Co. group of claims, including the Tabor, Zoo, Oolyte and Bush claims. The Oolyte Co., composed of Leadville men, secured control of the four claims named and is preparing to carry on development. H. R. Pendery is vice-president of the company and G. E. Eason, secretary. The group is northeast of the Poverty flat section, due north from the Little Chief and near the Progressive hill mines. It is believed that it will not be necessary to sink the shaft more than 250 feet to strike the ore horizon. The old shaft on which the company has done some work in the past few years is in good condition.

#### San Juan County.

The two drifts extending from the bottom of the Esmeralda shaft, near Silverton, measure 200 feet each and are in ore of from 5 to 6 feet in width. No ore is being broken, the work being done for development only. The shaft, which is 225 feet deep, will be put down 100 feet deeper. Superintendent Glanville has twenty-four men at work.

#### San Miguel County.

The Mayflower G. M. Co. has completed overhauling of the Philadelphia 10-stamp mill at the head of Bridal Veil falls, near Telluride, on which it has a lease for treatment of Mayflower product. Pack trains are carrying mineral from this company's property, in Bridal Veil basin, to the plant, says Manager E. L. Davis of Telluride.

The Smuggler-Union M. Co. at Telluride, B. Wells manager, whose properties were closed last month, due to the labor situation, has a few men working in its mines in Marshall basin, and a portion of one of its mills at Pandora—2 miles above Telluride—continues to operate on Smuggler-Union ore. It is understood the men in the mines are breaking down and taking out ore which had been stripped and left standing in the vein on the ninth level and removing broken mineral from the chutes and manholes in other parts of the property. Reports say that portion of the Smuggler-Union mines which has been operated by the company will be leased. It is also said that, in the event of the mines not being leased, the company will resume operations inside of two months on a more extensive scale than heretofore. A few men will be kept on development meanwhile, says Manager Wells.

J. & G. Wagner, who have a lease on the Smuggler, Sheridan and Union dumps, and the 76 claim in Marshall basin, properties of the Smuggler-Union Co., near Telluride, are preparing to send down over the company's tramways enough mineral to regularly supply thirty stamps of one of its mills at Pandora. They expect to keep seventy-five men at work.

#### Summit County.

(Special Correspondence).—From the Wilcox and Vidler tunnels in East Argentine to the top of the range is 2 miles. From the top of Argentine Pass can be seen Gray's and Irving's peaks, and 4 miles down the valley is the mining camp of Argentine, formerly called Decatur, and then changed to Rathbone. (See illustration page 56). The Continental Divide is crossed at the top of the pass. In the "amphitheater," or "horse shoe," some prospecting is being done. W. Farager of Georgetown has a lease on some property in the "shoe" and is shipping high-grade ore. The second grade ore is said to run \$1.25 per pound. —J. Robinson, owner of the Bonnie Bell, has a tunnel on his property 400 feet in length and taking out ore.

W. B. Le Wald, manager of the Ohio M. Co., is operating the Ohio and Pennsylvania mines and mill. (See illustration page 56). This company owns 215 acres. He is running a drift from the Ohio to cut the ore bodies of the Pennsylvania at a depth of 250 feet. The Penn-

sylvania is an old producer. At present he is running the dumps through the mill and is turning out eight tons of concentrates per day. He is putting in a steam plant to enable them to operate through the winter. A two-bucket tramway is being erected from the Ohio to the mill. Ore bin capacity will be increased. On the Ohio they have a crosscut in 800 feet, which cuts the Pennsylvania at 360 feet, and by running 750 feet farther they will cut twelve more veins from 700 to 1500 feet in depth. The company is owner of water rights on Snake river, North Fork and Bear creek, capable of generating several hundred horse power. They will install an electric power plant.

Argentine, July 17.

(Special Correspondence).—Four miles around the hill from Argentine is the camp of Montezuma. (See illustration page 56). This camp is capable of producing a large amount of zinc if the mines were worked. A. L. Jourdan has shipped several tons of zinc concentrates, which run from 47% to 50% zinc and 15 to 20 ounces in silver. This was taken from the dump of the Belle mine.

W. F. Parker, manager of the Glacier Mountain M. & M. Co., is putting up a small test mill for handling ores from its mines. He states he will put in 1500 feet of 15-inch pipe line and a water wheel.

One-half mile down the creek from town is C. H. Campbell operating the Fisherman G. M. Co. He has one tunnel on the property on Bear mountain 635 feet in length and is taking out a good grade of mill dirt. He has a 5-foot streak that he says will concentrate three tons into one. The ore carries zinc, iron, lead and some gold.

Montezuma, July 17.

(Special Correspondence).—The Summit M. & S. Co. are opening up good ground in the upper workings and have about 600 feet of development work. The mill will be overhauled and put in shape to treat the zinc ores. This property has been the main producer of the district. On account of the smelters not requiring sulphide ores, they are unable to ship as much as the mine is able to produce. E. E. Byron is manager.

The Delaware M. & M. Co. on Elk mountain, and adjoining the Summit county, is shipping 30 tons per day.

Kokomo, July 17.

(Special Correspondence).—W. E. Thorne, manager of the Oro Grande Placer M. Co., is getting the plant ready for operation. To reduce the lift he has added another flume. The lift was formerly 102 feet from the bottom of the pit. It is now 76 feet. By reducing the lift the capacity of the plant has been increased about 30%. The company expects to put in a power plant at junction of Rock and Boulder creeks and the Blue river, where they have a good water supply.

Dillon, July 18.

The King Solomon T. & Dev. Co., at Frisco, will improve its water power and open up its placers in addition to increasing work on its main tunnel. In this tunnel they expect to cut a body of high-grade ore in the next 250 feet.

#### Teller County.

The St. Patrick M. Co. of Scotland has bought the St. Patrick mining claim in Victor.

G. Jordan, who last summer treated the tailings of the Summit dump by cyanide process through the Summit mill, which he converted into a cyanide plant, has resumed operations on the balance of the tailings. His plant is small, ten tons being treated daily.

J. Wright, formerly leasing on the Thompson claim of the Elkon Co., who has a lease on the Zenobia and Ajax claims on Beacon hill, Cripple Creek, has started operations.

Assistant Secretary C. Fitch of the Mine Owners' Association, says the association had last week issued 3700 recommendation cards to miners and engineers since April 1st last. Since June 8th there has been issued 1100. It is a compulsory measure adopted by the association, and unless a man has such a card showing that he is all right, both as to character and ability, work is forbidden on any of the association mines, and now all mines are governed by the association. He stated there were about 350 applications on file which had not been acted upon. If all of these were reported upon favorably there would be not less than 4000 men carrying cards in the district. The camp never had more than 4000 men, so it would seem as if the usual number of men were at work.

Harrison & Seaver, on the W. P. H. mine, on Ironclad hill, Cripple Creek, sent out 1000 tons of ore during the month of June, which gave an average value of \$55 in gold per ton, or a gross production of \$55,000. The vein varies in width from 4 feet to 15 feet. This ore is being

mined between the second and third levels, and Harrison & Seaver are employing twenty men.

The Blue Flag G. M. Co., operating on Raven hill, Cripple Creek, is preparing to put in more machinery, including a compressor, boiler and hoist. A shaft has reached a depth of 150 feet and it is intended to cut stations every 100 feet as depth is attained, from which points levels will be run.

F. Finnegan of Colorado Springs, owner of the Savage claim, north of the Mabel M., on the east slope of Beacon hill, Cripple Creek, says he will resume operations on the property. The shaft on the Savage claim has been sunk to 340 feet and some lateral work done.—Beacon hill is a lively section of the camp, and at the present time it is estimated the west slope, along which are to be found the El Paso, C. K. & N., Old Gold, Henry Adney and Lonaconing, is sending out a trainload of ore per day. There are said to be several owners who are contemplating either giving leases or starting up on personal or company account.

Though June was a short month, owing to closing down for a week on account of the Independence depot disaster, the production for the month indicates that more men are at work than formerly, and that the payroll was as near to the normal as the production. A disbursement of \$460,000 was made in the district, says the Cripple Creek Times.

The El Paso Con., on west slope of Beacon hill, Cripple Creek, shipped out 900 tons of ore during June which gave average values of \$110 in gold to the ton, says the Times. The ore is being mined exclusively from the third level, although there is ore on every level. Manager Bainbridge is working 125 men. Men are being put to work crosscutting from the seventh and eighth levels. They will crosscut for the ore bodies found in the upper levels. After this work is completed the sinking of the shaft will be resumed.

## IDAHO.

#### Blaine County.

W. Shakespeare at Carrie Town, on the Little Smoky river, near Hailey, is reopening the Carrie Leonard and the Fisher groups of mines, on which he has lease and bond.

C. M. Schwab of Pittsburg, Pa., has closed his option on a majority interest of the Minnie Moore mine, says the Hailey Times. I. E. Rockwell, who unwaters and reopened the mine after it had been closed for years, retains an interest and will continue in charge.

The Miles group of claims, near Muldoon, near Hailey, is reported improving. It is the eastern extension of the Muldoon claim, being between it and the Argosy group. It shows a 6-foot vein of lead carbonate and galena between well-defined walls, and a shaft 33 feet shows ore. The group consists of four claims and is owned by J. J. Plumer, T. Miles and J. J. Baker.

#### Boise County.

The claims on a fork of Alder creek, bonded by the Overlook M. Co., will be worked. They will place the mill, now at Neal, on the property. The mill has a capacity of fifty tons daily. The company will dig a ditch from West creek to the properties.

The men who are ground sluicing in the old Banner mill, near Idaho City, for quicksilver and amalgam report getting 125 pounds a day, a portion of which is silver amalgam. About a month will be required to complete the work.

#### Idaho County.

L. C. Van Riper, manager of the Wendenhoff mine at Big Creek, 35 miles from Warren, has work under way on the mill and cyanide plant. A 20-stamp mill will be put on the Empress mine.

W. H. & W. C. Colwell and J. Downall of Tampa, Florida, are reopening their mining properties on War Eagle mountain, near Warren. A hand power drill is being used. The properties consist of six claims on north slope of War Eagle mountain at head of Grouse creek 7 miles from Warren. A tunnel has been driven on the John D. claim. Work will be done later with an electric drill.

#### Owyhee County.

The Homestake mine, near Silver City, has been leased to S. Longfellow, and men under M. White have begun development work in sinking and putting up buildings.

#### Shoshone County.

During June the Bunker Hill & Sullivan mine at Wardner shipped 6000 tons of concentrates and ore, said to be the largest monthly shipment ever made from a single mine in the Cœur d'Alenes.

Under E. P. Spaulding, sixteen men are working on the Monarch group of claims, near Mullan, which had lain idle for several months. Preparations are being made to ship ore from the 300-foot level.



There are 40 feet of ore. Since work has resumed it is thought a shaft will be sunk on the ledge. Many of the claims that now compose the Monarch group were formerly known as the Barton group. In the Monarch group are fourteen claims, which are 4 miles east of Murray.

The Ruth M. Co. on Nine Mile, 2 miles from Wallace, will begin a lower tunnel August 1. It will put in a compressor. Among the principal stockholders are O. Wallace, J. McLaren and D. Genoway.

#### Washington County.

A strike is reported on at the Ladd Metals Co. smelter and mines at Mineral. The muckers and topmen went on a strike against a reduction of wages, and the miners walked out in sympathy with the movement. Manager McDowell says the wage scale proposed for the muckers and topmen is the same as was in force last summer. The winter wages of this class of workmen was voluntarily raised by the company, and that now the old scale will be adopted. It is reported that the company has suspended operations indefinitely with the hope of eliminating ill feeling said to exist among the workmen, and with a further view of ridding the camp of an undesirable class of people.

### MONTANA.

The annual report of B. H. Tatem, assayer in charge of the United States Assay Office in Helena, for year 1903, has been issued, showing total production of the State \$50,276,355, an increase of \$3,315,188. Gold and silver being computed at coining rate for each and the copper and lead at the year's average price, the production was as follows: Gold, fine ounces, 222,066,236; value, \$4,590,516.31. Silver, fine ounces, 13,224,004.22; value (coining rate), \$17,097,702.43. Copper, fine pounds, 213,076,628; value, at \$13.325 per cwt., \$28,200,691.72. Lead, fine pounds, 9,144,313; value, at \$4.237 per cwt., \$387,444.54. Total, \$50,276,355. The increased market prices paid for copper and lead stimulated the production of these metals. Silver shows a decrease of 400,000 ounces from the 1902 output. The average price paid for electrolytic copper (the Montana product being of that kind) was \$13.235, against \$11.626 for the preceding year, while the price for lead was \$4.237 against \$4.069 per cwt. in 1902. Copper is the principal feature of the mining industry in Montana. More than 80% of the total values won in the State during the year 1903 came from the mines of Silver Bow county, around Butte, in the shape of copper, gold, silver and some lead.

The production of gold and silver by counties was:

Counties.	Gold, Fine Ounces.	Silver, Fine Ounces.
Beaverhead	3,969,473	154,918.39
Broadwater	3,958,546	61,940.24
Cascade	712,929	261,339.56
Choteau	3,412,940	5,992.90
Deer Lodge	3,418,615	12,463.21
Fergus	54,734,690	12,010.39
Flathead	2,225,004	110,132.61
Granite	9,170,293	1,429,456.30
Jefferson	12,312,621	237,362.81
Lewis & Clarke	22,399,156	143,050.37
Madison	30,257,680	128,301.78
Meagher	400,520	88,008.38
Missoula	4,285,954	1,035.78
Park	9,992,864	3,350.53
Powell	3,272,344	20,396.43
Ravalli	706,490	2,193.50
Silver Bow	48,800,775	9,811,544.69
Returns from custom smelters, mints and assay offices, impossible to classify by counties.	8,844,781	746,596.37
Totals	222,066,236	13,224,004.22

The sources of gold and silver were divided thus:

	Gold, Value.	Silver, Value.
Placer dust	\$ 481,446.65	\$ 3,321.71
Mill bullion	1,033,862.75	1,912,448.72
Cyanide bullion	1,315,767.94	154,918.39
From copper ore	1,250,881.12	11,225,913.60
From lead ore	123,056.95	582,209.47
From smelting ore	375,500.91	3,319,207.43
Totals	\$4,590,516.32	\$17,097,702.43

By counties, the production in fine pounds of copper and lead was:

County.	Copper.	Lead.
Beaverhead	118,755	506,540
Cascade		950,348
Broadwater		4,000,040
Flathead	15,500	48,709
Granite	245,000	329,971
Jefferson	57,500	72,969
Lewis and Clarke		79,613
Madison	6,200	630,000
Meagher		28,068
Ravalli	210,933,785	209,500
Silver Bow		
Custom smelters in addition to the above not possible to classify by counties.	1,732,888	1,387,329
Totals, pounds	213,106,628	9,144,313

The diminished yields shown for copper and smelting ores was governed largely by a lower percentage of the metal contained in the ores mined and by local conditions within the State, which necessitated closing down on several occasions of the prominent producers. During 1903, the prosperity of Butte, the largest mining camp in the State, was interrupted on two occasions. The first was the closing

down of some of the principal producers early in July to permit of the finishing and connecting of the new flue and stack of the Washoe smelter at Anaconda. The second was caused by mining litigation which caused a cessation of work at the mines and smelters of the Amalgamated Co. from Oct. 22 to Nov. 11, and was remedied by measures passed by the Legislature.

#### Deer Lodge County.

J. Ducie of Anaconda has bought the Nelson interests in the Montana mine at Georgetown for \$2000. The shaft of the Montana mine is down 65 feet. A vein has been exposed. The hoist has already been put up and the shipping of ore will be begun this week.

M. Johnson of Anaconda, part owner of the Long Spring mine in Moose Lake district, reports that a strike of lead and silver ore has been made. Development work will be increased. The other owners are J. J. Harper and J. Long of Anaconda. Assays show a value of \$100 per ton in lead, silver, gold and copper.

Mining is reported improving around Anaconda. Work is ready to begin at Danielsville on the group of mines bonded for \$60,000 by Eastern men, and under direction of Manager F. Murphy. The Danielsville M. & M. Co. is also doing work. At Georgetown, Cable and the Southern Cross district work will again be going full blast. The Blue Eyed Nellie district will be worked as usual and ore shipped from the mines.

#### Fergus County.

G. A. Wells, part owner of the sapphire mines at Yogo, near Utica, says the mines south of Great Falls supply 90% of the watch jewels of the world. There are seventy-five men working in the mines and the output is increasing. The stones are blue and are shipped to London in the rough state for cutting and sale. During the past year the company's sales were \$300,000 worth of sapphires. These Montana sapphires are used largely in the manufacture of watches for the reason that the smaller pieces are about right for such purposes with but little cutting and practically no waste, says Wells.

#### Granite County.

J. W. Haggerty of the Montana G. M. Co. of Butte says it is proposed to resume operations at the Sunday mine at Royal, near Phillipsburg. A stamp mill will be built.—The Gold Reef properties on South Boulder creek, which were closed down last fall owing to lack of water for milling purposes, will resume operations this month. Manager L. U. Loomis states that the mill and equipment of the Mary Jane Co. at Boise, Idaho, has been bought by him and will be moved to the Gold Reef. The plant will be operated by steam power and will be set up about 2 mile from the mines.

#### Madison County.

The Green Campbell Con. M. Co. has been incorporated to work the Green Campbell and several other adjoining claims in the Silver Star district. The Green Campbell was formerly worked to a depth of 200 feet. No attempt has been made to open the property in later years, work at present being confined to the Edgerton and Eagle claims, on which the company has a bond and lease. A shipment of fifty tons is being made from these claims to the Watseka mill at Rochester for test purposes. An incline shaft on the Edgerton has been extended from a depth of 90 feet to 260 feet. It will be continued 100 feet deeper. Twelve men are working under Superintendent B. C. Leyson. On the Green Campbell is a tunnel 1000 feet long, opening the vein at a depth of 100 feet. E. B. Howell of Butte is president.

On Mineral hill the Bozeman group, owned by J. McKitterick of Pony, has been bonded by J. Miles et al. of Pony and J. J. Cusick of Butte. Operations will be increased.

The Duncan Bros. 10-stamp mill on Norwegian gulch has been leased to Micklejohn & Wishom, and started up last week on ore taken from properties in Norwegian district, near Pony. It is intended to make a cyanide test of the Norwegian ore, and if these tests prove satisfactory, a plant will be built.

#### Powell County.

C. S. Loring has shipped the machinery of his concentrating plant from near the Silver King mine of Park City, Utah, to Emery, 9 miles from Deer Lodge. He expects to have his mill in operation on his Emery holdings by next month.

#### Silver Bow County.

Butte reports to the Daily Mining Record give the following figures showing the net earnings of the Butte mines for the year ending June 1, 1904, as compared with the previous year. The figures are complete for the district, with the exception of the Hypocra M. Co., one of the

Heinze corporations. When that company makes its report the total net earnings are expected to equal those of last year. The showing is considered good in view of the fact that the Anaconda mines were closed down for a long time last year and later all the mines of the Amalgamated sub-companies also suspended operations for three weeks or more.

	1903.	1904.
Boston & Montana	\$4,053,465	\$4,574,408.12
Anaconda	1,601,200	1,259,875.91
Butte & Boston	202,410	10,853.48
Parrott	586,365	233,064.68
Colorado	43,090	74,833.35
Colusa-Parrott	245,785	244,794.00
M. C. P.	601,250	459,113.30
Johnstown Co.	106,765	80,113.26
Speculator		223,737.63
Goldsmith Mine.		111,500.73
Allice		4,045.07
Lexington		637.00
Miscellaneous	1,450	1,643.97
Totals	\$7,441,800	\$7,345,010.34

\* Listed this year as the Original M. Co.

Butte reports say the Parrott M. Co. has brought suit against F. A. Heinze et al. in the District Court to recover the sum of \$2,200,000 and costs. The suit was brought to force Heinze and his fellow defendants to pay for ore which they are charged with taking from the Little Mina mining claim of the Parrott company. It is charged that the defendants entered the Little Mina ground by means of the workings of the Nipper claim.

### NEVADA.

#### Esmeralda County.

The Goldfield Mohawk M. Co. has been incorporated under South Dakota laws to develop three claims at Goldfield known as Mohawk Nos. 1 and 2 and Slim Jim Fraction, which adjoins the Combination, Jumbo and Red Top mines. The officers are: H. Ramsey, G. Wingfield, H. H. Brown, G. S. Nixon, J. H. Forman, A. C. Eisen, A. D. Myers. Four leases have been granted on the group.

#### Eureka County.

W. C. Rose, of Hamilton, says he has suspended work on the Hamburg mine on Prospect mountain, near Eureka. He had four men sinking a shaft and was down 70 feet.

#### Lincoln County.

Caliente reports say J. Weiser of New York has an option on J. Hullicks Sun Set group of claims, 3 miles north of Bitter Springs and 14 miles south of the San Pedro right of way, between Moapa and Las Vegas ranch. Assay reports show \$16 free gold from ore taken from the group. A 3-foot ledge is showing at a depth of 60 feet on the May Day claim, and a 23-inch ledge on the New Year's claim in the same group, but on another contact carrying gold and silver values. Weiser also has an option on the Never Sweat salt mines, 16 miles east from the Sun Set group, which will be developed. All that is restraining development is the lack of railroad facilities, which will be overcome when the San Pedro shall have reached a point half way between Moapa and Las Vegas ranch.

#### Nye County.

The Liberty mine, near Tonopah, under management of W. C. Wynkoop, is being developed. The shaft has been continued to a depth of 258 feet and drifts have been run for 200 feet west on the 145, 200 and 258-foot levels, the vein varying from 6 to 8 feet in width and averaging \$30 per ton in silver (in form of chloride) and \$1 per ton in gold. This vein is in line dipping at an angle of 43° toward a porphyry and lime contact. A main hoisting shaft will be started and a steam hoist set up. Plans for a mill are being formulated. Water is at hand, but crude oil will be used for fuel. High-grade ore has been sacked from development work.

Superintendent F. B. Work reports progress in development of the Hannanah mine, 18 miles east of Tonopah. During June he extended the drift 52 feet, the last 4 feet showing 10 inches of ore carrying a sprinkling of ruby silver.

#### Storey County.

Fire starting in the rope house of the Union mine at north end of Virginia City last week caused a loss of \$125,000, destroying the entire hoisting plant. Through the Union shaft, the Scorpion and Sierra Nevada mines are worked. Miners were at work in the mines at the time. Their only escape was through the Union shaft. The engineer remained at his post until the last cage was hoisted and no one was injured. Superintendent A. J. McDonell says the plant will be rebuilt.

### OREGON.

#### Grant County.

(Special Correspondence).—The Copperopolis C. Co., at the annual stockholders' meeting at Portland last week, elected the following directors: W. W.

Gibbs, M. A. Butler, A. C. Lindsay, H. W. Prettyman, of Portland, and M. Marks of Omaha, Neb. W. W. Gibbs is president. The company's property is in Quartzburg. Operations are progressing. Quartzburg, July 19.

Addition of stamps to the Dixie Meadows mill, near Prairie City, will be made. The ore mined there with higher values is very hard, being a bluish quartz. It is said that stamps will be put below the two sets of rolls now in use, using the gyratory breaker, roll-jaw breaker and ruffing and finishing sets of rolls for the first crushing and the stamp batteries for the last. As originally designed, the Dixie Meadows plant was a concentrator, and calculated to save on plates but little of the free values. Ore is delivered to a No. 2 gyratory breaker, where the size was to be reduced to about 1½ or 1-inch pieces, and thence to a roll-jaw breaker, where ½-inch product was expected. The first set of rolls, which have been run at about 350 revolutions, next received the ore, and the finishing set, running at 650 to 750 revolutions, brought the product down to 10 to 20 mesh. The pulp passed over plates immediately below the batteries and thence to concentrators. A Huntington mill was put below the rolls as a finishing grinder, and by means of it the management was able to increase the output materially, and would continue work steadily but for the excessive abrasion of the faces of the rolls.

G. J. Barrett and G. L. Lindsay have a bond on the Wolverine group on Boulder creek, 4 miles from Granite. The Wolverine group contains three claims and a millsite, also a water right in connection. W. H. Robinson is owner. There are two veins reported on the property, one 2½ feet wide and the other 8 feet wide. These veins are 100 feet apart and have been proved up on the surface by open cuts for 700 feet, showing values in free gold. They are preparing to sink a shaft on the principal vein, and after the veins are more thoroughly prospected a tunnel will be started to open up the ledges in depth.

Granite reports say the Comstock mine, ½ mile from the Red Boy, has been sold to men who will increase development work. W. J. Keough is in charge of the mine. The vein will be drifted on both ways from the crosscut and a raise run to the surface.

The Middle Fork Electric Power Co. has been organized at Prairie City for installing an electric power plant on the middle fork of the John Day river, to generate 700 H. P. to be used for lighting and operating the Dixie Meadows mine and other purposes. The officers are: R. C. Reese, F. Newman and V. C. Belknap.

#### Baker County.

A. M. Paul, superintendent of the Imperial mine, near Sumpter, says a mill will be put on the Imperial this summer.

#### Jackson County.

Men are at work getting out timber for a complete rebuilding of the Shorty Hope mine shaft, near Ashland, from the surface down to the Golden Spike level. This will be a two-compartment shaft. A station will be made at the intersection of the Shorty Hope crosscut and necessary machinery placed at this point for sinking several hundred feet on the ledge, which is nearly vertical. It is intended that the shaft repairs will be completed and sunk to the Golden Spike level before the tunnel reaches the intersection.

#### Josephine County.

W. C. Slade, who has a placer mine on Johnson gulch, a tributary of Sucker creek, near California Bar, near Grants Pass, reports he has also located a 4-foot ledge of gold-bearing quartz on his placer claims. He has found indications of quicksilver ore deposits. A find has been made on Sucker creek, near California Bar, by J. Burnett. He has two ledges running parallel.

Grant's Pass reports say a 5-stamp mill and equipment, formerly used at the Granite Hill mines, are being moved across the gulch to the Red Jacket claim of the Granite Hill Co. The mill is replaced at the Granite Hill by a 10-stamp battery, with four Frue vanners. The new mill has begun operations. The Red Jacket claim has several ledges of from 2 to 6 feet width, carrying values. It is intention of the American G. F. Co. to operate the Red Jacket separately, but later in conjunction with the Granite Hill. As development proceeds, the two will be united, says Superintendent Wickersham.

#### Wallowa County.

A. J. Murphy et al. have organized the New York C. M. & M. Co., to operate a group of copper claims on Snake river, 1 mile from the Eureka group, near the mouth of the Imnaha river, near Imnaha. The men are largely of Lewiston, Idaho. It is intended to open the property rapidly.

A. P. Lester of Joseph of the Tender-



foot M. Co., and manager of the interests of the Badger M. Co., reports work progressing. President E. R. Tripp of the Tenderfoot is arranging for a 20-stamp mill complete, including a cyanide plant, for that mine, and the machinery is to be delivered and set up this year. Lester says the Tenderfoot and Badger are on the north slope of the Wallowa (or Eagle) range and 20 miles from Joseph. The district is on the headwaters of the Imnaha river, at the mouth of which is the Imnaha copper district. Though on the Imnaha, the properties find their outlet through Joseph, and thence to the O. R. & N., and Lester says it is proposed to ship out a small quantity of ore this year to the smelter. To do this there will be a 90-mile wagon haul, then a rail haul on the narrow gauge road from Elgin to La Grande, thence over the O. R. & N. to Baker City, and then the Sumpter valley to Sumpter. It will have to be \$50 rock to pay this haul, but both the Tenderfoot and Badger can output some this year. The ore carries gold values. Preliminary to building the mill and starting heavy work, the companies have spent approximately \$20,000 on wagon roads connecting the new district with the wagon roads of Wallowa county.

## SOUTH DAKOTA.

### Custer County.

The Extreme M. & M. Co. is operating its mine and mill, 3 miles from Custer, with satisfactory results, says the Review. The mill has ten stamps, amalgamating plates and concentrators. The concentrates are being held for shipment to a smelter.

The Ruberta M. Co., whose superintendent is W. W. Olds of Custer, expects to have its 10-stamp mill running next month. A cyanide plant will be used for treatment of tailings following amalgamation.

### Lawrence County.

A bar of gold bullion, value \$11,000, was shipped last week by Superintendent O. B. Ansdren from the Clover Leaf mill at Roubaix, as a result of seven days run of the 60-stamp mill.

The Custer Peak M. Co., near Custer's Peak, near Terry, has its hoisting machinery set up and expects to resume sinking next month. The plant consists of a 75 H. P. boiler and single drum hoist. The shaft is 75 feet deep and will be continued several hundred feet, making cross-cuts at intervals.

The Dakota M. & M. Co. proposes using electric drills at its mine near Portland. Negotiations have been under way for securing electrical transmission line. The Belt E. L. & P. Co. has such a line to the Lundberg, Dorr & Wilson plant near Terry, and it is stated the company will continue this line to the Dakota property. The object of the company in adopting electric drills is chiefly to avoid the necessity of building a power plant on its property. Such a plant would require a larger amount of water than the company has available at present. The Dakota company's cyanide plant at Deadwood is in complete running order and all of its stamps are dropping.

The Globe G. M. Co., operating near Lead City, proposes to build a mill at its group of mines. Contract has been let for 40,000 feet of drilling on the property of the Deadwood Standard G. M. Co., near Cyanide, in the Ragged Top section west of Lead. The work will be done with a churn drill.

Superintendent O. N. Brown says the Spearfish mill, at Spearfish, is treating from 6000 to 6500 tons of ore each month. A day's run at the plant is about 250 tons. Some time is lost each month through necessary shut-downs while the rolls are being shelled or other repairs made. Clean-up is made twice a month.

### Pennington County.

The Rochford district, both east and west, is receiving attention this season, according to Deadwood reports. In the Hornblende camp, 4 miles west, the Black Eagle M. Co. is completing a 10-stamp mill. The company has a vertical vein of free milling ore 30 feet in width that assays \$6 in gold. The property adjoins that of the Golden West M. Co., which is also a producer. The Black Eagle M. Co. is capitalized by Indiana men. It is expected the Golden West Co. will build a 50-stamp mill on its property this season. The company has a large vein of free milling ore.—A strike of free gold ore has been made by J. Craig et al. east of the Cochran mine. A strip 40 feet in width and several hundred feet in length is said to pan at the surface \$3 a ton. A tunnel was run in, which cut the vein.

J. Cochran, who owns the mine 3 miles west of Rochford, is preparing to start his Huntington mill. A year ago his property was bonded to Eastern men, who made first payment, and while sinking the shaft deeper the vein dipped out of sight and the property was abandoned.

The owner has since crosscut from the bottom of the shaft and found the vein. The vein is said to be 75 feet in width, carrying free milling gold values.

## UTAH.

The following statistics of the metal production for the calendar year 1903 are shown by the annual report of B. H. Tatem, assayer in charge of the United States assay office at Helena, Mont. The value of the gold, silver, copper and lead was the largest in the history of the State—detailed as follows:

	Quantity.	Value.
Gold, fine ounces.....	237,233.844	\$ 4,905,092.38
Silver, fine ounces.....	19,571,766.99	25,304,910.83
(coining rate).....		
Copper, fine pounds, at \$13.235 per cwt.....	33,552,692	4,440,698.79
Lead, fine pounds, at \$4.237 per cwt.....	109,765,257	4,650,753.94
Total.....		\$39,301,455.94

The total output being an increase of \$11,419,302 over the value of 1902 output.—By counties, gold and silver was divided as follows:

	Gold.	Silver.
	Fine Ounces.	Fine Ounces.
Beaver.....	1,336.000	296,027.00
Box Elder.....	6,100.000	7,280.00
Iron.....	3,102.320	24,410.30
Juab.....	44,837.867	4,565,950.19
Plute.....	22,262.600	67,109.14
Salt Lake.....	57,327.157	3,215,252.84
Summit.....	24,325.290	8,810,850.12
Tooele.....	68,029.195	732,279.97
Utah.....	250.000	200.00
Washington.....	520.000	15,752.64
Impossible to classify.....	8,593.472	1,834,834.79
Totals.....	237,233.844	19,571,766.99

As to sources the output was:

	Gold.	Silver.
	Fine Ounces.	Fine Ounces.
In quartz and dry ores.....	11,037.230	976,692.04
In cyanide mill bullion.....	99,036.355	80,709.92
In lead ores.....	35,048.941	11,258,323.91
In copper ores.....	80,190.617	6,271,815.55
In milling ores.....	11,080.701	984,231.34
Totals.....	237,233.844	19,571,766.99

The larger gold output is traceable to the expansion of mining operations in Bingham district, Salt Lake county, where a rapidly growing copper production includes a proportionate increase in gold and silver extracted from ores in which they are associated with copper. The Tintic (Juab county) and Park City (Summit county) districts, by increased values of these metals contained in the lead ores from their mines, have also contributed to the advance in production of these metals and the steady output recovered by the cyanide process continues.

The copper and lead output of the State was by counties:

	Copper.	Lead.
	Fine Pounds.	Fine Pounds.
Beaver.....	732,085	6,005,694
Juab.....	8,214,216	16,492,984
Salt Lake.....	16,689,132	3,680,976
Summit.....	3,797,101	79,453,945
Tooele.....	1,658,208	3,391,234
Utah.....	1,811,626	100,000
Washington.....	650,324	1,100,424
Custom smelters in addition to the above not possible to distribute by counties.....		
Totals.....	33,552,692	109,765,257

### Beaver County.

The Horn Silver mine of Frisco is maintaining a steady output of ore carrying values in copper, silver and lead. The copper ore shipped is said to average 25% copper. Considerable development has been done in the mine recently and satisfactory disclosures made.

### Grand County.

The pump with which the gold-bearing bars of the Big Six M. Co. at Dewey, on the Grand river, have been equipped, is raising 2000 gallons of water per minute from that stream, and with this washing the gold out of 500 cubic yards of gravel daily, says Manager Cato. While the equipment thus far is but a unit in that which is projected, the future of the Grand river placers will be influenced largely by results with which the initial plant shall be operated. While it has required some time to set it up, the plant thus far consisting of a 30 H. P. engine and pump, has been inexpensive, the entire cost being \$4100. For 80 miles along its course the stream is said to have been profitably panned.

### Salt Lake County.

It is reported the copper plant on the Jordan river, near Salt Lake City, is reported sold to the Utah Fuel Co., for \$100,000. With the plant, which has been idle for twelve years, is included ninety-four acres of surrounding land. It is said the structure will be used as steel works.

R. Rodgers, general superintendent of the Bingham Con.'s system of Bingham mines, says the main tunnel in the Dalton and Lark group is going ahead on the strike of the Miners Dream ledge, the tunnel having penetrated the zone for 6500 feet with 1700 gallons of water per minute issuing from its mouth. The Dalton and Lark shaft is also dropping down

again with the next level to be established at 1200 feet. From the Dalton and Lark and Commercial groups Superintendent Rodgers is forwarding 250 tons daily, with this to be increased.

T. R. Jones of the ore purchasing department of the United States S. Co. at Salt Lake City says his company will enter the market for lead ores August 1. Jones has been making contracts with producers for some time past. While the new lead plant is not yet ready to go into commission, it is the intention of the United States Co. to get a good supply of ore on hand before the plant is blown in, which will be in September.

It is stated that H. M. Crowther, manager of the Continental-Alta mines at Alta, has a lease on the tramway between that camp and the outlet into the valley, and that under him its repair and re-equipment will begin this month. The Continental-Alta Co.'s mines have a large volume of ore awaiting an outlet such as the tramway may be made to provide. There are heavy tonnages awaiting its reopening in other properties.

Over the tracks of the Copper Belt railway in Bingham section, there is being moved daily with the mills and smelters as its destination 1500 tons of ore and yet patrons on the route are calling for more rolling stock, says Superintendent Van Housen. The principal customers are the Boston Con., the Commercial, the Utah Copper, the Yampa and Ohio, with others of smaller output, while the up-freight to the United States company's properties and others on the route is large.

### Summit County.

Negotiations for the consolidation of the Comstock and California mining companies at Park City are said to be pending. The apex question has come up between the two companies and if they do not consolidate there is said to be possibility of a lawsuit.

The new pumps and machinery on the Silver King Con., at Park City, have been put in operation, and as soon as the water in the mine is lowered sufficiently, operations on a larger scale will be started underground. The shaft, which is down 700 feet, will be sunk to the 1000-foot level.

### Utah County.

F. B. Many of Cleveland, O., part owner of the Dutchman mines, in American Fork canyon, near American Fork, says they propose to equip the group with a mill this season. During the past year the management has done 600 feet of tunneling and built a sawmill. W. J. Holden, vice-president of the company, is in charge at the camp.

## WASHINGTON.

### Chelan County.

The Larica gold mine at Blewett is reported working seventy-five men and milling 140 tons of ore a day. J. D. McIntyre is manager. The mine is equipped with a 20-stamp mill, cyanide plant and an aerial tram. It is said to be the intention of the company to add twenty more stamps to the mill.

### Okanogan County.

The Oversight mine, near Chesaw, has been bonded to Superintendent H. Thompson of the Interstate Co. and others. One payment has been made. Work will be increased. The Oversight is on Copper mountain. A shaft has been started near the center of the area.

### Stevens County.

J. Wolff reports a strike on the Ruby group, one-half mile northeast of the Cleveland mine, 18 miles northwest from Springdale. Chloride of silver was found in an incline on the ledge. The Ruby group comprises three claims, and is owned by S. Emerson, J. Wolff, M. C. McGrogh and J. McMinis. Two shifts are sinking an incline which is 50 feet deep. The vein is a contact, between diorite and lime. The ore is gold, copper and silver. A strike of a 3-foot ledge of gold ore is reported made on the Muldoon mine, 3 miles from Marcus.—A 4-foot ledge of gold ore has been opened up on the McMillan mine, near the Muldoon, said to run one ounce in gold per ton. D. Clark of Spokane has a bond on it and is working two shifts. Eastern men are said to be negotiating for the Big Bear property in same district, owned by Portland, Or., people.

## WYOMING.

### Crook County.

It is reported the operators in the oil fields of Wyoming have been given a decision by the Commissioner of the General Land Office at Washington, holding that they can enter on the sections in each township set apart for school purposes—sixteen and thirty-six. The school sections near Moorcroft have accordingly been entered, and on some of them prospecting is under way.

## FOREIGN.

### BRITISH COLUMBIA.

#### Boundary District.

The British Columbia C. Co. of Tate has been doing diamond drilling at the company's Mother Lode group of mines in Deadwood camp. A body of iron ore was found in the Primrose claim, one of the group, and holes are being put down from the 300-foot level of the Mother Lode mine.—Work has been discontinued at the Breyfogle mine, in Summit camp, one of a number of iron claims, on which work had been done for some weeks past. On an adjoining claim, the No. 37, under bond to the Granby smelter interests, development and shipping continues with favorable results.—P. J. Dermody of Phoenix will develop his mining interests up the west fork of Kettle river.

At the Providence mine, near Greenwood, preparations are being made to put in a complete electric equipment, by Manager D. McIntosh. It is said the Elkhorn, adjoining the Providence, and owned by P. McDonald and J. Sutherland, will also install an electrical equipment. Power will be taken from the Cascade power lines.—The Great Northern graders have opened up bodies of ore on a number of claims near Phoenix, thereby assisting in the development of the properties, as well as affording convenient transportation as soon as the railway line is completed and the properties are ready to ship.

Electrical energy is being utilized as motive power at the British Columbia C. Co.'s Mother Lode smelter at Greenwood. The power is used to operate the blowers for the two blast furnaces. The Cascade W. P. & L. Co., Ltd., built a pole line from the Phoenix substation to the smelter, 5 miles, to supply the necessary 800 H. P. The entire works, including the newly installed two stands of converters, will use electrical power. The 50% copper matte will have the waste blown out by the converters till it is 98% pure, containing only copper, gold and silver values. The refining will be done in the East. Till recently the matte was sent to the Tacoma smelter for converting. The converter will run but one shift until new furnaces are added. It is also said plans are under way for extension of the electrical line to the Mother Lode mine, 3 miles west of Greenwood, where steam power is being used to operate the drills, hoists, pumps and ore crushers. It is also said that as the electrical power can be delivered at one-third or one-quarter the cost of steam power the Boundary Falls smelters will some time this year arrange for using it, as it is but 3 or 4 miles down Boundary creek from Greenwood.

#### Cariboo District.

Johnson & Fry have found a deposit of scheelite in the Willow creek region of Cariboo, says the Journal of Ashcroft.

#### Nelson District.

Near Ymir the Drummer group, at the head of Hall creek, is starting operations. J. A. Turner of Nelson is interested.—There are seven mines steadily producing in Ymir district, being the Ymir, Wilcox, Hunter V., Fern, Queen, Arlington and Second Relief.

It is reported that the Leo G. M. & M. Co., which owns seven crown-granted claims on Hall creek, near Ymir, will start systematic development this year. A. J. McMillan of Rossland is president of the company.—Peterson Bros. have started work on their placer lease on the Salmon river. They have ½ mile of the river, starting 2 miles above Porto Rico siding. They are putting in flumes and sluice boxes.

The Ymir mine at Ymir is reported producing at the rate of \$16,000 a month. Last month the forty stamps ran twenty-nine days and 2950 tons of ore were crushed, producing 789 ounces of bullion. The estimated realizable value of the product is \$8450. Two hundred and twenty tons of concentrates were shipped, of a gross value of \$6250. The cyanide plant treated 2900 tons of tailings, producing bullion valued at \$1100. The sundry revenue made the total receipts of the Ymir mine for the month \$16,700. Working expenses were \$15,000. There was expended on development during the month \$1690.

#### Rossland District.

At the Cliff mine, at Rossland, Superintendent Angus has men at work on the No. 1 glory hole, from which initial shipments of ore will be quarried. It is near the north end of the claim, and the vein is 11 feet in width. The second glory hole is being opened lower down on the vein.

Sixty men will be added to the War Eagle-Centre Star working number at Rossland when the extraction of milling ore reaches its maximum. Continuous shipments of second-class ore at full capacity will begin August 1. The ore is



already being stopped. The combined mines are employing 220 men. Six to eight machine drills will be required on milling ore. The complement for six machines is twenty-four miners and as many more laborers. At least a dozen extra men will be employed about the mine and surface in the handling of second-class ore. Milling ore will be extracted largely from the upper stopes in both mines.

The machinery is being set up, says F. Demuth, superintendent of the White Bear Co. at Rossland, referring to the work in the concentrator. Twenty stamps are in place, and ten more are on the way. It is expected to have the concentrator running in August. The 350 H. P. electric motor is set up, and the wires are being connected. When the mill nears completion they will start unwatering the mine.

F. Dietzsch, consulting engineer of the Giant M. Co., near Rossland, says plans are formed for rehabilitating the company and increasing development. Reduction works may come later, depending upon the results of development. Dietzsch will make tests in magnetic separation as applied to Rossland ores.

Seven hundred and fifty miners' inches of water on Sheep creek, near Rossland, has been taken up by the Le Roi M. Co. for concentration purposes, says Manager J. H. Mackenzie. He asks permission to divert the water specified at a point 1/2 mile below Silica, on Little Sheep creek, returning it at or near Sheep Creek station, or Patterson. The difference in altitude is 250 feet and a flume and dam will be used. The notice states that the land on which the water will be used is that on which a concentrator will be built.

#### Slocan District.

Slocan ore shipments for the first six months of 1904 are in excess of same period last year by 1000 tons silver-lead and 300 of zinc, says the Rossland Miner. Further increase is expected in Sandoz camp. The total amount of ore shipped from the Slocan and Slocan City mining divisions for the year 1903 was 15,200 tons. Since January 1 to June 25, 1904, the shipments have been as follows:

	Tons.
Alamo	290
Blue Bird	43
Black Prince	43
Charleston	60
Chapleau	43
Cinderella-Medford	175
Comstock	200
Enterprise	340
Fisher Maiden	30
Hamlet	390
Idaho	100
Ivanhoe	1,305
Last Chance	216
Lorna Doone	40
Ottawa	241
Payne	1,273
Rambler	480
Red Fox	61
Reco	577
Ruth	255
Slocan Star	746
Sovereign	41
Sunset	288
Wakenfield	80
Fifteen others	216
Total tons	7,563

Seventy men are at work at the Slocan Star mine, at Sandoz, says B. N. White, of Spokane, Wash., manager. The mine is shipping 500 tons of silver and lead ore and 600 tons of concentrates to the smelter each month. The ore assays 96 ounces in silver and 55% lead.

The Rockland group of three copper claims, 4 miles south of Silverton, has been sold to Eastern men, W. W. Spinks of Vernon, B. C., and F. Watson of Spokane, Wash., retaining an interest. They have put eighteen men to work and it is intended to increase development during this summer, and next spring decide on a reduction plant. A tunnel to crosscut the ledge at a depth of 300 feet will be started. A compressor will be put in. The mill is 2 1/2 miles from the Canadian Pacific railway.

#### Yale District.

Copper prospects are reported near Ashcroft on the main line of the Canadian Pacific Railroad, out from Vancouver. J. D. Sword says the largest exposures of ore are on the Transvaal group, which consists of several claims. The Transvaal group is under bond to S. Curtis of Rossland and J. D. Sword and considerable development work will be done. From the nature of the ore a large amount will be smelted direct, the balance being concentrated. Power will be obtained from Eight Mile creek and transmitted electrically to the mine. The ore carries azurite and malachite. The coal fields of the Nicola valley, which are 40 miles distant, and to which railway construction will find no engineering difficulties. South of the copper district are deposits of iron which carry small percentages of copper and which will be valuable as fluxes for the Highland valley ores.

American capital is reported interested in the cinnabar mine on Hardie mountain, near Savonas, on the main line of the Canadian Pacific railroad. Men have been sent there to develop the claims,

R. G. Tatlow of Vancouver is interested. Coal Hill camp, in Kamloops district, about 250 miles from Vancouver, on the main line of the Canadian Pacific railway, is being opened up.—F. Lunderwood and W. E. Thomas of New York, of the British Columbia C. Co., operating at Greenwood in the Boundary district, say the self-fluxing character of the gold-copper ore in the Kamloops will make it valuable for smelting. They are interested in Coal Hill and in Cherry Creek, close by. They are negotiating for the Copper King mine there.

#### MEXICO.

##### Ohhuahua.

D. J. Knotts has machinery for a 5-stamp mill being put on his mine at Santa Ramona, 65 miles from Mesa de Sandia, the terminus of the Parral & Durango Railroad. A cyanide plant will also be built. Santa Ramona district is on the road to Guadalupe y Calvo. Knotts says the veins carry high-grade silver and gold values. It is too remote from transportation to make the refractory ores pay. He is sinking four shafts on his property.

##### Guerrero.

A concession has been granted by the Government to J. L. Requena to exploit lode mines and gold placers in the municipalities of Chilpancingo and Tlacotepec, in the Bravos district, and in the municipality of Atoyac, in Galeana district. The concession is for three years, and exploration work must start within six months from June 25, 1904.

##### Jalisco.

The Valenciana M. Co. of Guadalajara has been organized to take over several gold and silver properties in Navidad district. These properties aggregate sixty-four pertenencias. J. T. Jackson, at La Barca, and E. Schuh of Guadalajara are interested. The company will begin development work this week.

L. Navarro, for the Compania Petrolera Mexicana, will prospect for oil on the Rancho de las Candelas, bordering on Lake Chapala, near Sahuayo. Three drilling outfits will be put in operation.

Guadalajara reports say M. D. Watson et al. of Chicago, Ill., have organized a company to develop the Rosa Amarilla copper mines in Autlin district. It is intended to exploit also a timber tract of 2,000,000 acres and to build an electric railroad from the mines to the Pacific port of Navidad. The railroad is being surveyed. The electricity will be generated by a series of plants on the Cusapala and Santa Maria rivers where water power is obtainable.

##### Mexico.

At El Oro, the north tunnel of the Dos Estrellas mine is reported to have cut the vein.—At the Santiago Anexas group of mines bought by J. J. West, of Chicago, Ill., and other Eastern men, preparations are being made to increase the milling plant to, ultimately, 1000 tons daily. The present equipment has a capacity of sixty tons a day and is run by water power. The ore is said to carry \$5 per ton in gold, with silver values, occurring in a mass of small quartz veins in talcose slate, and it is said can be worked by open cuts. Electric power will be used for the enlarged milling plant.

##### Michoacan.

S. Hagelin of El Oro reports having made a cinnabar discovery in Michoacan, near the Mexican State line. Locations covering 142 pertenencias have been made.

##### Oaxaca.

At Penoles the Rosario y Anexas M. Co. proposes to build a 10-stamp mill. The company's property contains ninety claims on eight separate veins.

##### Sinaloa.

Mining activity has been renewed in Cosala district, says the Jalisco Times. In this district are the mines of the Guadalupe de los Reyes Co. At La Dura mine, owned by F. Aragon, considerable American machinery is to be set up, including a concentrating plant. In the San Antonio mine, owned by A. Zazueta and F. J. Loureiro, a vein of silver ore has been opened up which assays 600 ounces silver. At La Prieta mine, owned by Hernandez & Borbolla of Sinaloa, a large number of men are employed in development work. Near San Ignacio, south of Cosala, La Compania Minera del Chilar has started work on a gold and silver property.

##### Sonora.

At Los Coches Manager W. J. Burdick, of the Los Coches M. Co., is putting up a stamp mill and cyanide plant. The reduction plant will consist of ten stamps and twenty cyanide vats, the pulp going to the solutions from the stamps.

At the Ures Con. mine at Gabilan, 33 miles up the Sonora river, northeast of Hermosillo, the main shaft, down 320 feet, will be sunk to 500 feet. A pump with capacity of 250 gallons per minute is

handling the water. The water is utilized in the milling plant. The equipment includes a 10-stamp mill, with pan amalgamation. There is also a steam hoist with capacity for raising 100 tons of ore daily from 500 feet depth. The company also owns El Murcielago (The Bat) mine, 3 miles distant. S. B. Smith is superintendent.

The Gutierrez mine at La Barranca is reported developing high-grade silver ores. Recently a shipment of 400 tons to the Toledo reduction works yielded \$28,000 and netted \$12,000, gold. The shaft is 300 feet deep. A heavier hoist will be put in and the shaft continued to 600 feet. A plant to reduce ores by lixiviation process will be put in.

Chicago, Ill., and Western men have organized the Cieneguita C. Co. The company has acquired 20,000 acres and 1000 Mexican mining claims, some of which were superficially worked two centuries ago. Smelters are expected to be in operation in November. The company owns 6000 feet of tunnels. The general headquarters of the company are in Chicago, Ill. The president is G. Beebe of Cieneguita, Mexico, and vice-president G. A. Sanderson of Chicago. The directors include G. Beebe, G. A. Sanderson, G. M. Reynolds.

##### Vera Cruz.

S. Pearson & Son report striking a heavy flow of gas in a well being driven for oil near Jaltipan.

#### TASMANIA.

The Mount Lyell M. & R. Co. at Mount Lyell, from May 26 to June 22, inclusive, treated a total quantity of 27,147 tons of ore, being 19,827 tons from the Mount Lyell mine and 7320 tons from the North Mount Lyell mine. In addition there was treated 199 tons of purchased ore and metal-bearing fluxes. The converters produced during same period, 603 tons of blister copper, containing 595 tons copper, 59,166 ounces silver and 1671 ounces gold.

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**Personal.**  
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E. BABCOCK, a mine owner of Helena, Mont., is in the East.

G. H. EVANS has returned to Breckenridge, Colo., from Sumpter, Or.

C. J. BANDMANN of San Francisco, Cal., is examining gold mines in Wyoming.

T. J. HOUGHTON of Folsom, Cal., is in San Francisco, Cal., on mining business.

JOHN H. MACKENZIE of San Francisco, Cal., is at Le Roi mine, Rossland, B. C.

J. M. WALBRIDGE of Yreka, Cal., is in San Francisco, Cal., on mining business.

GEO. A. TWEEDY of Los Angeles, Cal., is examining property in Butte county, Cal.

T. B. JENNINGS has resigned as manager of the Guinea Fowl mine near Gwelo, Rhodesia.

MANAGER B. WILKINS of the Idaho-Maryland mine at Grass Valley, Cal., is in Boston, Mass.

CHAS. L. LANG of Sonora, Cal., is examining mining property at Mooretown, Butte county, Cal.

M. D. KELLY is superintendent of the Republican mine at Jacksonville, Tuolumne county, Cal.

D. M. WATTERS of Sumpter, Or., is superintendent of the Blue Bird mine and mill near Sumpter.

F. W. BRADLEY of San Francisco, Cal., has gone to Alaska to visit the properties under his direction.

R. STUART BROWNE of San Francisco, Cal., has gone to northern California on professional business.

J. W. WINKFIELD is superintendent of the Sydney group of mines, near Rico, Dolores county, Colo.

T. J. BULGER of San Francisco, Cal., has returned from making mine examinations in San Salvador, C. A.

W. F. DETERT of Jackson, Cal., president and manager of the Argonaut M. Co., is in San Francisco, Cal.

S. SWANSON is general foreman of the Granby copper mines at Phoenix, B. C., vice P. J. Dermody, resigned.

L. H. CARVER, manager of the Mountain mine near Sierra City, Cal., is at the mine from San Francisco, Cal.

W. A. PRICHARD left Kalgoolie, W. A., May 30 for London, and will visit California before returning to Australia.

G. V. NORTHEY of Sulphur Creek, Colusa county, Cal., interested in quick-silver mines, is in San Francisco, Cal.

W. J. SHARWOOD has been appointed assistant professor of chemistry at the University of California, Berkeley, Cal.

A. K. GRIM, president of the El Dorado C. M. Co., is at Georgetown, Cal., from Berkeley, Cal., visiting the company's mines.

W. W. TRIMPIE, Newark, N. J., has returned there from Breckenridge, Colo., where he has been looking after mining interests.

A. M. McDONALD, recently with the California Debris Commission, is superintendent of the Ida Mitchell mine, at Placerville, Cal.

F. HARRIS has severed his connection with the Rand Drill Co., of which he was formerly sales agent in Butte, Mont., and Salt Lake City, Utah.

P. J. DERMODY, for six years general foreman at the Granby copper mines at Phoenix, B. C., has resigned to look after mining interests on Kettle river.

E. A. KING of Chicago, Ill., is manager of the Tonopah-Belcher M. Co. and has taken personal supervision of the company's mines, near Tonopah, Nev.

SUPERINTENDENT ENGLISH of the Mount Jefferson mines at Groveland, Cal., has returned there after an absence of several weeks in the northern part of the State.

J. M. CALLOW of Salt Lake City, Utah, mechanical and consulting engineer for the Montana Ore Purchasing Co. of Butte, Mont., is in Butte installing mill equipment.

C. B. LAKENAN has resigned as superintendent of the Turner mines in Mohave county, Ariz., near Needles, Cal., and has gone to Grass Valley, Cal., to accept the superintendency of the Idaho-Maryland mine.

W. F. WARDEN, president and general manager of the Burt Manufacturing Co. of Akron, Ohio, has returned from an extended business and pleasure trip through Europe. While in London, Mr. Warden secured an order from his British agents for 150 oil filters and exhaust heads, which, he says, is the largest single order for goods of this kind that has ever been given.

FREDERICK A. C. PERRINE, PH. D., first vice-president of the Stanley Electric Manufacturing Co. of Pittsfield, Mass., has resigned his position, which carried a large salary, to devote his attention exclusively to private practice as a consulting electric engineer. Dr. Perrine was formerly professor of electrical engineering at Stanford University, Palo Alto, Cal., and consulting engineer to the Standard Electric Co. of California.

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**Obituary.**  
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T. C. BORLAND, a mine owner of Keeler, Inyo county, Cal., died at Keeler on the 3d inst.

J. P. WOODHAVE, a pioneer mining man of Colorado and Wyoming, died at Denver, Colo., on the 9th inst. Deceased was 65 years of age.

WILLIAM JACK of Los Angeles, a pioneer mine owner of Idaho and Montana, died at Grangeville, Idaho, on the 18th inst.

ISAAC ROBERTS, the astronomer and geologist, died at Crowborough, England, on the 18th inst., aged 75 years. Nine years ago deceased was given the gold medal of the Royal Astronomical Society. Since 1890 he had continued his scientific work at Starfield, and had been a frequent contributor to scientific journals.

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**Commercial Paragraphs.**  
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THE Mineral Products Co. have moved from Philadelphia and are now located in their new and specially equipped building at C and Buttonwood streets, Wilmington, Del.

THE Brown-Corliss Engine Co., of Corliss, Wis., have opened a department for building high-speed engines, and are now working on two units of 150 H. P., three 250 H. P., two 50 H. P. and one 75 H. P., all to be direct connected.

ARTHUR KOPPEL, manufacturer of industrial, narrow and standard gauge railway materials, of 66-68 Broad Street, New York, has an exhibition of track switches, turntables, cars of various styles, etc. His exhibit will be found in the Building of Mining and Metallurgy,



block 20, assignment 10, and visitors will receive a cordial welcome.

THE Columbus Machine Co. of Columbus, O., have opened an office in Cincinnati, O., at No. 227 West Fifth Street, where they will carry a stock of engines. The office will be in charge of Mr. Van Dusen, who will have engines in operation to show the merits of the Columbus.

## Latest Market Reports.

SAN FRANCISCO, July 22, 1904.

### METALS.

**SILVER.**—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c, refined (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 45½c New York.

**COPPER.**—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$13.00; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £57 11s 3d spot per ton.

Copper remains practically unchanged, an advance of a fraction of a cent being observed within the week. Still the demand for the metal is good. The strike at one of the Lake mines has not spread as yet, and its effect is not noticeable. The strike of pilots on the Lake steamers having failed, the influence on the market may be to increase shipments during the remainder of the open season, which may have the effect of bringing about somewhat lower prices.

Following are the figures of the German consumption of foreign copper for the months January—May, 1904, compared with the same period of time in 1903-1902:

	1904.	1903.	1902.
Imports, tons.....	47,231	36,223	33,971
Exports, ".....	3,239	4,739	3,748

Consumption.....43,992 31,484 30,223

**LEAD.**—New York, \$4.35; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 13s 9d long ton.

**SPELTHER.**—New York, \$4.85; St. Louis, \$4.75; London, £22 ½ ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

**TIN.**—New York, pig, \$26.30 @ 26.50; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, ½ lb., 30 @ 32½. London, £120 spot.

**PLATINUM.**—San Francisco, crude, \$18.50 ½ oz.; New York, ingot, \$19.00 ½ Troy oz. Platinum ware, 75 @ 82c ½ gram.

**QUICKSILVER.**—New York, \$44.50 @ 45.50, large lots; London, £8 San Francisco, local, \$43 @ 43.50 ½ flask of 75 lbs.; Denver, \$46.00. Export, \$43.00 @ 43.50.

**BABBITT METAL.**—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

**ZINC.**—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

**NICKEL.**—New York, 40 @ 47c ½ lb.; ton lots, 40 @ 47c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31 @ 34c.

### STRUCTURAL MATERIALS.

**IRON.**—Pittsburg, Bessemer pig, \$12.60 @ 12.85; gray forge, \$12.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

**STEEL.**—Bessemer billets, Pittsburgh, \$23.00 @ 23.00; open hearth billets, \$23.00 @ 23.00; San Francisco, bar, 7c to 12c ½ lb.

### CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$14 75@15 00
Foundry Northern 1.....	13 75@14 00
Northern 2.....	13 25@13 50
Northern 3.....	12 75@13 00
Southern 1.....	13 15@13 65
Southern 2.....	12 65@13 15
Southern 3.....	12 15@12 65
Forge.....	11 40@11 90
Charcoal.....	14 50@15 00
Billets, Bessemer.....	23 00@24 00
Bars, iron.....	1 30@ 1 35
Bars, steel.....	1 51@ 1 51
Rails, standard.....	28 00@30 00
Rails, light.....	23 00@25 00
Plates, boiler.....	1 91@ 2 01
Tank.....	1 76@ 1 81
Sheets, 27 store.....	2 26@ 2 31
Angles.....	1 76@
Beams.....	1 76@
Tees.....	1 81@
Zees.....	1 81@
Channels.....	1 76@
No. 1 railroad wrought.....	10 50@11 00
No. 1 cast, net ton.....	9 00@ 9 50
Iron rails.....	14 50@15 00
Car wheels.....	10 50@11 00
Cast borings.....	3 25@ 3 50
Turnings.....	6 00@ 6 50

**WHITE LEAD.**—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails,

¾c ½ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ¾c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

**LUMBER.**—(Retail): Pine, ordinary sizes, \$24.00 @ 25.00; extra sizes higher; redwood, \$28.00 @ 30.00; lath, 4 feet, \$4.50 @ 5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @ 35.00.

**NAILS.**—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.45; Cut, \$3.55; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

**LIME.**—Santa Cruz, \$1.25 country, \$1.25 city ½ bbl.

**CEMENT.**—Imported, \$2.15 @ 2.65 ½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 ½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

**ANTIMONY.**—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300 @ 500-lb., 8½c; 100-lb. lots, 10½c.

**POWDER.**—F. O. B. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1½, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1½ 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2½ 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

**CAPS.**—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

**FUSE.**—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 11½c ½ set; 14 oz., 40s., 10c.

**COAL.**—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.00; Southfield, \$5.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$11.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$11.50, long ton.

**CHEMICALS.**—Cyanide of potassium, 98%—99%, jobbing, 23 @ 24c ½ lb.; carloads, 23 @ 23½c; in tins, 30c; soda ash, \$2.00 ½ 100 lbs.; hyposulphite of soda, 3 @ 3½c per lb.; caustic soda, in drums, 3 @ 3½c ½ lb.; Cal. s. soda, bbls., \$1.20 @ 1.40 ½ 100 lbs.; sks., \$1.05; chlorate of potash, 12 @ 13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½ @ 2½c; powdered sulphur, 2 @ 3c; flour sulphur, French, 3½ @ 3½c; alum, \$2.00 @ 2.25; California refined, 1½ @ 2c; sulphide of iron, 8c ½ lb.; copper sulphate, 5½ @ 5½c; chloride of lime, spot, \$2.50 @ 2.75; sulphuric acid, in carboys, 66% B, 1½ @ 2c ½ lb.; nitric acid, carboys, 8c ½ lb.

**OILS.**—Linseed, boiled, bbl., 54c; cs., 59c; raw, bbl., 54c; cs., 52c; Lucol oil boiled, bbl., 48c; cs., 53c; raw, bbl., 46c; cs., 48c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 88° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 68c; Sperm, crude, 63 @ 68c; Natural White, 70c; Bleached, do., 80c; Whale Oil, cs., 52 @ 57c.

**BONE ASH.**—Extra No. 1, 5 @ 6c ½ lb. No. 1, 4 @ 5c.

**RED LEAD.**—500 lbs. and over at one purchase, ¾ lb., 7c; less than 500 lbs., 7½c.

**LITHARGE.**—Pure, in 25-lb. bags, 8 @ 9c ½ lb.

**BORAX.**—Concentrated, 6 @ 7c ½ lb.; powdered, 8 @ 10c; fused, 20 @ 25c; crystal, 7c; calcined, 25c.

**MOLYBDENUM.**—Best, \$2.00 ½ lb.

**CHROMIUM.**—90% and over, ½ lb., 80c.

**PHOSPHORUS.**—American, ½ lb., 70c.

**SILVER.**—Chloride, ½ oz., 90c @ \$1.00; nitrate, 55c.

**MERCURY.**—Bichloride, ½ lb., 77c.

**MAGNESIUM.**—Pure, N. Y., 60c.

**MANGANESE.**—½ lb., \$2.75.

**SODIUM.**—Metal, ½ lb., 50c.

**BISMUTH.**—Subnitrate, ½ lb., \$2.10.

**ALUMINUM.**—No. 1, 99%, small lots, 37c ½ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburgh. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburgh.

**URANIUM.**—Oxide, ½ lb., \$3.50. (These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING JULY 12, 1904.

- 764,971.—LEATHER DRESSING—A. Aagaard, Everett, Wash.  
764,701.—BOOK LEAF—H. W. Ayers, Los Angeles, Cal.  
764,836.—ELECTRIC SWITCH—W. J. Bell, Los Angeles, Cal.  
764,708.—OIL BURNER—I. Carl, Los Angeles, Cal.  
764,709.—RESPIRATORY APPARATUS—Chapin & Sherman, Berkeley, Cal.  
764,560.—SHINGLE MACHINE—F. A. Cloudy, Startup, Wash.  
764,714.—SAFETY HOLDER—Mary A. Davis, Los Angeles, Cal.  
765,071.—GAS GENERATOR—Eichler & Becker, S. F.  
764,567.—ENDLESS CHAIN SICKLE—H. S. Ekel, Stockton, Cal.  
765,074.—LEMON SQUEEZER—W. H. Gregory, Vallejo, Cal.  
765,014.—SKIRT PIN—Mary E. Kintz, Tacoma, Wash.  
765,084.—DENTAL MATRIX—S. E. Knowles, S. F.  
764,739.—CARPET RENOVATOR—W. H. Loomis, Alameda, Cal.  
764,866.—ELECTRIC RAILWAY—T. Mahoney, S. F.  
764,858.—SAW SET—J. S. Mason, Santa Ana, Cal.  
765,027.—OIL BURNER—R. Matheson, San Diego, Cal.  
764,751.—GARMENT HOLDER—T. J. Murphy, Needles, Cal.  
764,674.—ELECTRIC HEATER—L. B. Pemberton, Redondo, Cal.  
764,624.—BORING MACHINE—Pfuger & Christensen, Portland, Or.  
764,557.—PENDULUM POWER—A. T. Prather, Douglas, Ariz.  
764,938.—PROPELLER—J. W. Raine, Seattle, Wash.  
764,865.—FOLDING TRESTLE—W. G. Read, Davisville, Cal.  
764,866.—FOLDING TRESTLE—W. G. Read, Davisville, Cal.  
764,959.—BOTTLE—G. G. Ross, Hazel, Wash.  
764,970.—ROTARY AGITATOR—J. Smith, S. F.  
765,155.—CAN OPENER—H. W. Thurlow, S. F.  
764,646.—AUTOMOBILE—C. W. Van Winkle, S. F.  
765,117.—BOTTLE—P. J. Wilson, Ben Lomond, Cal.  
764,654.—BOX—A. W. Wright, Pomona, Cal.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**FOLDING EXTENSION TRESTLE.**—No. 764,866. July 12, 1904. W. G. Read, Davisville, Cal. This invention relates to an apparatus which is designed for the use of carpenters, painters, plasterers, paper-hangers and the like. It consists in the combination of supports, separate legs, braces and attachments and means for dismembering and folding the apparatus into small compass, so that it can be taken through small doorways and spaces and afterward reassembled and extended to any required size.

**FOLDING EXTENSION TRESTLE.**—No. 764,865. July 12, 1904. W. G. Read, Davisville, Cal. This invention relates to a device which is especially designed for the use of carpenters, painters, plasterers, paper-hangers, and the like; and it consists in the combination of supports, separate legs, braces and attachments whereby the apparatus may be dismounted for the purpose of taking it through doorways or narrow places into rooms where it is to be used and afterward assembled and extended to any desired or required size.

**ELECTRIC RAILWAY.**—No. 764,856. July 12, 1904. T. Mahoney, San Francisco, Cal. This invention relates to improvements in electric railway systems of the third-rail type. The object of this invention is to devise a switch-box and operating means therefor carried by the car which shall be simple, cheap to construct, install and maintain, which requires a minimum amount of power to operate, and which will permit cars to travel at a high rate of speed.

**THE CALIFORNIA DEBRIS COMMISSION** having received applications to mine by hydraulic process from E. A. Moody, in Good Luck Mine, near Gold Run, Placer County, Cal., draining into Squires Creek, which reaches Bear River, and from Eagle Bar Placer Mining Co., Limited, in Eagle Bar Placer Mine, near Forest Hill, Placer County, Cal., draining into Middle Fork of American River, gives notice that meeting will be held at Room 96 Flood Building, San Francisco, Cal., Aug. 1, 1904, at 1:30 P. M.

**THE CALIFORNIA DEBRIS COMMISSION** having received application to mine by hydraulic process from W. J. Berry, Theodore Rupley and Bruce Graham, in Sugar Pine Mine, near Pino Grande, El Dorado County, Cal., draining into Silver Creek which reaches American River, gives notice that meeting will be held at Room 96 Flood Building, San Francisco, Cal., Aug. 8, 1904, at 1:30 P. M.



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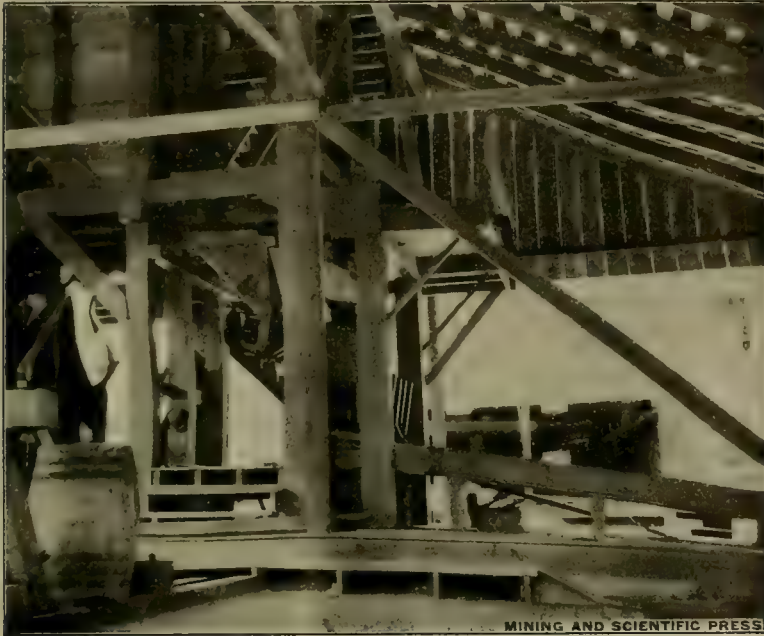
SAN FRANCISCO, CAL., SATURDAY, JULY 30, 1904.

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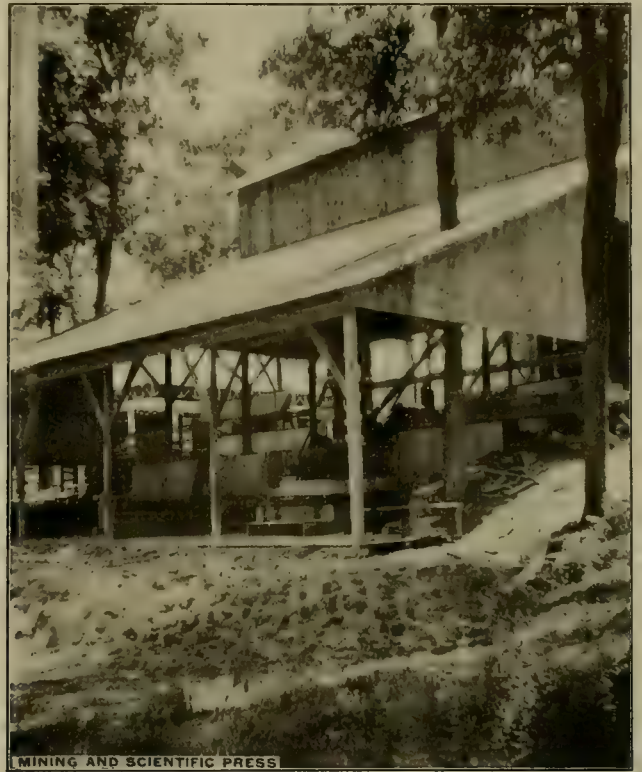
## The Importance of Geological Knowledge.

Many practical miners underestimate the value of a knowledge of geology. They conceive that geology requires an intimate acquaintance with the origin of

when veins and ore shoots are interrupted by faults. There are numerous cases of record where a superintendent lost his vein and gave up the search after expending large sums of



Interior of California Gold Mill at St. Louis Exposition.—(See Page 69.)



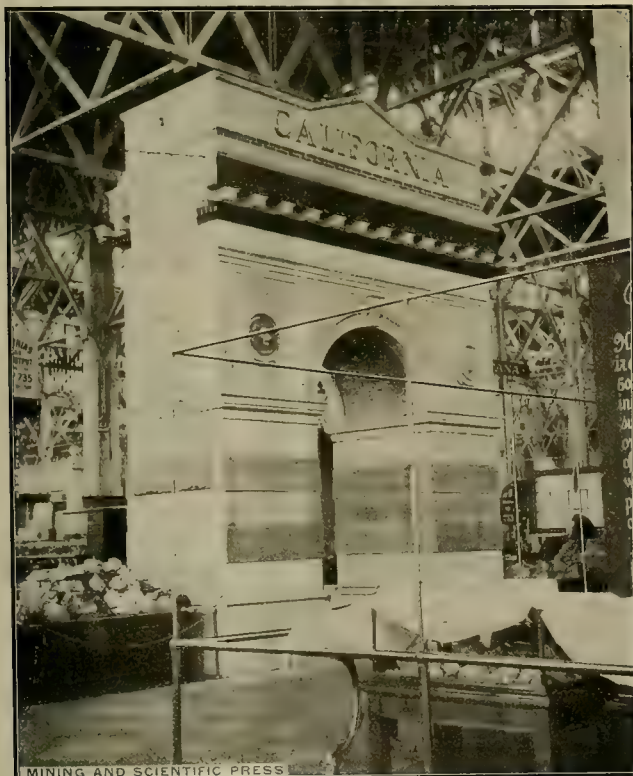
California Quartz Mill at St. Louis Exposition.—(See Page 69.)

the earth, and also, as well, of all of the numerous geological horizons from Archæan to Recent, etc., and that he must be able to tell at sight whether a formation belongs to this or to that period or age. It is true to be a thorough geologist requires a knowledge of all of these things, but the miner may acquire a knowledge of structural and dynamic geology as referred to ore deposits, and such knowledge will prove of great service many times. It often deters him from doing development which would be useless, and it as often indicates what should be done

money fruitlessly, leaving the rediscovery of the faulted vein to his successor, whose knowledge of geology gave him the needed advantage. In one instance a valuable vein which was being worked came upon a fault, cutting the vein at a small angle. The superintendent followed the fault, in the belief that he was still on the vein, though without ore. After running several hundred feet without finding ore the mine was shut down, but later, being reopened, another superintendent, on examining the disturbance where the ore abruptly ended, correctly

analyzed the situation, drove a crosscut in the hanging and in a short distance encountered the continuation of the vein. In another instance, also the case of a faulted vein, the fault was plainly exposed on the surface, but the superintendent—a good practical miner, who could do anything to be done about a mine, and who thoroughly understood handling men—failing observation sufficient to appreciate the geological conditions perfectly apparent to even a novice, drove an expensive crosscut in the wrong direction and nearly bankrupted his company in his

strenuous effort to find the vein again. Finally he drove to the opposite side and in less than 15 feet was in good ore. Neither of these cases seem as bad as that of the superintendent—a man of over thirty years' practical experience—who mistook a nearly flat vein, about 2 feet in thickness, lying on the surface, for a monster outcrop over a hundred feet wide, and sunk a shaft several hundred feet in hard rock and then crosscut hundreds of feet more in the vain effort to develop the great deposit. He passed through the vein in his shaft where it was about 4 inches thick, but it was too insignificant to attract even passing attention from one who was expecting a vein 100 feet in width. In either of these instances had the miner even a small knowledge of geology the mistakes above cited would not have been made.



Composite Arch, California Mineral Exhibit, St. Louis Exposition.  
(See Page 69.)



California Exhibit, St. Louis Exposition, Showing Model Quartz Mill.  
(See Page 69.)



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## Technical Schools and the Mining Industry.

It is only within comparatively recent years that mining schools have become numerous in the United States. Forty years ago the education of an American mining engineer was not considered finished until he had taken the course at the noted mining school of Freiberg, in Saxony, Germany. To-day comparatively few American students believe it essential to their success to take the course at Freiberg, although that is still an excellent school, and one which the engineer can lose nothing in attending. American methods and practice, however, have gradually diverged from the hard and fast lines of a few years ago, and it has been found advisable, owing to the great diversity of mineral deposits, and to variable economic conditions found in America, to make many changes in methods, both in mining and metallurgy, to secure the best economic results. America is essentially a mining country. There is not a State or Territory in the Union that has not its mines and quarries, or oil and gas wells, or other valuable mineral deposits, and it is due to this fact, and to the environment of many mining regions, together with the demands of manufactures upon these deposits, that new systems have been introduced. Ore deposits of a size and existing under physical and economic conditions unknown in Europe have been discovered, developed and exhausted in America, while the mines of Europe continue to produce year after year, as they have for decades, and in some instances for centuries, under the dilatory policy which directs the scope and character of mining operations there.

The conditions in America have resulted in educating men in such a manner as to enable them to cope with the newer and greater problems. Throughout the West—and the West has been made by the mines, not the mines by the West—innovations are as commonplace as the discovery of new districts or new mines, until they have ceased to create wonder, and sometimes even comment. Realizing the importance of educating the rising generation of engineers to the understanding of these broader physical and economic problems, excellent mining schools and colleges have been established in many Western States and Territories, and Eastern educational institutions have recently added mining engineering to their course of study, although there are in the East some of the oldest and best mining schools in America. In all of these schools there is an increasing demand for more of that which is practical in the course. The theories which are taught are all founded on the best practice, but the practice hand in hand with the theory is what is required to accomplish the best result. The peculiar conditions found in American mines and the methods, which are an outgrowth of the necessities of each case, have made American engineers the most versatile and successful in the world. One thing is pronounced in the American mining engineer—he is not afraid to take the initiative. If he thinks he has a scheme which will be an improvement over old-time methods, either in mining practice or in the reduction of ores, he is not afraid to try it; and it is this characteristic that has made the services of American engineers abroad in great demand. No unusual condition is so unique or difficult but that the American engineer will devise a way to get around it. He can always make the best of the situation, and can seemingly create what he needs if it is not at hand. His inventive genius is so often called into play that he looks upon no proposition with misgivings, and he usually succeeds if there is any merit in the enterprise under his direction. This is partly the result of the character of the instruction received in mining schools and partly the result afforded in greatly varied conditions in the mines of America.

### Mistakes Still Being Made.

It seems strange that with all the years of practical experience which the mining regions of the West afford, that the most glaring mistakes are still being made, almost daily, in the choice of the type of mill selected to do certain work; in the situation of the mill after such choice has been made; in the construction details after the site has been chosen, and in the arrangement of the transportation problem between mine and mill. The reason for these mistakes will

probably be found in the fact that the arrangement of these matters has been placed in the hands of incompetent persons. In considering transportation, men of this class put in "what they know will work"—usually a track on a grade and a series of chutes to reach the mill, when aerial tramway would be no more expensive, cheaper to operate, and more satisfactory in every way. Rock breakers are placed in the mill, when the proper place for them is at the mine. The mill is set in such a manner that ore is delivered at the rear in the middle instead of at one end; to be distributed where required. Mills are placed on flat ground when hillsides are available. Gravity is almost lost sight of in the unwise arrangement of some mills. It is still not an uncommon thing to find rock breakers elevated above the ore floor, so that every pound of ore must be raised a foot or more with a shovel. Some mills have no grizzlies, necessitating the passing of all the rock, both coarse and fine, through the breaker, thus multiplying the work of the crusher man and uselessly consuming power. Among the minor offenses of construction, if they may be termed such, are the failure to provide separate power wheels for concentrators, and often too few concentrators are provided. The mistakes being made in mill construction—mistakes, too, for which there is no reasonable excuse, are all the result of inexperience or lack of judgment.

### The Greatest Gold Mines.

The recent completion of an addition of 100 stamps to the Amicus mill of the Homestake Co. at Lead City, S. D., gives that company the largest combination of gravity-stamp batteries in the world—1000 heavy stamps—which crush every twenty-four hours upward of 4000 tons of ore, or about 1,400,000 tons annually. There are many mines, and good mines too, which have not sufficient ore in sight to keep these Homestake stamps in operation six months, but the Homestake ore is low grade—under \$4—and to make mining profitable under the existing conditions it is necessary to conduct operations on a scale attempted in but few places elsewhere. The first Homestake mill consisted of thirty-five light stamps and was built in 1876-77. In the summer of 1878 the first heavy mill, the Homestake of eighty stamps; was completed, and soon, thereafter, was commenced the construction of the second large mill, the Golden Star of 120 stamps, followed the next year by the Highland (now Amicus) mill, with 120 stamps. In the meantime the Father De Smet Co., 1 mile to the northward, built a mill of 100 stamps, the Deadwood Co. and the Golden Terra Co. each built 60-stamp mills, and the Caledonia Co. put in forty stamps (now Munroe mill), replacing their original 20-stamp mill. The Deadwood and Terra mines, adjoining at Terraville, were consolidated about 1880, and this property, with the 120 stamps, passed to the Homestake Co. later, as well as the Caledonia and Father De Smet.

All of these mills, excepting that at the De Smet, have been enlarged, some of them more than once, to keep pace with the expanding industry, until it has become the greatest gold mine in many respects on earth. Many mines are richer as to value of the ore they produce, but no others have the magnitude of the Homestake, nor are operations conducted on such a large scale.

The nearest competitor for magnitude of operations in a gold mine is found in the Alaska-Treadwell and Alaska-Mexican mines on Douglas Island, Alaska. The mining methods are somewhat dissimilar, but the general features of these great mines are about the same. The evolution of these mines from properties of small and incomplete development and equipment, as compared with their present magnitude, has been a constant study of changing conditions—physical, structural and metallurgical. Every advantage has been made use of. Automatic machinery has been introduced in every department. Gravity has aided greatly in the solution of the problem, and to-day cheaper mining is done nowhere under similar conditions than at the Homestake and the Alaska-Treadwell and Alaska-Mexican mines. The latter are operated at a somewhat lesser cost, owing to a rather more advantageous situation as to transportation; but, aside from this, these mines furnish examples of management and equipment which great mines throughout the world are endeavoring to profit by through their adoption.

THE great danger always present when working in a mine which is connected with another which is flooded was exemplified within the week by the breaking of a timber bulkhead in a Butte, Mont., mine, resulting in the flooding of the adjoining excavations and the drowning of several miners. The pressure of water on a watertight bulkhead is often greater than is supposed. In the case of a bulkhead 5 by 7 feet, sustaining a column of water 100 feet in height, the pressure would be 45 pounds on each square inch of surface of bulkhead, or a total pressure of over 226,000 pounds. This tremendous pressure furnishes an idea of the necessity of a construction made of the best materials, and so solidly anchored that it would be impossible for it to break away.

RECENT press dispatches state that the military have been recalled in Colorado and the maintenance of law and order has again devolved upon the civil authorities in the disturbed districts. The cost to the State for military protection during the past eighteen months is stated to have been about \$1,000,000. While this is a hardship upon the taxpayers of that State, there is no one well informed of the conditions which made military rule necessary but who believes that this sum is much smaller than the losses to mine owners and others would have been had not the military taken the reins and protected property. Even as it was, there was sufficient evidence of the lawless character of certain men to justify military rule. At such times the strikers and their sympathizers are wont to point to the fact that all is peaceful and quiet—when the place is under military restraint and the active agitators are being watched day and night, or possibly restrained of their liberty—and that the soldiers should be withdrawn. Experience has taught that those at the scene of the difficulties are the best judges of what steps are most essential to the preservation of peace. It is hopeful that the present peaceful conditions in Colorado will be maintained.



## CONCENTRATES.

TENORITE is a black oxide of copper and usually occurs in scales or in crystals, otherwise it is similar to melaconite, which is an earthy variety of the same mineral.

ANTIMONY has the effect of hardening lead, and this property is taken advantage of in the arts and manufactures. It is antimony that gives babbitt metal, type metal, etc., their requisite hardness.

OFTEN pyrite and marcasite are covered with a thin film of copper sulphide of brilliant peacock colors (bornite). This coloration is sometimes only a thin film and only denotes the presence of copper. Elsewhere in the vein copper ores may occur in larger amount.

THE bursting of dams is due to various causes, but the usual cause is an insufficient factor for safety. In some instances the shock of earthquake has weakened a dam of masonry or concrete, and collapse has resulted, but this is an unusual occurrence, particularly in the United States.

THE Homestake M. Co. at Lead, S. D., now has 1000 stamps dropping, crushing about 4000 tons of ore daily. This ore contains less than \$4 per ton on an average, but it is mined and milled at a good profit, owing to the magnitude of the ore bodies and the extensive scale of operations.

"CONCENTRATES" knows of no place where electric signals are operated in mines by means of electric currents passing along the track rails, but as signaling by this means is commonly practiced on the surface on railways, it is possible that this method of transmitting signals may be found feasible.

WHERE the filter in a chlorination barrel gave considerable trouble and required frequent renewal—in this instance cocoa matting—the matting was covered with a sheet of perforated lead, firmly secured to the interior of the barrel, and it was found that the filter would last for several months without renewal.

PURE GOLD has a tensile strength of seven tons per square inch. The admixture of some other elements with gold will destroy this wonderful tensile strength and ductility of gold. A very small admixture of bismuth—one part in 2000—renders gold so incoherent that it may be pulverized in the hand.

WHEN the water in a beaker glass, on being heated, shows a tendency to "bump" on reaching the boiling point, this "bumping" may be stopped by dropping into the beaker a small piece of clean glass. At once a large number of small steam bubbles will rise through the water, instead of a few large ones as before.

WHEN baryta (heavy spar) is transparent it is sometimes mistaken for calcite (calcium carbonate). The former crystallizes usually in flat, tabular crystals with edges having 90° angles; calcite crystallizes in rhombs. It also has the property of double refraction, which barite does not possess. The great difference in specific gravity also serves to distinguish them. Calcite effervesces with cold hydrochloric or nitric acid, and baryta does not.

IF concentrates are to be treated by the cyanide process it is better not to dry them, as in drying a greater or less amount of oxidation takes place with the formation of soluble sulphates which are detrimental to the operation of the process. At some works the sulphides are kept under water until they are charged into the vats for agitation or percolation, thus reducing the opportunity for the formation of the objectionable sulphates.

WHERE magnetite occurs in the surface outcrop of a copper-bearing gossan it is often observed pyrrhotite, the sub-sulphide of iron, is found, associated with the other sulphides of iron and copper. While pyrrhotite is often found thus accompanying copper ores, its occurrence cannot be considered a reliable index of the occurrence of payable copper ore, as the pyrrhotite is often found with little or no copper at all. All pyrrhotite deposits should be tested for nickel, as not infrequently it carries that metal in payable quantity.

WHITE skilled miners on the Rand are paid \$4 to \$5 per day. What wages are paid in the South American States and Republics is not known to "Concentrates," but generally the work is done by natives under white bosses. An American miner should make a contract with the mine management or owner before going into a foreign country. Men who go to South Africa, South America, or to other foreign lands without contract sometimes fail in their calculations and have to accept work, if they are so fortunate as to get it, at a lower figure than they had expected.

THE cause of frost about the exhaust of machine drills, pumps, engines and other devices run by compressed air is the freezing of moisture in the atmosphere, owing to the low temperature produced by the rapid expansion

of air from the exhaust, which always results when compressed air escapes. This is exemplified in an ordinary way in forcing air through the lips. The freezing of exhaust pipes may be prevented to some extent by making the exhaust apertures of good size, and in the case of pumps it is easy usually to arrange a small stream of water to fall upon the exhaust, which prevents the temperature falling below the freezing point.

THE Simplon tunnel now being driven through the Swiss Alps has encountered hot springs which have raised the temperature in the Swiss side of the tunnel to such a degree that further work is stated to be an impossibility, and it is possible the entire project may have to be abandoned, unless the distance still remaining unfinished (about 2600 feet), can be completed in the heading driven from the Italian side. The present rate of advance on this side is stated to be nearly 20 feet daily. The temperature of the springs and the atmosphere are not stated, but should these subterranean channels of hot water be struck on the south workings the tunnel will probably not be completed in many months.

THE percentage of quicksilver in ore varies greatly from 60% or over down to a fraction of 1%. Pure cinnabar contains 86.2% mercury. The statement has been officially made that in recent years the average contents of ores treated at New Almaden, Cal., has been 0.5% quicksilver. As the mines are continuously operated it is presumable that the operation has been carried on at a profit. The tonnage treated has been about 4000 tons of ore per month. That the average of metal in the ores of Spanish or Australian mines is much lower than that now being treated at New Almaden is improbable. Ore containing 3% to 12% quicksilver is rich, and conditions must be very bad where such ore would not pay a handsome profit.

ALUMINOTHERMICS is the name of a new science, based on the discovery that when oxygen and aluminum—the two most abundant elements known—are united in a proper manner, a temperature is created which is equal in intensity to that of the electric arc. This scientific principle is made use of in the arts. In it is employed, not the oxygen of the air, but oxygen as a solid in the form of some well known oxide, which is mixed with aluminum in the form of white powder. This material is known as "thermit." When ignited at one point the combustion extends to every other particle, creating an intense heat, which is now being utilized in many ways, but chiefly as a means of welding heavy pieces of rails, beams and machinery, such as shafts, etc.

GOLD may be precipitated from chlorine solutions by means of sulphurous anhydride (SO<sub>2</sub>). This process is employed at chlorination works at Angels, Cal., with success. Formerly, in the same works, ferrous sulphate solution was used for the purpose. The SO<sub>2</sub> is said to work as well and is more satisfactory. The gold is not permitted to settle in the vat into which the SO<sub>2</sub> is introduced, but the solution is agitated with compressed air, keeping the gold precipitate in suspension in the tank, from which it is drawn off and run through a filter consisting of several boxes filled with sawdust. When the filters are fully charged the sawdust is removed, dried and incinerated in a suitable retort and the resultant gold and ash smelted with suitable fluxes in a crucible.

THE statute permits a locator to take 1500 feet of unoccupied mineral land for each location made. This measurement is made horizontally along the outcrop or in its general direction, as determined by an outcrop extending a portion of the length of the claim. If the length of a claim were measured up the slope of a steep hillside, the locator would get considerably less than 1500 feet. A ledge or vein discovered in a tunnel may be located on the surface, in such manner that the apex shall be included where it should appear on the surface. If, however, the apex should be found later by another not to be within the claim as located, the original locator would lose his extralateral right. Therefore, it is better to discover the apex, if possible, by sinking shafts or by raising on the vein to the surface.

THE greatest geyser in the world is said to be that at Rotura, in New Zealand, where a geyser spouts from a boiling lake to a height of 900 to 1000 feet and over. The column consists of boiling water, steam, stones and mud. Its period of eruption is uncertain, but averages twenty-two times monthly. Within a year several tourists who approached too closely to the rim were overwhelmed by the eruption. The cause of the eruption of geysers is probably due to the formation of steam in the neck of the vent, beneath the water, which, on gathering sufficient force, violently ejects the water in a cloud of liquid, spray and steam. The greater the depth at which the steam is generated or finds a suitable chamber for collecting its force, the longer the interval and usually the more violent is the eruption. Why geysers become active when soap is thrown in the water is not known.

ALLOTROPIC minerals are those which present several varieties of physical appearance, while having the same chemical composition. Carbon exists in the form of the diamond as graphite, and as charcoal. Gold is stated by some to exist in allotropic forms, but these are of somewhat doubtful character. Gold exists in chemical combination with several other elements, in nature. Tellu-

rides and selenides of gold are examples. Ores of this character may contain higher values in gold, and still afford no indication of its existence by the ordinary methods of crushing and panning. Gold also forms combinations with oxygen, as aurous oxide (Au<sub>2</sub>O<sub>3</sub>) and auric oxide (Au<sub>2</sub>O<sub>3</sub>). A gold nugget which is much lighter than its size would indicate is probably of a spongy or cellular character, and would not properly be considered as an allotropic form of that metal.

COKE is usually employed all the time, or a portion of the time, in all of the so-called pyritic smelters of the United States, though where conditions are favorable "runs" are made of considerable length without the introduction to the furnace of other fuel than the sulphur in the ore, but occasionally coke is added to correct some defect in operations. A higher or lower temperature of the air blast, a variation in the pressure, high and low feeding, all have a direct influence on the running of the furnace. One may study the chemistry of blast furnace reactions in the office and the laboratory, but it requires actual experience about the furnace to make a smelter capable. The working of a furnace often destroys the student's preconceived notions, and causes him to introduce innovations and expedients not found in text books.

THE proposition to sink a drill hole near a shaft at Mogul, New Mexico, for the purpose of draining the shaft of water is ingenious, but it is of doubtful practicability. If the drill hole be located near enough to the shaft to affect the water in the shaft when a pump is in operation, the probability is that blasting in the shaft would so shatter the rocks that pumping would become impossible unless casing were used in the hole. If the drill hole be located far enough from the shaft to remain undisturbed by blasting in the shaft, it is doubtful if the water flowing into the shaft would be influenced to a sufficient extent to justify the expense of the drill hole and pump. A better scheme would be to put in a sinking pump—a small one at first, and substituting a larger one when it became necessary by increase of water. As the pumping must be done, it may as well be done in the shaft at once. There will be no difficulty in obtaining a sinking pump which will handle all the water that will probably be met to a depth of 500 feet.

THE right of the owner of a valid subsisting lode claim to follow his vein downward, outside of his claim side lines and beneath an agricultural patent, the title of which grant passed prior to the location of the mining claim, has never been determined by the United States Supreme Court, though Judge Sawyer, in the Ninth Circuit Court, in the case of the Amador-Medan G. M. Co. v. the South Spring Hill G. M. Co., ruled in the negative. The case was appealed to the United States Supreme Court, but, before the case came up for argument, both properties involved in the suit passed to a third party and the suit was quashed. In "Lindley on Mines" the author does not agree with the opinion of Judge Sawyer, and says: "The land covered by an agricultural patent is conclusively deemed to be agricultural, but this does not necessarily imply that a lode under its surface, apexing outside it, cannot be reserved without impeaching the patent and changing the legal character of the land. The two classes of grant may exist without conflicting in a legal sense."

AS THE statement from Director of the U. S. Mint Roberts, which appeared in the issue of the 9th inst., is uncontradicted by him, it is assumed to be a correct report of his assertion, viz., that there would be no more new silver dollars coined in any U. S. mint, and that the silver bullion purchased under the Sherman law is all minted. The Idaho, Colorado and Mexico inquiries are based on a mistaken premise. It has been ten years since there was any purchase of silver bullion under the Sherman Act. The accumulated bullion so purchased is now all coined. The Silver Coinage bill was passed as an intended reinforcement to the resumption act, resumption having been primarily on a gold basis. It is true that Congress can order the recoinage of silver, the purchase of silver bullion for such purpose, or anything else looking to a readjustment of specie payment conditions; but it is not likely so to do, nor is it at all probable that any material change from present conditions will be seriously contemplated by the present national legislature or its immediate successors.

THE chute doors of coarse-ore cinnabar roasting furnaces are usually made of cast iron, and are much heavier than the steel sheet doors of mine chutes generally. This is due to the fact that the ore is still very hot when it reaches the point of discharge, and an ordinary door is quickly so badly warped by the heat as to become useless. Quicksilver furnaces are sometimes run from two to four years without allowing the fires to go down. It is desirable to keep up fires in brick furnaces as long as possible, as the furnace usually suffers considerable damage from shrinkage and expansion when allowed to cool and the fires are again started. A quicksilver reduction furnace needs, of necessity, to be free from open shrinkage cracks, or those caused by expansion, as gases escaping into the air from such a furnace would be fatal to men employed about. The ore is not smelted, merely roasted, the heat only being sufficiently high to reduce the cinnabar from the mineral to the gaseous condition, from which it condenses into the liquid. The material treated ranges from screenings to pieces of ore 6 to 8 inches in diameter.



## California Mining Exhibit at St. Louis.\*

From Our World's Fair Special Correspondent.

The California mining exhibit at the World's Exposition, St. Louis, Mo., is located in section 71 of the Palace of Mines and Metallurgy, and near its southwest corner. The exhibit occupies a space of 43x103 feet.

At the entrance of the exhibit a beautiful arch has been constructed, which is representative of the structural materials of California. This arch furnishes in a practical manner an idea of the diversity of building materials to be obtained in California. While many States have adopted the scheme of archways for entrances to their exhibits, the California arch is said by many to surpass all others in magnitude, beauty of design and variety of materials. The arch, which was designed by State Mineralogist Lewis E. Aubury, who is also chief of the mining department, is 25 feet in height, 17 feet in length, 6 feet thick, and has an entrance 7 feet in width. The arch is composed of the following material, furnished by various firms, individuals and quarries as follows:

**GRANITE.**—Raymond quarry, Madera county, Raymond Granite Co.; Santee quarry, San Diego county, San Diego county; Folsom quarry, Sacramento county, State of California; Declez quarry, Riverside county, Los Angeles Times; Rocklin quarry, Placer county, Rocklin Granite Co.; Declez quarry, Riverside county, Los Angeles Express.

**SANDSTONE.**—Colusa quarry, Colusa county, Colusa Sandstone Co.; Sespe Canyon quarry, Ventura county, Ventura county; Alamo quarry, Solano county, Solano county; Caen quarry, San Luis Obispo county, E. S. Hoyt; Stony Point quarry, Sonoma county, Petaluma & Santa Rosa R. R. Co.; Contra Costa quarry, Contra Costa county, Wilson, Lyon & Co.; San Jose quarry, Santa Clara county, Jno. McGilvray.

**MARBLE.**—Columbia quarry, Tuolumne county, Columbia Marble Co.; Colton quarry, San Bernardino county, Colton Marble Co.; Artificial Marble (Mosaic), Henry Gervais, San Francisco.

**TERRA COTTA.**—N. Clark & Sons, San Francisco; Steiger Terra Cotta Co., San Francisco; Medallions (Seal of California and bears' heads), Gladding, McBean & Co., of San Francisco.

**GLAZED BRICK.**—Gladding, McBean & Co., San Francisco.

**TILING.**—Pacific Art Tile Co., Los Angeles.

**SLATE.**—Slatington quarry, El Dorado county, Eureka Slate Co.

**PRESSED BRICK.**—Los Angeles Pressed Brick Co.

It will be seen by the above list of exhibits that the material for the construction of the arch has been gathered from widely different sources, and the impartiality which has been shown in the selection of materials gives no particular section of the State any advantage over others.

The story of the selection and collection of the material which composes the arch is an unwritten one, and no one but the State Mineralogist can appreciate the difficulties which were encountered, and which have been surmounted, in giving to the California exhibit the finest entrance to any exhibit which that State has ever made.

After passing through the arch, the visitor first sees the model exhibit. Here are arranged a complete working model of a 5-stamp gold quartz mill, illustrating California mill practices. A tunnel is shown from which a carload of ore is run to the mill and the course of the ore can be readily traced from the time it is run over the "grizzly" down to the rock breaker, into the ore bins, to the feeder, and thence to the mortar, where it is crushed by the stamps. The process of amalgamating the gold and concentration of the sulphurets, together with other mechanical operations common to gold mills, are also shown. This mill was built by the Union Iron Works of San Francisco, and is exhibited by the California State Mining Bureau.

Adjoining the mill is a complete working model of a cyanide plant, exhibited by the Pacific Tank Co. of San Francisco and Los Angeles. An elevator lifts the tailings after they have been treated by amalgamation and concentration into a bin, from which they are distributed to the leaching tanks. Here a cyanide solution is allowed to percolate through the tailings, and most of the remaining gold not extracted by milling methods is taken into solution. From the leaching tanks the solution is run to the zinc boxes, where the gold is precipitated. The solution being freed of its gold contents is run to the sump tanks and is pumped back to be again used.

With the models the visitor is able to obtain a clear conception of the manner of gold extraction from quartz.

The method of handling gold-bearing gravel from the drift mines and the washing to recover the gold contents is shown by a model exhibited by the Hidden Treasure mine of Placer county, of which Harold T. Power is manager. Like the models already described, this practical model fully illustrates the practice in gravel mining operations.

Another model of much interest is exhibited by R.

H. Herron of San Francisco and Los Angeles. This model shows an oil derrick, with complete drilling rig.

Last, but not least, is an old rocker used in the early days of California, which illustrates the crude methods in vogue at that time. A number of mining curios and implements used in placer mining are also shown with this exhibit.

**PETROLEUM AND ASPHALT.**—Adjoining the model department, the authentic collection of California petroleum is exhibited. Here are shown first the different geological surface formations in which petroleum is found. With these are shown samples of oil sands taken from the different districts at various depths as they were taken from the wells. Duplicate samples show the same sand after having been washed and freed from its petroleum.

There are also included in the oil collection sixty-two samples (quarts) of oil which were taken from representative wells in all oil producing districts in the State; also twenty-four two-gallon samples taken from the different districts. With these are shown all the different grades of refined oils, illustrating the products of California petroleum. Then there are large samples of natural and refined asphalt, bituminous rock, California coal and coal formations, briquettes, etc.

Blocks or sections of oiled roads are also on exhibition, and the State Mineralogist loses no opportunity to expatiate on the superiority of oiled roads and the advantages of California petroleum in general.

In the corridor of the Mines Building is an annex to the oil exhibit. In this exhibit are shown an oil tank wagon and White oil distributor, and also a distributor manufactured at Stockton, Cal. Both of these are of the type used in oiling roads.

In the main oil exhibit is a photograph cabinet where the visitor can inspect views of everything pertaining to the oil industry. Here it is well to state that with the different mineral products and in each section of the exhibit, photo cabinets are arranged, and the finest collection of views of different classes of California mines and quarries, deposits, mills, etc., ever attempted, has been made.

With the oil exhibit is also exhibited and distributed literature published by the State Mining Bureau, giving reliable information concerning each sample of oil and a general description of the wells, names of owners, etc., also furnishing a commercial analysis of each sample.

To the side of the oil exhibit a stand some 12 feet high has been erected, on which is exhibited eighteen different mineral waters of California. The diversity of these waters occasions much surprise, and many inquiries are made concerning the same.

Parallel with the oil exhibit is the structural and industrial exhibit, in which are shown clays, limestone, mineral paint, blocks of building stone, the various classes of brick, terra cotta, tiling, soda, gypsum, cement from three different plants (showing cement in its different courses of manufacture), magnesite and its products, slate, asbestos, graphite, marble, glass sands, pottery, and many other products too numerous to mention are also shown.

With this exhibit a pyramid of nitrate of soda from the deposits of Death valley, Inyo county, is also shown. This is the only exhibit of its kind displayed in the Mines Building, California being the only State in the Union producing it.

Next to the niter exhibit a large block of diatomaceous earth from Santa Barbara county has been placed.

On each side of the main exhibit and facing the aisles the large show cases have been arranged, consisting of five on each side. Between each case large stands have been placed on which are arranged, pyramid shape, massive pieces of ore. The ores are arranged or classified by subject. Five stands and two show cases are devoted to copper ores, which are to the right of the arch. Next to the copper exhibit two cases of cinnabar ores, with two stands containing massive samples of the ores, have been placed. There is also an exhibit of native mercury from Solano county.

The copper ores are representative samples. The most prominent mines as well as many prospects are here represented. On two stands erected at the east entrance of the exhibit are shown large pieces of copper sulphide ores from Shasta county, the smallest pieces weighing 650 pounds and the largest over 1800 pounds. Bars of blister copper, flue dust and briquettes are also features of the copper exhibit.

Next to the cinnabar exhibit, massive samples of gold-bearing quartz from Tuolumne and Calaveras counties are displayed. Here we have a show case containing miscellaneous ores. Next that is a massive display of ores from San Bernardino county. Adjoining this is a large stand containing gold quartz from representative mines of Nevada county. Near this is also the large Empire block of ore, weighing 2200 pounds.

To the left of the arch is arranged on the aisle most of the gold quartz exhibit. Four large cases are devoted to the smaller-sized pieces and nine stands contain pyramids of the massive samples of ore. These ores are from all the counties but Nevada, that county having made a special exhibit.

The gold ores of the State, like the balance of the

exhibit, are as nearly representative of the average ore as it was possible to obtain. These ores were collected from Siskiyou to San Diego. The exhibit differs materially from those of past Expositions, insofar as no attempt was made to display gold specimens, with the exception of some \$2000 worth of gold quartz specimens purchased by the commissioners. The losses at previous Expositions of many fine specimens caused the State Mineralogist to refuse to accept any loans, unless the commissioners would furnish bonds. This they refused to do. Therefore, Mr. Aubury did not feel that he should assume personal responsibility for their safe return. Hence a large collection of fine specimens was not obtained.

Leaving the gold ores, one is attracted to what is the rarest and one of the most beautiful exhibits in the mines building, at the same time one of the most unique, viz., the lepidolite or lithia mica exhibit, the apex of which can be seen from most parts of the building. When this exhibit is seen from a distance, the visitor at once determines on a closer inspection. To the mineralogist, a large exhibit of this nature excites his wonder, while to the casual visitor the crystals of rubellite showing in the lithia mica, and the variety of coloring in the formation, appeals to the artistic fancy. Many demands for a specimen of the lepidolite have been made by visitors to the California exhibit.

In the construction of this exhibit, twenty-three tons of material were used. The exhibit is 12 feet in diameter at the floor, and rises dome shaped to a height of 9 feet. Surmounting the dome is a column 16 feet in height and 2 feet in diameter, or a total height of 25 feet. On the apex of the column is a ball 3 feet in diameter, in the center of which is a belt of crystallized quartz.

Below the floor an inverted dome extends to a depth of 8 feet, thus forming a grotto 17x12 feet. The grotto has four openings, from which a view of the interior, which is lit by electricity, can be seen. The lepidolite used is of variegated colors, from the white silvery gray to violet, and with the pink, green and black crystals of tourmaline form a most beautiful combination.

While it is recognized that the production of lithia mica is of comparatively minor importance, it being a new industry in California at this time, it is exciting much interest on account of the gems tourmaline and kunzite which are found in the formation. During the year 1902 tourmalines to the value of \$150,000 were produced, while lithia mica to the value of \$31,880 was also produced. The statistics for 1903 will undoubtedly show a large increase in the output of tourmalines, and to this will be added a large production of kunzite. San Diego county is believed to be the only place in the world where the latter gem has been found.

Potash minerals, besides the lithia, are also contained in the ore. Since the discovery of the gems in this formation, which caused much local excitement, the formation has been traced and several new deposits have been found.

The lepidolite exhibit was collected and shipped by the county of San Diego, not for the purpose of advertising any particular deposit, of which there are several, but in a general way to call attention to the mineral possibilities of the county.

Close to the lepidolite exhibit are two cases of the gems tourmaline and kunzite. These gems are shown in the rough and with the formations in which they are found; the cut and polished gems are also shown. These collections were loaned to the State Mineralogist of California by Schernikow & Co. and Tiffany & Co. of New York and by Frank Salmon of Pala, Cal.

Every variety of tourmaline is shown, and some exceptionally large and valuable specimens of kunzite are displayed.

Prominent among the exhibits is that of borax, which occupies a space of 20x20 feet and adjoins the lepidolite. The Pacific Coast Borax Co. has a fine exhibit of both crude and refined borax, showing the latter in several different forms. Booths constructed of crystallized borax serve to make the borax exhibit an attractive one. Moving pictures, showing Death valley and vicinity, methods of mining borax, as well as other California views, are a feature of this display. California produces practically all the borax consumed in the United States, having produced in 1902 of borax and boric acid 17,202 tons, at a value of \$2,234,994.

The Pacific Coast Borax Co. is also presenting one of the novel features of the Fair, which serves to advertise California borax, in connection with the exhibit displayed in the Mines Building. A twenty-mule team, with main wagon, trailer and water wagon, are driven about the grounds by "Borax Bill" (Parkinson), whose driving with a "jerk line" excites the wonderment of the public. Free rides are given to those who wish to enjoy the novelty of riding on a "desert auto," and behind one of the finest mule teams California can produce. The team and wagons were brought from San Bernardino county and are one of the "sights" of the Fair.

On one side of the borax exhibit are cases devoted to silver, lead and iron ores, and to minerals of a miscellaneous nature of minor importance. Large stands are also filled with iron and manganese ores.

Here also is a case containing gold quartz specimens and placer gold, which were purchased, and of



which about \$2000 worth are shown. There are also plaster casts of various historical nuggets which have been found, among which is the Marshall nugget.

Back of the borax exhibit Nevada county has placed a mineral cabinet 20 feet long and 11 feet high. In this cabinet are specimens of ores from all the prominent mines in Nevada county, and a collection of placer gold. As at past Expositions, Nevada county—the leading gold county of the State—presents a beautiful collection of gold ores, many fine specimens being exhibited. In addition to the gold cabinet, two large stands are devoted to massive gold quartz. A prominent feature of the Nevada county exhibit is the cabinet of gold specimens presented to President Roosevelt on his visit to California by the citizens of Nevada county. The cabinet is secured by a gold padlock and key. This cabinet attracts much attention and is always surrounded by a crowd of admiring visitors.

At the rear of the main exhibit an information bureau has been erected. Here information published by the State Mining Bureau is being distributed, and the reports and bulletins of this department can be consulted in the booth erected for that purpose, and information is furnished concerning the mineral deposits of the State and all branches of the industry.

In this booth are on file various papers published in California.

Dividing the California and Colorado exhibits is a large partition. On this is displayed a large relief map of the State, with mineral maps of the counties,



California Mineral Exhibit Looking South, St. Louis Exposition.

showing the location of mines and deposits. An oil portrait of Marshall, the discoverer of gold in California, occupies a prominent position. Enlarged photographs are also displayed, as well as the photographs displayed in a cabinet for that purpose close at hand.

At one end of this exhibit has been placed an old Mexican ladder, used in the early days; also a seron, or leather bag, which was used by the miners in carrying ores from the mines.

Conspicuously displayed over the exhibit in various places are green silk banners, bordered with gold, on which are lettered the value of and amount of production of the various mineral substances. A large gilded cube shows the average annual production of gold in California.

It would seem that every means had been used by Mr. Aubury throughout the exhibit to properly label and display to the best advantage California minerals, but, while the space occupied by the exhibit is larger than that of any other, had it been greater the exhibit could have been shown to better advantage.

Considering the many adverse conditions met with in collecting and installing the most varied display of any State or country, and with almost no assistance from the mining counties, it is remarkable that such a display has been made.

**OUTSIDE EXHIBIT.**—Situated in California Gulch,  $\frac{1}{2}$  mile southwest of the Mines and Metallurgy Building, is the milling exhibit, which occupies a space of 200x300 feet. A substantial mill building 60x60 feet has been erected, and in this has been installed a complete Hendy 3-stamp mill, which is now ready for operation. Next to the Hendy mill a Lane 7-foot

rotary mill of the Chilean type has been placed.

Below the mills are three different types of concentrators, viz., the Pinder, New Standard and Woodbury, which are all complete and ready for operation. In the building is also erected a Mitchell slag steam generator.

Outside of the mill is located an old wooden stamp mill. This mill was erected in Shasta county in 1853, being the third erected in California. It will prove of much interest as showing the crude methods of quartz crushing in early days, as compared with those in use at the present time.

Mr. Aubury has at comparatively small expense put in a modern milling plant, and one which will reflect credit on the California mining exhibit.

Under the direction of practical mine operators, an exhibit of the Pennsylvania anthracite mines has been prepared in the mining gulch at the World's Fair. In a ride on mine cars through the underground passages of a great anthracite mine, visitors will see exemplified the life of the 145,000 men and boys.

Mining scenes are reproduced in underground chambers. Life-sized figures of men and animals, moving automatically, are used. They start in the mine buildings on the surface and run through tunnels in the coal 1260 feet long. The mine buildings are 236 feet long, 80 feet wide and 60 feet high, being reproductions of those used in the anthracite field. There are eight typical mine scenes illustrated in the underground passages along the line of the electric tramway. One shows the miners as they are going down to their work in the morning. Three shifts of miners go down daily, each for eight hours' work.

Another one shows the slate pickers at their task of sorting the slate from the coal in order that they may send clean coal to the market. This work is done by boys who work eight hours a day, seated on narrow boards across the top of the chutes. A third scene shows a party of miners at meal time and recreation, while a companion scene shows miners at work with a pick and drill getting the coal ready to be carted out of the mine. The fourth scene shows the horrors of a flooded mine in which a party of miners were imprisoned waist deep in water for nine days without food or drink.

Another scene illustrates the constant danger to miners. This is an explosion scene which is usually caused by fire damp or a short time fuse that makes a premature blast, often killing the miners and mules in its immediate vicinity. The injured are cared for in an emergency hospital which is maintained at the foot of the shaft in the mine.

In another scene the visitor gets a view of an underground stable where the mules, blinded by their life underground, spend their days, never going above ground except when the mine is shut down for a long time.

The last scene shows the miners coming out from their day's work ready to go to their homes. Altogether the exhibit is a realistic one, and the ride through it on the tram cars is veritably

a scenic railway on which hundreds daily have the pleasure of being instructed in the features of one of the great industries of the United States. The mine is located in the mining gulch opposite the Maine State building.

**THE MISSOURI LEAD AND ZINC MINE.**—This is a reproduction of a typical mine in the Joplin district of southwest Missouri showing how lead, zinc and marcassite occurs in the ground. The mine was reproduced by miners of many years experience in the Joplin district and is as true to nature as it is possible to be made.

In the "calcite room" is said to be one of the finest exhibits of beautiful specimens ever collected. The collection of lead ores contains every specimen that could be found in years of research, some of them being valued at hundreds of dollars. One especially beautiful specimen weighs about 150 pounds and shows rare peacock hues that make it extremely beautiful.

The mine is also so constructed as to show the method of timbering in mines. The mine is cooled by a 6-foot fan which makes it possibly the coolest spot on the entire Exposition grounds.

**THE CARIZZO COPPER EXHIBIT.**—This exhibit shows a primitive copper mining camp operated by Mexican Indians. All the work is done entirely by hand. The ore is first crushed, then washed in wooden dug-out troughs in order to wash away the useless material. It is then put into a large furnace and roasted for forty-eight hours, in order to desulphurize the ore, after which it is put in the smelter with charcoal and smelted, the ore running down and forming in a molten mass in a small pit at the base of the smelter. The copper is then separated from the cooled mass

and is again melted in order to rid it of impurities, after which it is cut into small pieces and hammered into various forms of copper vessels by a half dozen Aztecs who stand around an old-time anvil and beat the copper into thin sheets. After this it is worked into the various designs intended.

Senor Timoteo Panduro, a sculptor, entertains visitors in his art of making busts.

**THE CRYSTAL WIND CAVE.**—A party of citizens of Deadwood, South Dakota, wishing to show one of the State's most wonderful natural curiosities, has reproduced in detail many of the most beautiful chambers of the original cave, showing some of the finest specimens of stalagmites and stalactites brought from the original cave, which is owned by the United States Government. About 300,000 pounds of crystals were used in reproducing this cave, and it is one of the most remarkably beautiful exhibits that has ever been the feature of any exposition.

## Gold Milling.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by  
ALGERNON DEL MAR.

Clean-ups may take place once or twice a month, according to the richness of the ore or other reasons. The first thing to do is to hang up the feeder and stamp the battery as dry as safety will permit, the object being to leave as little sand in the battery as possible. Next hang up the stamps on the fingers and turn off the water. Then rub up the plates with a whisk broom, beginning at the upper plate, and take off with rubber and scoop all the loose amalgam. A little mercury sprinkled on the plates from a canvas-covered bottle or a canvas bag before rubbing up will often help if the amalgam is thick or hard. This is the same procedure followed for the daily clean-ups of the battery plates. If a splash plate is used, this is taken off, washed and scraped. Then knock out the iron wedges, take off the screen and lay aside for washing. Take out the chuck block, lip plate and back plate and scrape off the amalgam. The scraping tools may be an iron chisel, an old file with a chisel edge or a putty knife. Then take out the sand and the dies. If the false linings of the mortar do not fit close, these may be taken out. The sand and all the scraps that are not pure amalgam, including all iron holding amalgam, go into the clean-up barrel, where a quantity of mercury is added and the barrel revolved for four or five hours—sometimes longer—and then washed out. The excess of mercury may then be squeezed through canvas or buckskin, after using a magnet to extract iron particles.

If new dies are needed, these are put in the mortar, first spreading a layer of about half an inch of sand to protect the bottom of the mortar. They are then held in place with iron wedges or simply tamped with coarse rock. If new shoes are required, the old ones are forced off with a steel wedge and the new ones put on. The wooden wedges that hold the shank of the shoe to the boss may be held in place by tacking to a strip of canvas or by a piece of string. These wedges should be thick enough to prevent the shoe from coming into contact with the boss, or the iron rings that are shrunk on the boss to strengthen it may loosen. The tappets are then loosened and set to give the stamp the required drop, the back plate is put in and bolted to the mortar, the lip plate, chuck block and screen put in and wedged, and the battery plates sprinkled with mercury and well brushed.

There is some difference of opinion whether plates brushed transversely or lengthwise give the best results. The former leave riffles and hold sulphurets, while the latter allow the sulphurets to pass off and, I believe, give as good results. A compromise might be made by brushing at an angle toward the center and down.

The splash plate is then put in and the battery is ready for the water to be turned on, the feeder prepared for starting and the stamps let drop. In starting a battery it is preferable to let the middle stamp drop first, then the two outer ones. This starts the screen discharge better than if let drop in succession.

The amalgam from the various sources of the clean-up is rather dirty, being mixed with sulphurets and iron. The coarse iron is eliminated by diluting with mercury and using a magnet, while the sulphurets and fine iron are got rid of by grinding in an amalgam grinder with a flow of water. To save time this grinding is continued long enough to get the amalgam homogeneous and the impurities sufficiently fine to be able to use a magnet and pan. A copper bottom pan is useful for this purpose. The amalgam is then squeezed through buckskin or canvas, the resulting balls of amalgam being ready for the retort and the smelting furnace. These last two operations the assayer has charge of, so will not be further considered here.

It is presumed that the beginner has some knowledge of boilers and engines; at all events it would probably be best for him to start where he can get an idea of the mill routine. A job on the concentrator floor or on the rock breaker gives one a good



start, especially the former, as he may be often called to help the mill men.

The first lesson to learn is the feed of the battery, so that he can judge by the wave on the screen and the "feel" of the stamps whether too much or too little ore is being fed. As he becomes more expert, the sound produced by the falling stamps will tell him a great deal more. Do not get the screen covered with ore so that no splash is seen, or do not let the battery get so dry that the clank of iron on iron is heard. The former will necessitate hanging up the feeder or, maybe, taking off the screen and cleaning out the mortar, and the latter may cause a broken stem and the consequent hanging up of the battery and stripping of stem.

Another duty which the novice must soon learn to perform, and one involving some personal risk, is the hanging up of the stamps. To one unacquainted with this operation, who sees an old practiced hand quickly hang up a mill of sixty stamps, it seems easy; but it is quite the contrary and requires quickness, knack and muscle. However, it is something easily acquired with a little instruction and experience.

The second lesson is to amalgamate properly. It is better to feed a little mercury often than a larger amount at long intervals. Do not use oil on cam shafts, but some compound or axle grease, and do not let any get to the mortar. Use ordinary sense, and, if anything goes wrong, keep cool and either hang up the battery or slow the engine down and find the trouble.

## Mining and Ore Treatment in Western Australia.\*

NUMBER III.

Written by DONALD CLARK.

When ore was first treated at the Boulder it was assumed that the old-time methods would be good enough; the gold was got, the tailings were waste products. Battery work, followed by pan amalgamation, was looked upon as perfect. Fortunately there were no running rivers in which they could hide evidences of bad work. Tailings heaps remained to be sampled, and the army of assayers and scientists from other States, Germany, England and America, showed that altered methods were necessary. The tailings heaps were cyanided, and the difficulty of extraction was declared to be overcome; roasting and cyaniding were introduced, and yet the recovery of gold was not satisfactory. Rich tailings were hidden and buried in the stopes of some mines. A new word was necessary, since the tailings from such operations were rich enough to be re-treated. Residues was applied to such payable sand, and tailings to the final material going over the dump. Then commenced a series of rival methods of treatment. Claims were always put forward for over 90% extractions. Yet even after this tailings often became residues, from which as much as 16 dwt. per ton were extracted. Each man did what was right in his own eyes, and though in many instances the process has been fearfully extravagant so far as companies are concerned, as silently testified by the "hospitals" or masses of unused or discarded machinery; yet out of the chaos has emerged a few interesting and original processes, which will serve as stepping stones to future advancement. The end is not yet come. Even now the rivalry does not appear to have ended; tailings heaps are said to be guarded in some instances against would-be intruders, who are anxious to know the value of the tails, "for fear tellurides might be stolen," as one manager facetiously remarked.

From a treatment point of view, the Boulder ores cannot be looked upon as specially refractory. For instance, they cannot be compared with those at Bethanga or Cassilis in Victoria, nor with many ores in central and northern Queensland. There are two difficulties to contend with, the former being due to the presence of tellurides, the second that the gold is so fine and so encased that the finest grinding is necessary to free it. Treatment with special solvents, such as cyanide of potassium, with bromo-cyanide, or roasting, is necessary to overcome the first difficulty, while the second necessitates sliming the whole of the ore and the attendant difficulties in treating it.

The Great Boulder Co. started with the battery and pan amalgamation system, but afterwards, with the knowledge gained from the nature of the ore, erected a special plant to deal with the same; while the tailings which had accumulated were dealt with specially also. Analyses of the oxidized sulphide ores are given:

	Oxidized.		Sulphide.
SiO <sub>2</sub> .....	65.80	SiO <sub>2</sub> .....	74.85
Al <sub>2</sub> O <sub>3</sub> .....	8.44	Al <sub>2</sub> O <sub>3</sub> .....	1.75
Fe <sub>2</sub> O <sub>3</sub> .....	17.39	FeS .....	5.40
Fe <sub>3</sub> O <sub>4</sub> .....	0.46	FeCO <sub>3</sub> .....	8.22
CaO .....	0.37	CaCO <sub>3</sub> .....	7.03
MgO .....	0.13	MgCO <sub>3</sub> .....	4.76
NaCl .....	0.50	K <sub>2</sub> O Na <sub>2</sub> O .....	1.40
H <sub>2</sub> O (combined) .....	5.15	H <sub>2</sub> O (combined) .....	.25
	99.24		98.76

As previously mentioned, there are two distinct classes of machinery for the treatment of the oxidized and sulphide ores. The oxidized ore and a portion of

the sulphide free from telluride is put through the usual stamp battery, followed by amalgamation and cyaniding. The machinery for treating the sulphide is of an altogether different type, the ore being dry crushed, roasted, pan amalgamated, and cyanided. The ore is brought from the main shaft in box cars, having a capacity of 14 cwt. each. These are pushed into a kick-up, and discharge their contents into a No. 5 Gates breaker fitted with a manganese steel mantle instead of the ordinary chilled solid head. One mantle in use crushed 80,000 tons of rock from pieces up to a hundredweight down to a gauge of 2 inches before it was replaced. This breaker is driven by a 14-inch rubber belt, from a 5-foot 6-inch friction clutch pulley placed 60 feet from the breaker. The breaker wheel runs 400 revolutions per minute, and absorbs about 50 H. P. Its capacity is 170 tons in eight hours. The broken material is delivered into a revolving trommel, having inch screens. The fines when dry drop on to a 14-inch belt conveyor, and are carried direct to the mill bin; if they contain more than 3% of water they are passed through a Howell White pattern revolving drier, and then elevated to the bins. The coarse lumps from the trommel fall on to a grasshopper conveyor, having discharge doors 6 feet apart; these doors are regulated so that a 500-ton bin may be evenly filled. The ore is taken from this bin by three automatic feeders, and dropped on to shaking troughs, which deliver it into three breakers, each having a capacity of 100 tons per twenty-four hours, crushing the rock down to 1 inch gauge. These are driven at 600 revolutions per minute. The crushed ore falls on to a 14-inch conveyor, thence into a truck, which is tipped into the mill bin. The ore is broken, crushed and pulverized in a rotary mill. By means of a fan fixed on a shaft, the pulverized ore is blown through the screen, and falls through a series of slots into a receptacle below, whence it is continuously removed by means of a spiral conveyor. The pans and screens are encased in an iron cover, while on top is fastened a conical shield, through which the shaft works. At the Boulder, the annular space between the shaft and the top of the shield is usually covered by a piece of bagging to prevent dusting. The mills are fed automatically, and on the under side of the roll or disc are ploughs or shoes, which prevent the ore from packing below. They scoop up the uncrushed material, and throw it between the ring and disc. The disc, which is capable of rotation on the shaft, travels round the ring, revolving in an opposite direction to the swinging circle described by the shaft. The pressure between the roll and ring is said to amount to about 6000 pounds.

A remarkable feature is the fineness of the product from a comparatively coarse screen. For instance, at the Boulder, where a 15 woven wire mesh is used, it is found that 80% will pass through a 120-mesh screen. The pulley is driven at a speed of 135 to 150 revolutions per minute.

The dust is drawn away from the mills through a zig-zag pipe by a fan and settled in a large chamber. The pulverized ore is conveyed by a spiral conveyor to a double push conveyor 180 feet long. From this the ore is distributed to twelve shoots, each leading to an Edwards furnace. They are of the standard type, 64 feet long, swung on trunnions, and set for the local ore with an elevation of 15 inches. The upper rabbles are plain cast-iron; the lower ones are water-jacketed. When wood is used for fueling, 15% of the weight of the ore is found to be necessary. It was discovered in roasting this ore that the furnace was unnecessarily long for the operation. If any roasting went on in the upper portion the lower part became too hot and led to fusion of the ground material; the ore in itself, containing such a small quantity of sulphur, supplied such a small amount of heat to the furnace that the conditions which held with concentrates did not apply. In order to supply sufficient heat, so that the temperature should be high enough to induce the necessary chemical changes, recourse was had to gas firing. This was supplied through the crown of the furnace at various points, and has overcome the difficulty. They are fed with coal, saw-dust, chips, and like materials. The gas so produced is led away to any part of the furnace which requires it. The roasted ore contains from 2% to 3½% of sulphur as sulphates, and .18% to .2% of sulphur as sulphide.

At the Great Boulder mine the furnace in use consists of three hearths, superimposed above each other, each hearth being 23 feet long, 8 feet wide, and about 12 inches from the floor of one hearth to the bottom of the next, the hearths themselves being about 12 inches thick. The ore is delivered automatically into a hopper on top of the last hearth near the flue end; from the hopper it is fed on to the first hearth. It is worked automatically by rabbles until it comes to the end; from this it may be dropped through a discharge chute on to the second hearth, along which another set of rabbles cause it to travel towards the flue end; from this it drops on to the third floor, and it travels along this towards the fire-box end. It drops through a chute on to a short fourth floor, where it either can be in the hot-test part of the furnace, or be worked with a single rabble, after which it may be discharged.

The modification of this furnace for silver roasting or chloridizing is arranged by having a chute from the last hearth mentioned discharging into a revol-

ving cylinder, which has a movable fire-box at one end.

There are four rabbles working on each hearth, each being 4 feet in length. Three revolve in one direction, and are always in the same or in parallel lines; the fourth revolves in the opposite direction, and is at right angles to the others. The rabbles are attached to vertical shafts, of which there are four, through the three-hearth furnace, and one through the single hearth. Those through the three hearths are 5 feet apart, and pass through the bottom floor to an archway, where each is supported on a foot-step. They are all water-jacketed, and are driven at a uniform rate by bevelled cogwheels attached to a horizontal shaft working into corresponding wheels on the upper end of the vertical shaft. Provision has been made for removing or replacing rabbles without having to cool down the furnace. Inspection doors are provided on each floor opposite the rabbles. The furnace is stayed by means of railway rails placed as girders, and connected together above and below the hearths.

The cylinder on the chloridizing furnace is 10 feet long and 6 feet in diameter. It is lined with fire-brick, arranged so as to taper from the feed to the discharge end. The movable fire-box is a brick-lined furnace set on wheels. The flue passes into the center of the end of the cylinder.

The air is allowed to pass into the ordinary furnace through the fire-box, where it is partly consumed; the excess of oxygen in air, the nitrogen, and products of combustion pass over the ore lying on the last hearth, thence over a short bridge along the third hearth. At this point, if desired, the gases may be sent through the flue without traversing the upper hearths at all. Otherwise, as is usually the case, the air passes back over the second floor, and escapes through a flue capable of being closed by a damper on to the upper floor, from which it finally passes away.

(TO BE CONTINUED.)

## Jeffrey Grab Buckets.

Illustrated herewith is "Class A" grab bucket recently brought out by the Jeffrey Mfg. Co., of Colum-



bus, Ohio, for handling lump and run-of-mine coal, who say:

"Its path is such that it is absolutely self-filling under all conditions and the weight of the enclosed coal assists the bucket to close. The lines on which power is applied are such that the entire weight of bucket and load is utilized at closing with sufficient force to crush the largest lumps should they come between the scoops. These buckets are made in the most substantial manner to withstand hard usage, and in sizes of from 15 to 160 cubic feet capacity, and are used in unloading coal of any commercial size from cars, vessels or barges, for shipment or stocking, also for reloading from storage piles. A booklet describing this class of machinery is issued by the manufacturers, which they are pleased to send to all interested."

## Retorting Amalgam.

TO THE EDITOR:—Referring to "Concentrates" article of July 2, on the "Danger of Explosion From Retorting," I will say that there is a possibility, when not allowing the fire to go down during the retorting, to melt some gold in the bottom of the retort. The temperature of the fire is also difficult to control.

I have found satisfaction in using a retorting pipe which does not dip in the condensing water, but comes 1 or 2 inches above its surface, the end of said pipe being wrapped with a cloth which dips in the water, and shall be kept continuously wet by means of a sprinkler or a dipper. It is a little more trouble to take, but in my opinion the only way to be absolutely safe from explosion coming from the pressure of the air on the surface of the water.

N. E. IMHAUS.



## The Ore Deposits of Bisbee, Arizona.\*

NUMBER III.

Written by F. L. RANSOME.

Similar chalcocite and pyrite ore was noted on the fourth level in the old Dividend stope, northeast of the Holbrook shaft. Just above the same level, about 500 feet south of the Spray shaft, a stope has been opened on a mass of solid, compact chalcocite, intimately mixed with a little bornite. The chalcocite immediately overlies ferruginous oxidized material. Close to the copper glance, and cut in the drift near the stope, is a body of pyrite, the individual granules of which are in part covered by a black coating of chalcocite. Development had not gone far enough at the time of visit to discover what connection, if any, exists between this body of pyrite and the chalcocite ore body, or to show what overlies the latter. All of the ore is inclosed in altered mineralized limestone, into which the pyritic mass passes by insensible gradations.

Some chalcocite occurs on the fifth level of the Copper Queen mine, but it was not seen below this, in the deeper levels connected with the Spray shaft.

By no means all of the occurrences of chalcocite in the Copper Queen mine have been here recorded, but those mentioned are enough to indicate the general mode of its occurrence and distribution, and to illustrate its characteristic association with masses of pyrite on the one hand and with oxidized ores on the other.

In the Calumet & Arizona mine chalcocite is found associated with cuprite, limonite, malachite and brochantite (a basic sulphate of copper) in an ore body about 400 feet south of the shaft, on the 850-foot level.

On the 950-foot level the ore in what is known as "the big sulphide stope," about 650 feet east-northeast of the shaft, consists chiefly of pyrite, with which is intimately associated dull cryptocrystalline chalcocite in the form of a thin coating on some of the pyrite grains. At one point in the stope the ore consists of pyrite and chalcocite in a hard quartzose gangue. The microscope shows that the sulphides are embedded in a matrix of granular quartz. The chalcocite is seen to occur as an envelope about many of the pyrite grains and to fill microscopic fissures in the latter. This ore body shows incipient oxidation at a height of about 15 feet above the level.

Chalcocite in similar close association with pyrite is found also on the 1050-foot level, particularly in a body of mixed sulphide and oxide ore about 300 feet east of the shaft, where the chalcocite occurs as irregular envelopes around residual masses of lean pyrite. Chalcocite, in the condition of a soft, black powder, was noted also in the main drift on this level, 500 feet east of the shaft.

As a rule, on the 1050-foot level, wherever the pyritic masses are soft and traversed by fissures, they constitute workable ore. The miners know that when their picks leave dark, metallic marks the ore is good. Close examination of such ore always reveals the presence of chalcocite, and it is the shining streak of this mineral that gives the miner his rough but effective test.

In the Lowell mine chalcocite occurs on the 1000-foot level in a soft, black earthy form with partly oxidized pyrite, and on the 1100-foot level in a similar association. It is also found on the latter level in a more compact form, associated with pyrite, native copper and malachite, and resting upon a body of lean pyrite cut by the shaft.

Outside of the larger mines chalcocite is found irregularly but widely distributed through the large area of Glance conglomerate stretching from Gold Hill southward to the international boundary. The mineral occurs in minute reticulating veinlets, often microscopic in size, and in little rounded bunches, rarely over  $\frac{1}{4}$  inch in diameter, usually inclosed within a thin envelope of malachite. The chalcocite is usually accompanied by the development of a secondary quartz in veinlets and small vugs. Both chalcocite and quartz have in part filled minute fissures in the conglomerate, but have also in part replaced some of the finer interstitial, calcareous matrix by which the pebbles are held together.

The mass of conglomerate forming the hill just west of the Glance mine exhibits well the scattered mineralization just described. The occurrence of this chalcocite in the Glance conglomerate has led to extensive prospecting, which has not, however, revealed workable ore bodies.

About 1000 feet northwest of the No. 3 shaft of the Lake Superior & Pittsburg Co. chalcocite, altering to malachite, occurs in a little vein in Martin limestone. This is the only observed instance in the quadrangle of the occurrence of the mineral in a fissure vein.

**MALACHITE.**—The familiar green basic carbonate of copper is found in greater or less quantity wherever copper ores are undergoing oxidation. In the older workings of the Copper Queen mine this mineral was abundant, occurring in large and beautiful masses with azurite and calcite in limestone caverns. The walls of these caves were covered with velvety,

moss-green malachite, and sparkled with the blue crystals of azurite, while from the roofs hung translucent stalactitic draperies of calcite, delicately banded and tinted with the salts of copper. But the caves have been stripped of their treasures and either filled with waste or allowed to collapse. They are things of the past, and museum specimens, of which perhaps the finest collection is that in the American Museum of Natural History in New York, can but feebly suggest their former splendor.

The malachite occurred in the form of mammillary incrustations, which, while often of considerable thickness, were of fibrous texture, and not adapted to ornamental purposes.

In the present workings of the Copper Queen mine malachite is not abundant. It occurs usually in little nests and bunches in soft limonitic ore containing earthy cuprite. The presence of little green specks of malachite in such ores is generally indicative of a high tenor in copper.

The Calumet & Arizona mine exhibits similar occurrences, but the mineral is here found also in vugs within masses of crystalline cuprite and native copper.

In both the Copper Queen and Calumet & Arizona mines malachite is frequently associated with small amounts of brochantite, a mineral easily mistaken for the green carbonate, and with chrysocolla. Nowhere at the present time does it constitute more than a very small proportion of the ore.

**AZURITE.**—The blue basic carbonate of copper, while formerly fairly abundant and occurring in large crystalline slabs in the oxidized ores in the Copper Queen mine, is now seldom met with except in occasional little bunches in the earthy ferruginous ores of the thoroughly oxidized zones.

**CERUSSITE.**—The carbonate of lead occurs in impure sandy form, the so-called "sand carbonate," in Hendricks gulch, where it forms very irregular bunches in the limestone in the vicinity of a fault fissure. It was not observed in connection with the copper ores in the larger mines.

**CHRYSOCOLLA.**—The hydrous silicate of copper, like malachite, azurite and brochantite, is a minor constituent of the Bisbee copper ores, and seems never to have been very abundant. It was noted in the Calumet & Arizona mine forming thin concentric shells about kernels consisting of crystalline cuprite, native copper and brochantite, and enveloped in turn by malachite and calcite. Intimately associated with the chrysocolla is a lustrous, brittle, pitch-black substance which Koenig has recently described as a new mineral species and named melanochalcite.

**MELANOCHALCITE.**—This is described by Koenig as forming a thin envelope about kernels of cuprite and inclosed in turn by chrysocolla. It is black, with a pitchy luster, and apparently amorphous. According to Koenig's chemical analyses, it is a silico-carbonate of copper with the formula  $\text{Cu}_2(\text{Si}, \text{C}) \text{O}_4 \cdot \text{Cu}(\text{HO})_2$ .

Material identical with that described by Koenig was obtained from the same locality, namely, the 850-foot level of the Calumet & Arizona mine. It occurs as thin shells about nuclei consisting of crystalline cuprite, native copper and brochantite. Under the microscope the melanochalcite is opaque in an ordinary thin section. It is inclosed by a concentric envelope of olive-green material, which is fairly transparent. The olive-green substance is traversed by reticulated microscopic cracks, shows concentric banding, and with high powers a rather indistinct radially fibrous structure. In color and structure it suggests chrysocolla, but unlike common chrysocolla it is apparently isotropic. This material is in turn enveloped in chrysocolla showing the usual optical behavior of that mineral, and the chrysocolla is succeeded by an outer shell of malachite.

**AURICHALCITE.**—This mineral, a basic carbonate of zinc and copper, has been reported from the Copper Queen mine, but none was seen in 1902.

**BROCHANTITE.**—This green, orthorhombic, basic sulphate of copper is not abundant in the Bisbee quadrangle, but has been noted in small amounts, often associated with malachite, for which it might be readily mistaken upon superficial examination.

As a rule it is recognizable in the Bisbee ores only by the microscopical examination of thin sections. Its most characteristic occurrence is in the form of little nests and irregular veinlets in the cuprite of the Copper Queen and the Calumet & Arizona mines. These nests and veinlets are aggregates showing a pale bluish-green tint by transmitted light, and composed of irregular granules with a decided tendency toward prismatic form. They exhibit a distinct cleavage.

Brochantite is not sufficiently abundant to form an important constituent of the Bisbee ores, and its occurrence in the district has not been previously recorded.

**CUPRITE.**—The red oxide of copper is an abundant and important constituent of the Bisbee ore bodies. It occurs sometimes in an impure earthy condition mixed with limonite and ferruginous clays, sometimes in crystalline masses associated with native copper. The latter occurrence is particularly characteristic of the deeper oxidized zones in the vicinity of chalcocite and other sulphides.

## Copper Ore and Garnet in Association.\*

Written by WILLIAM P. BLAKE.

The mineral, garnet, is a common associate of copper ore in the southwestern portion of the United States. This association may be observed on a large scale in southeastern Arizona, in southern New Mexico and in Sonora, Mexico, especially at El Cananea, and at Nacosari. At other localities in Mexico the general occurrence of garnet "as a contact metamorphic mineral" in the copper deposits of the Cretaceous limestone has been noted by Jose G. Aguilera.

It is usually found at the contact of limestone with diorites, granites, etc., at numerous mines. The same authority also cites the occurrence of garnet in metamorphosed Cretaceous limestone alongside of diorite dikes in association with iron ore.

Other foreign examples are found in the Banat and Servia, at Rezbanya in Hungary, and Offenbanya in Transylvania, and at Bogoslovsk in the Urals. In New South Wales, at Broken Hill, the gangue in the Proprietary mine is chiefly garnet, with quartz, opal and rhodonite, according to W. Lindgren.

Also, in a recent paper by George Smith, entitled "The Garnet Formations of the Chillagoe Copper Field, North Queensland, Australia," it is shown that in the copper field of Chillagoe, Australia, where there are many lode formations, about one-half of the number are garnetiferous, and many of this garnet type are associated with magnetite, which is regarded as of analogous origin. The two minerals are found merging imperceptibly into each other.

These examples suffice to show the very general and wide distribution of garnet as an associate of copper ore.

In addition to the localities already mentioned as known in Arizona may be mentioned the copper mines and occurrences in the Dragoon mountains and in the Santa Rita range south of Tucson. Also in the Tucson mountains; in the Serritas, the Santa Catalina mountains and the copper mines of the Lower San Pedro, near Dudleyville. Two more important and instructive examples are found in the mines of the Twin Buttes Co., south of Tucson, and in the property of the Imperial Copper Co., in the Silver Bell district, west of Tucson. It also occurs at the Atlas property, in the northern continuation of the Imperial mine.

These and other examples which might be added are sufficient to show that in Arizona, as elsewhere, it is the rule, with scarcely an exception, that wherever either a plutonic ejection traverses limestone, or follows a plane of contact of the limestone and another rock and has the conditions requisite for metamorphic action, then garnet, and sometimes other silicates, are developed and are found with the copper ore. So, also, is garnet found in reefs or beds at and near the plane of contact with limestone with a granitoid rock. This reef formation may be seen to an unusual extent at the Twin Buttes property, where there is a series of garnet reefs in parallel lines along and near the contact with the granite, which appears to be eruptive. These reefs are copper bearing and have the semblance of regular lodes. One evidence of the igneous intrusive character is the alteration of the blue, or dark colored, limestone to white, crystalline limestone near the contact.

Both at the Twin Buttes mine and the Imperial mines, where the garnet formations are much more massive, copper ore in the form of sulphide, usually chalcocopyrite, is disseminated in the midst of the garnet in the form of grains, stringers or nodular masses. Such masses are found completely enveloped in garnet and are evidently of contemporaneous origin. Large blocks of massive garnet rock quarried at the Twin Buttes often disclose, on breaking, nodules of copper sulphide so completely inclosed in a dense, granular, garnet magma as to be fully protected from atmospheric agencies, remaining unchanged, and even unoxidized, in the croppings exposed to the weather. The occurrence of copper sulphides in a more or less vein-like or tabular form is also to be noted as indicative of deposition in open spaces. This form of occurrence may be seen in the huge garnet croppings of the Silver Bell (Imperial) and Atlas ground, particularly where quartz vein stone is largely developed, the garnet itself having a tabular, vein-like structure. In such cases the garnet cannot be regarded as other than a true vein stone or gangue, and the garnet reefs as having the nature of lodes—a conclusion which is sustained when, as is often the case, vein-like inclusions of free quartz are found parallel to the general course of the main reefs of garnet rock, and in the midst of the garnet.

The garnet found in association with limestone is usually the variety known as grossularite, the calcium-aluminum garnet, without iron enough to give it much color, but the wine-yellow and cinnamon-brown colors are common.

At the Cananea copper mines in Sonora, Mex., there is a fine example of the conversion of a considerable area of limestone into garnet rock without the complete obliteration of the original bedding-planes, or partings, of the strata. This may be seen

\*Abstract Professional Paper No. 21, U. S. G. S.

\*Trans. Am. Inst. Min. Eng.



between the croppings of the Veta Grande and the Democrita mines at the place where, according to the plicated structure of the region, croppings of limestone would be expected to occur. Instead of limestone, massive garnet rock is found, with here and there bunches of included copper sulphides. These croppings afford a good example of areal metamorphism in contrast with local linear metamorphism following planes of fracture, or of contact.

In the case of reefs of garnet rock in Arizona, the croppings are usually rough and irregular, though preserving in the main a distinct tabular form. The garnet being much less soluble than the country rock of limestone, the croppings are usually found in bold relief above the surface, and can be readily traced.

It is usual to regard these garnet formations as the result of contact metamorphism; the alteration consisting of a combination of elements, or compounds, pre-existing in the strata of limestone, such as siliceous and aluminous layers—a condition so well exemplified by the metamorphic limestone of Sussex county, N. J., and of Essex county, N. Y., where bands of silicates and oxides shown by layers of such crystalline minerals as augite chondrodite, garnet, spinel and corundum, are common.

The conditions and phenomena of the copper garnet formations of the southwest, herein but partially set forth, indicate a somewhat different origin. They support and justify the conclusion, as regards the silica, that the formations are largely of extraneous origin, due to siliceous emanations traversing limestone, following, in general, contact planes, or planes of fracture, or fissures. These siliceous emanations supplying the silica for combination with the lime and alumina of the beds have resulted in the formation of veins and beds of garnet rock, and frequently of other silicates, especially epidote, a common associate; also of copper, in southeastern Arizona and elsewhere. The general presence of copper sulphides in these garnet reefs, together with an excess of silica, shown by the presence of quartz, gives the garnet reefs a lode-like character, the garnet becoming a true vein stone, or gangue, for the copper ore.

I am not aware that there has been any direct statement of this view of the origin of garnet rock, and of the recognition of linear reefs, or formations of garnet, as true lodes or veins which may be followed and exploited as veins of quartz are followed.

In the paper of Lindgren, before cited, reference is made to certain unpublished observations by S. F. Emmons "that garnets replace limestone at Clifton, Arizona, apparently as part of the phenomena of mineralization."

Aguilera also writes in regard to the copper deposits of Mexico: "The gangue in these contact veins is quartz; the ores are chalcocite, chalcopryite and bornite. These are generally accompanied by grossularite, iron garnet, wollastonite, tremolite and vesuvianite, all of which are products of alteration formed at the expense of the Cretaceous limestone through the agency of heated waters."

In the description of the garnet formations of the Chillagoe copper field by Geo. Smith, the garnet is regarded as intrusive and of igneous origin. After noting the absence of signs of replacement of the limestone, and describing a mass of garnet 200 feet thick, enclosed on either side by granite, Mr. Smith says: "The close association of the garnet with the limestone apparently points to an essential connection between them, yet the former rock (garnet) occurring elsewhere, and presumably without such association, has been unhesitatingly classified by eminent authorities as of igneous origin."

From an economic point of view, garnetiferous ores present some difficulties in working. The high specific gravity of garnet prevents its easy elimination by concentration processes. In smelting, the garnet forms a pasty slag, and is a worse than useless burden in the furnace. The true direction in which to work such ores appears to be by lixiviation. By crushing and roasting the copper becomes soluble, while the garnet gangue is not. It is quite probable, also, in some sections of the country at least, that the lixiviated garnet can be utilized as an abrasive.

RECENTLY a writer in the MINING AND SCIENTIFIC PRESS suggested a line of economic development in the establishment of manufactures of brass and copper articles in the immediate vicinity of the Michigan, Arizona and Montana mines that produce so much copper, arguing that such commonwealths would be more prosperous and the mine owners receive ultimately more were the men who mined the copper to make it into the manufactured requirements right where it was produced. There is something in the idea. The Selby Smelting & Lead Works of San Francisco, Cal., have for many years made shot, lead pipe, sheet lead, cartridges, etc., from a part of their lead product. The present month will see a lead pipe and sheet lead factory in operation at Trail, B. C., where the Canadian Smelting Co. propose to turn the "raw material," lead ore, into the finished product. It would be a new departure, but quite in line with industrial development to have a new Ansonia or Bridgeport transplanted from Connecticut to the Western copper mine that furnishes the metal that goes into copper ware there to complete the whole process from the ore in place to the finished copper or brass utensil.

## Economic Resources of the Northern Black Hills.

"The Economic Resources of the Northern Black Hill," is the title of an elaborate report recently published as Professional Paper No. 26 by the United States Geological Survey. The chief author of the paper is J. D. Irving, but important chapters have been written by S. F. Emmons and T. A. Jaggar, Jr. The report is in two parts, the first part, on the general geology of the northern Black Hills, being the work of Dr. Jaggar, and the second, on the mining geology of the region, that of Irving and Emmons. The entire report fills 214 pages and includes over 40 illustrations.

The area is comprised mainly within the Spearfish and Sturgis quadrangles, which were surveyed geologically in the summers of 1898 and 1899 under the direction of S. F. Emmons. These quadrangles include the major portion of the mineralized and productive territory, but as a few ore bodies that fall without its limits have been described, the title has been expanded to cover the mining region of the northern Black Hills.

Dr. Jaggar's treatment of the general geology of the district includes a discussion of its general structure, topography, drainage and stratigraphy. The intrusive porphyries are described in detail and the history of their intrusion is given. A description of the Algonkian, Cambrian, Ordovician, Carboniferous, Tertiary and Quaternary formations of the district closes the first part of the report.

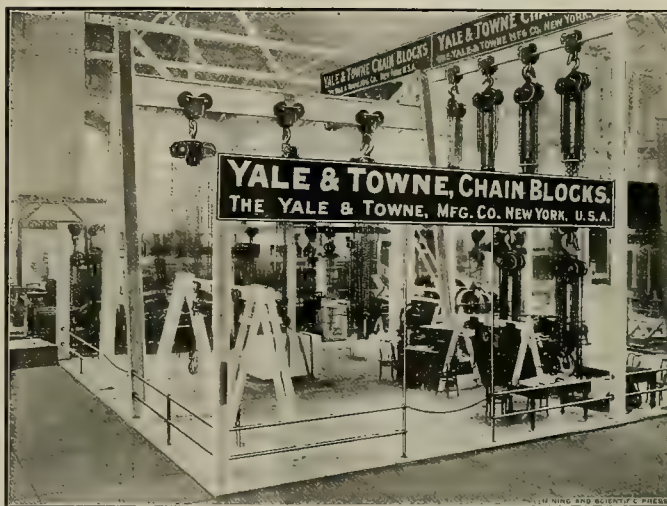
In the second part of the report, which treats of the mining geology of the district, theoretical discussions are either excluded or made as brief as possible. The work is chiefly descriptive in character. The first four chapters describe, (1) the ore deposits in Algonkian rocks, (2) those in Cambrian rocks, (3) those in Carboniferous rocks, and (4) those in rocks of recent origin. A fifth chapter is devoted to detailed descriptions of particular mines in the district.

Ore deposits in rocks of Algonkian age constitute the most important as well as the most permanent factor in the mineral resources of the northern Black Hills. They include gold ores, copper ores and tin ores. Of these, only the gold ores have thus far proved important. Three mines have yielded gold ores—the Homestake mine, the Cloverleaf mine and the Columbus mine—and the greatest of these is the Homestake. The gold product of the Homestake group of mines, which covers an area over a mile long and about 2000 feet wide, has always overshadowed the combined gold output of all the other mines of the Black Hills. For a long time it constituted about 90% of the total product of the Hills. Since 1890, however, with the increasing development of the siliceous ores of the Cambrian rocks, this proportion has gradually decreased to 60%, although the actual product of the belt has steadily increased. The chief economic features of this group of mines are described in detail by Mr. Emmons, and Mr. Irving adds a petrographic study of the Homestake ores.

The descriptions of the ore deposits in the Cambrian and Carboniferous rocks and in those of the recent origin rival in interest what is said of the Homestake ores. Those who are interested in the subject may procure a copy of the report without cost on application to the Director of the United States Geological Survey, Washington, D. C.

## Chain Block Exhibit.

Herewith is illustrated the chain block exhibit of



the Yale & Towne Manufacturing Co., at Machinery Hall, block 29, World's Fair, St. Louis, Mo. They show blocks of all three types, from  $\frac{1}{4}$  to 20 tons capacity. An interesting part of the exhibit is the moving hoists. There is a new electric hoist in operation, and also one each of their triplex, duplex and differential blocks operated by electric motors to show their relative efficiency. Each block is supplied with a 1000-pound weight and so arranged that equal

power is applied to each block. The triplex block lifts its load much quicker than the others, while at the same time the ammeters show equal power applied to each block. The mechanism is automatic, so that when the triplex weight arrives at the top all three blocks reverse their motion and lower the weights until all reach the floor, when they again automatically reverse and begin to hoist. The arrangement shows at a glance the comparative efficiencies of the blocks and is of particular interest to any engineer.

## Recovery of Bullion From Zinc - Box Sludge.\*

Written by E. H. TAYLOR.

The following notes embody the development of ideas regarding the economical uses of fluxes in the smelting of zinc-box sludges. The term economical is used in this instance with reference, not only to the quantity and cost of fluxes, but also with regard to the "fineness" of the bullion produced by fusion and the "values" in the resultant slags.

Only the material contained in the first four compartments of each box is treated at a cleanup, the bulk of the gold being therein concentrated from the fact that material of all but the top compartment of each box is daily shifted upwards, fresh zinc shavings being added as required to the depleted compartments at the tail end of the box.

This procedure is the outcome of a desire to conduct a cleanup as speedily and economically as possible, consistent with securing a maximum amount of the gold and silver on hand in the boxes. The material is lifted from the boxes into tubs, while the remaining solution and any suspended sludge are transferred to a lead-lined vat of about 400 gallons capacity.

The material in the tubs is washed over a  $\frac{1}{4}$ -inch mesh screen suspended within the vat under the surface of the solution, any "short zinc" is detached and falls through the meshes, while the material remaining on the screen is returned to the top compartments.

All material being washed, the solution in the vat is syphoned off and passed through a small filter press. Hot water is run on the material in the vat, the mixture well stirred, solution syphoned off and filter-pressed, and the operation again repeated. This treatment is for the purpose of removing as much chlorides as possible, and so minimizing the production of chlorine in the after treatment with sulphuric acid, this latter containing, as it sometimes does, a small proportion of nitric acid.

The material is now removed from the vat and allowed to drain on an inclined tray, while 90% sulphuric acid is being poured into the vat in quantity sufficient to satisfy the proportion, by weight, of 1 part acid, 2 parts drained sludge. This latter is then gradually added to the acid, hot water being added also as required, and the whole well stirred until all dissolving action ceases. After a certain point in this dissolving operation is reached, a gradual addition of hot water, corresponding with the additions of drained sludge, is beneficial, inasmuch as the polarizing effect of the zinc sulphate formed by the reaction, against the dissolving power of the remaining acid on the zinc, is thereby lessened. The vat is now half filled with water, the contents well stirred and then filter-pressed, the resulting cakes of sludge washed with hot water and dried by an air blast.

These cakes are now removed, broken up and dried in covered cast-iron trays in a reverberatory furnace. This sludge contains about 30% to 60% Au. Ag. Of course the acid treatment could be pushed to such an extent as to produce sludge containing Au. Ag. = 80% or more, but this is inadvisable for following reasons:

1. More sulphuric acid must be used, and so more chlorine, due to the interaction of the sulphuric and nitric acids and chlorides, is introduced, and consequently more gold will be dissolved. This gold can, of course, be recovered from solution by precipitation on zinc shavings or charcoal, but this necessitates additional expense.

2. Much silver may be dissolved unless a proportion of zinc is left unattacked.

3. Loss in subsequent handlings increases proportionately with the value of the sludge.

Experience has shown that the best economy for subsequent operations consists in producing, by acid treatment, sludge containing 30% to 60% Au. Ag.

By using the proportions aforementioned such a result is arrived at.

The next point in the treatment is the roasting of the dried sludge, whereby are oxidized any remaining zinc, copper, lead, etc.

The degree to which oxidation of the base elements

\* Report Chamber of Mines, W. A.



of the sludge, such as zinc, copper, lead, is effected, has a decided economic bearing upon the fineness of the bullion produced in the after fusion with fluxes, inasmuch as to more completely slag off these base elements aforementioned they must be present as oxides. If present in the metallic form, then portion of the zinc and probably all the copper and lead alloy with the molten gold and silver produced during fusion, and so a bullion of inferior "fineness" is produced. The results of Table II, when compared with those of Table I, will illustrate and emphasize this point.

On the occasion of producing these bullions the material from the zinc boxes had received no acid treatment, and contained much visible "short zinc," which, in roasting, was not completely oxidized. Likewise, the slag values are increased.

The base elements may be oxidized by mixing with a proportion of niter and heating in a covered cast-iron tray in a reverberatory furnace to a temperature short of the fusing point of niter. Properly manipulated, this method produces an oxidation as near perfection as possible.

Thus, having passed the mixture through a very fine screen, and mixed it thoroughly, each particle of sludge is in contact with one or more particles of niter; and so, at the temperature of decomposition of the latter, conditions are favorable for the interaction of the nascent oxygen and the zinc, copper, lead. The material not being rabbled or in any way disturbed during this operation, there is no loss of values by dusting.

Then the introduction of niter into the roasting process provides, subsequently, as a product of its decomposition by heat, a flux, very economical in all respects for fusion purposes.

In this decomposed condition the salt is less liable to cause violent ebullition in the crucible than would niter if used as a direct flux.

As a matter of fact, a constant gentle generation of nitrous acid gas during the fusion causes sufficient ebullition in the mass to produce perfect contact and mixing of particles. This feature appears to be one of the factors whereby are secured, under the conditions of working, some very low slag "values."

Thus then the dried sludge, along with 35% by weight of sodium nitrate (the soda salt is used in preference to the potash salt as being much cheaper and equally efficient), is passed through a screen 64 meshes per square inch, mixed until of a uniform color, placed in the trays, and heated to a temperature just below the fusing point of niter for several hours. After cooling somewhat, the roasted material is mixed with such proportions of borax and sand as to secure in the resultant fusion a slag containing about 33% of "acid radical," i. e., Si O<sub>2</sub> and B<sub>2</sub> O<sub>3</sub>. This mixture begins to fuse at a comparatively low temperature, and yields a slag which, at the temperature of the wind furnace, is very thin and liquid, pours like water.

Such a condition of the slag, in conjunction with maintaining the percentage of "acid radical" at about 33%, facilitates the production of a "perfect fusion" as far as the recovery of "values" is concerned. That the percentage of acid radical present has, during fusion, a most decided bearing upon the resultant "bullion fineness" and "slag values" is very apparent from the following comparative results:

Reference Nos.	Flux Used at Roasting.	Fluxes Used at Smelting.		Bullion Produced.	"Slag" Values.		Per Cent. Acid Radical in Slag.
		Sand Per Cent.	Borax Per Cent.	Per Cent.	Base Parts Per 1000.	Silver (Ag.) Ozs. Per Ton.	
1.....	35	25	25	36.18	35.5	20.3	27.2
2.....	50	25	25		45.9	69.5	45.6
3.....	60	25	10		87.7	342.4	153.7

In the three instances, the material being treated in adjoining furnaces, the mixtures fused easily, each producing very thin slags.

The slags from fusions 1 and 2 were quite glassy looking, showing no signs of gold prills. That from fusion 3 was quite dull and solid—basic looking, in fact—and showed many gold prills distributed throughout.

Knowing that the greatest possible degree of comminution of material is required to secure in a single fusion with fluxes the complete decomposition of most materials prior to a chemical analysis, it was assumed that the degree of fineness of the sludge and fluxes would in the smelting operations prove a very material factor in determining the "fineness" of the bullion produced, and also the "slag values."

The results of Table III prove the force of this contention. At this point the comparatively lower slag "values" produced in the smelting of the higher grade sludge suggested the desirability of, in after experiments, increasing the proportion of fluxes relatively to the percentage of "base" contained in the sludge.

At first, being doubtful as to the action of any undecomposed niter on the salamander crucibles, only about 10% was used for roasting, along with a proportion of sand, but, as no undue "eating" of the

crucibles occurred, the niter was afterwards gradually increased, until finally 35% and no sand was used, the latter being added, however, after roasting, as a flux for smelting.

The sand and borax in proportions, as used at present, of 25% and 35%, respectively, along with the roasted sludge, are now passed through a sieve 300 meshes per square inch, and all mixed together until a uniform color is attained, transferred to the crucible in wind furnace, smelted to tranquil fusion, and then immediately poured.

During this smelting operation a cover placed over the crucible prevents loss of values by dusting and spurning, and also prevents coke particles and dust from falling into the mixture.

In this latter case the coke, of course, would reduce zinc, and so lower the grade of the bullion.

The buttons of gold resulting from the smelting operation are melted down with enough borax and sand to form, when fused, a cover for the bullion, and without any refining whatsoever poured into a mould. A sample for assay purposes is taken during the operation of pouring, about half way through. As soon as the gold in the mould is solid the still liquid slag is run off, the bar scraped, dipped in nitric acid, and then scrubbed and washed with salt and water.

By following the above outlined treatment, bullion is produced rarely containing more than 30 parts of base per 1000 parts.

The slag, without further treatment, is sampled twice independently, and assays of each sample made in triplicate. Assay results, as shown in tables, are thus the mean of six assays.

One attempt to use a minimum amount of flux in smelting yielded a slag assaying 291.85 ounces of fine gold per ton, a small portion of the values existing as metallics (see 1, Table I). The proportion of flux: "base" in sludge equaled 1 : 1, enough "acid radical" being present to insure 30% for the resultant slag. The smelting mixture fused only at a comparatively high temperature, yielding a thick viscous slag.

At this point it may be mentioned that it is not advantageous to increase the percentage of niter and correspondingly reduce the percentage of borax, as compared with the amounts used at present.

If this be done, unless an increased proportion of sand is added, then the mixture is too "basic," and fowl slag and bullion are the results. See previous table.

If sand be added in sufficient quantity to maintain the "acid radical" in the resultant slag at 33%, even then the result obtained is high "slag values" as the percentage of borax is decreased.

(TO BE CONTINUED.)

## THE PROSPECTOR.

The similarity in the physical appearance of various minerals is very confusing to the average prospector, and although a knowledge of mineralogy is indispensable to the best results, a little knowledge of the science often misleads the beginner and some amusing situations result. Selenite, the common calcium sulphate, is frequently mistaken for mica, which it greatly resembles. Azurite, the blue carbonate of copper; linarite, a basic sulphate of lead and copper, and vivianite, a hydrous-ferrous phosphate, each look sufficiently alike to deceive the inexperienced, and either is usually taken for the first. Mariposite, a chromium mica, has often been mistaken for malachite, the green copper carbonate, and so also have many other minerals.

The mineral from Sumerduck, Va., is ilmenite, or menaccanite, a titanite iron ore. It is slightly magnetic.

The shaly rocks from Greater-ville, Ariz., are not "oil shale," but a shaly or slaty rock containing iron and black oxide of manganese.

The fossils from southeastern Idaho have been determined by F. M. Anderson to be No. 1 corbula perundata, M. and H. Judith river Gr., of the Laramie epoch; and No. 2, cyprina and maetra, presumably also of the Laramie epoch. The existence of coal in these beds is also an indication of their age—the Laramie, or lower member of the Cretaceous.

The mineral specimens from Princeton, B. C., are: No. 1, a yellow powder, alumina, silica and iron oxide, no vanadium nor uranium; No. 2, shaly rhyolite tuff.

The rocks from French Gulch, Shasta county, Cal., are: No. 1 is a metamorphic rock (quartzite) heavily impregnated with iron sulphide; No. 2 is vein quartz, containing iron sulphide and probably gold; No. 3 is

metamorphic argillaceous rock, probably altered shale, and containing native copper in thin films like gold leaf; No. 4 is also a metamorphic rock of argillaceous character in which there has been a development of calcium carbonate; No. 5 is a lens of quartz containing a large amount of iron sulphide, and is probably gold bearing; No. 6 is similar to No. 4, but contains a large amount of iron sulphide.

The rocks from Bisbee, Ariz., are: No. 1, composed chiefly of an aggregate of crystals of calcium sulphate (gypsum), with iron oxide; No. 2, sandstone made up of rounded quartz grains in cement of iron oxide and calcium carbonate.

The mineral specimen from Gold Hill, Or., is infusorial earth, largely composed of silica. It resembles some clays, but is much lighter and has different properties from clay. It is difficult to tell the two apart often without microscopic examination. With the aid of the latter under high powers the diatoms may usually be generally seen. Scrape off a small quantity of the material and place on a glass with a drop of water.

## Advertising and Export Business.

During the summer of 1901, the writer of this, on a business trip to Europe, landed in Cuxhaven, which is the first landing port of the Hamburg-American Line steamers bound for Hamburg. The wharves and railway station in Cuxhaven, since then, have been rebuilt, but at that time the landing wharf was connected with the old railway station by a long covered passage. The station end of this passage was a blank wall, the entire surface of which was entirely covered with the—on this side—well-known advertisement of "Quaker Oats."

This particular advertisement, in the writer's opinion, had a better position than any other advertisement which he has ever seen, as it was bound to make a lasting impression on the thousands of men, women and children whose minds and eyes had been relieved from looking at any and all kinds of advertisements for the period of an ocean voyage.

The European traveler will find familiar signs advertising American specialties not only in every large city, but in many out-of-the-way corners, and these specialties which are advertised extensively cannot help but do a profitable business, as the mind of the average European responds readily to good advertising.

In England, especially, a number of well-located signs advertising Lord's boiler compounds can be seen. The manufacturers of these compounds, while they have numerous agencies established on the continent, have made a special effort during the past few years to gain a strong foothold for business in all English-speaking countries. In England and Scotland, several agencies have been established, and, while the undertaking has been expensive, the volume of business secured has been sufficient to prove the undertaking to be a profitable one.

A business once established in England will, naturally, extend to its colonies, and the Geo. W. Lord Co., manufacturers of Lord's boiler compounds, found it advisable to open offices in Australia as well as Madras, India. A great deal of advertising is done by each of these branch offices, a sample of which reached us from Madras, India, recently.

This particular advertisement was designed to be sent out by mail. The scene represents a photo-



Transportation at Madras, India.

graph of a large shipment of Lord's boiler compounds arriving in Madras and being transported from the wharf to warehouses. Particular attention is called to the mode of transportation, which is peculiar to the Madras presidency. It appears that each two-wheeled cart is handled by three men, two of them managing the front end of the vehicle while one of them pushes on behind, usually with his head.

The mere fact that a specialty like boiler compound can establish a profitable business in foreign lands should be proof to the average American manufacturer that the world can be made his market.

V. O. LAWRENCE.

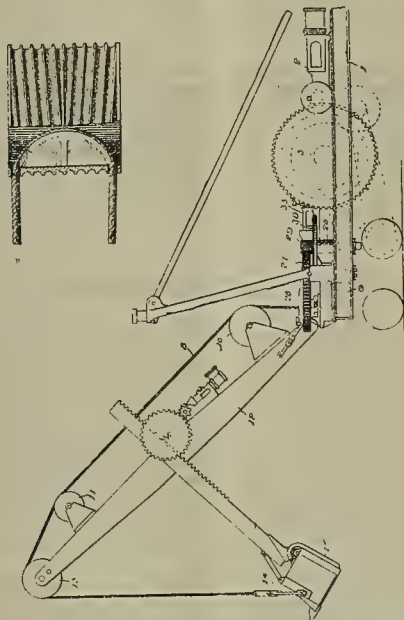


## Mining and Metallurgical Patents.

PATENTS ISSUED JULY 19, 1904.

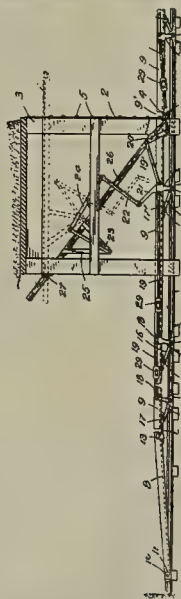
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

STEAM SHOVEL.—No. 764,600; G. W. King, Marion, Ohio.



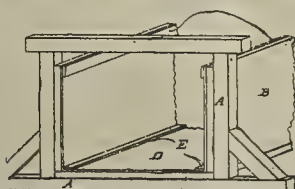
Combination, with dipper and guiding sheaves, of hoisting drum having aperture through its body near each end of face thereof, and grooved bridge or saddle arranged longitudinally of drum within interior thereof between apertures, and double hoisting cable, two leads whereof connect dipper and drum, cable passing through apertures and having its connecting portion arranged in grooved saddle or bridge and adapted to slide therein.

APPARATUS FOR OPENING OR CLOSING MINE DOORS.—No. 765,282; F. Hutter, Clealum, Wash.



The combination of supplemental rails, rocker shafts each provided with two crank arms, one crank arm of each shaft being pivotally connected to rails, connections between other arms, door, tiltable frame having one end hinged to framework of door and other end projecting beneath lower edge of door, pivoted lever having hinged connection to tiltable frame between hinged end and end operating door and means for connecting pivoted lever to rocker shafts and rails.

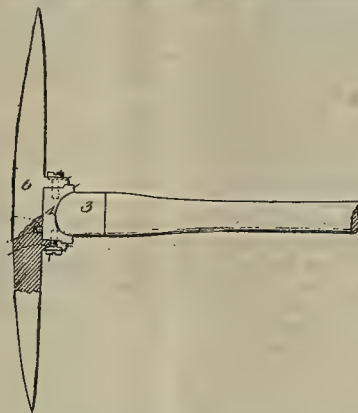
CONDUIT.—No. 765,631; J. D. McNab, Fillmore, Cal.



Flumes having frame A and side walls B and bot-

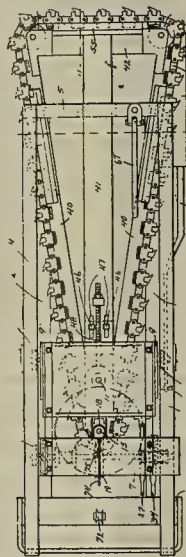
tom C secured to frames; paper lining D secured to inner side of side walls and bottom; lining having applied thereto coating of hot asphaltum.

PICK.—No. 765,642; G. Tippet, Whatcheer, Iowa.



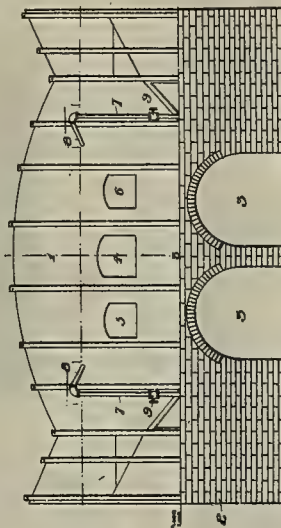
Combination of blade having plurality of stationary projections extending at right angles therefrom on inner face thereof, and plurality of seats between projections, handle head, top of which is adapted to fit against blade between projections, having studs to enter seats and lateral flanges provided with up-turned lips at ends extending short of top of head and adapted to receive projections, latter having open ended slots, and screws tapped into head and fitted into slots.

MINING MACHINE.—No. 765,317; F. M. Lechner, Allegheny, Pa.



In mining machine, combination of frame, cutting chain operative thereon having links formed with grooved outer faces, and guides on frame extending into link grooves.

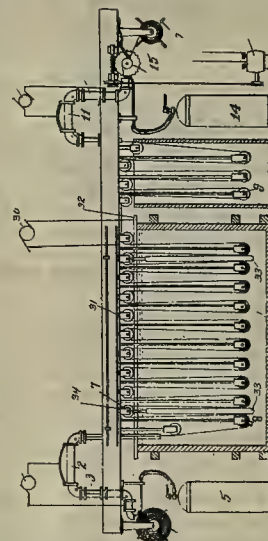
REFINING FURNACE.—765,323; R. Robinson, Pittsburgh, Pa.



Furnace for refining iron and steel, combination with melting chamber, series of flues arranged at each end of melting chamber within body of furnace, central one of flues being in communication with draft stacks for carrying out waste gases, and pair of flues arranged one at either side of central flue in each of these series of flues adapted to introduce flame to melting chamber, standpipes having controlling valves therein arranged exteriorly and adjacent to

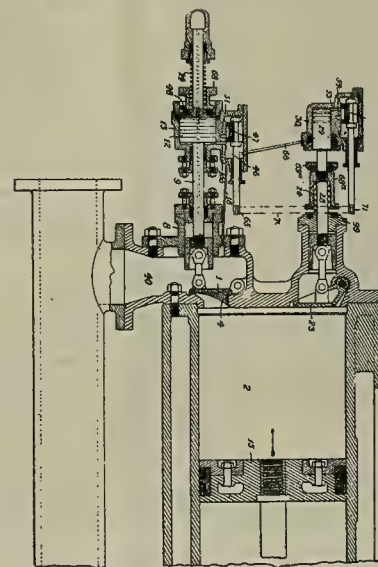
melting chamber, nozzle-forming extensions formed on pipes and converging toward common point within chamber, extensions being provided with twyers for introducing draft into melting chamber.

PROCESS OF NICKEL PLATING.—No. 765,371; J. W. Aylsworth, East Orange, N. J.



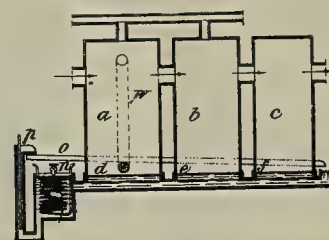
Process of electroplating strip-like article or connected series of separate articles, which consists in continuously passing article or articles through heating chamber in presence of reducing gas to deoxidize article or articles, in continuously progressing article or articles through plating bath and simultaneously electroplating metal thereon in transit.

VALVE MECHANISM FOR AIR COMPRESSORS OR THE LIKE.—No. 765,359; A. W. Daw and Z. W. Daw, London, England.



Combination of compression cylinder, delivery valve opening outward therefrom and having its rear face exposed to pressure in receiver, cylinder open at inner end to pressure in receiver, spindle provided with piston on its inner end adapted to work in cylinder, means connecting piston with valve, spring for closing valve, second piston mounted on spindle, cylinder in which last-mentioned piston works, valve governing supply and exhaust of cylinder for second piston, pipe leading from receiver to valve chest of governing valve, and means controlled by governing valve for buffering stroke of second piston.

PROCESS OF MAKING SULPHURIC ACID.—No. 765,520; A. L. Stinville, Paris, France.



Process for manufacture of sulphuric acid in lead chambers which consists in causing to circulate in dishes of chambers acid having density of 3° to 5° Baume below density of acid produced on vertical sides, and having temperature of 15° to 20° centigrade lower than temperature of gases in chambers.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

A gold quartz strike is reported made by the Treadwell M. Co. on Kensington ledge at Berners bay, near Juneau. This property is under bond to Superintendent J. McDonald and F. W. Bradley, consulting engineer of the Treadwell mines. After bonding the property two months ago they started a crosscut tunnel 800 feet below the lower surface workings, which were 100 feet deep. They struck the Kensington ledge within 20 feet of its expected location from the surveys.

T. W. Murphy and A. L. Davis of Spokane, Wash., have bought placer claims on the north side of Copper river, 90 miles east of Valdez, and will locate additional placer ground adjoining the two claims. Davis et al. of Spokane own coal lands in Alaska which will be developed. At their placer holdings, after the ground adjoining the two claims is located, they will arrange for starting work. It is intended to take in machinery this fall, while the snow is on the ground. The one drawback to the placer ground is the lack of transportation, says Davis. The coal lands are 20 miles east of Kayak, near the Finch & Campbell coal mines. Part are on the oil seepages.

Fairbanks reports say there are more than 3000 men along the Tanana river and many of them are not working. It is no place for laboring men as yet, because the mines have not been sufficiently developed to permit of the employment of workmen. The country has been staked in all directions for miles. There are enough stores to supply ordinary wants. These conditions will continue until the mines are somewhat developed, giving the miners an income to work their properties and employ more men.

Valdez reports say W. A. Clark of Butte, Montana, has bonded twenty-eight copper claims on Latoche island, Prince William sound. The conditions are that \$70,000 shall be expended this year for development work, to be started at once.

## ARIZONA.

### Cochise County.

Superintendent C. T. Bricker says operations will be resumed in the Old Terrible mine and mill in the Dragoon mountains, near Pearce. The mine has been closed for three months; and there is a 20-stamp mill. The ore carries gold and silver.

### Gila County.

Work is progressing at the works of the Old Dominion C. M. & S. Co. at Globe, and a large number of mechanics are employed. At the new smelter construction work is being rushed, but it will be a month yet before the plant is ready to operate. The three furnaces are finished and the blast and converter pipes, 5 and 2 feet in diameter respectively, and about 250 feet in length, have been put up. The converter hoods are in place, the electric crane being used to move the heavy pieces. The brick work of the dust chamber is almost finished, and the construction of the ore bins, on the hill above the smelter, is progressing; also the trestle leading from the ore bins to the feed floor of the smelter, over which electric motors will haul the ore. The bins, nine in number, will have a capacity of 1000 tons of ore. Grading for the concentrator is finished, and for the machine shop is well under way. At the new shaft an oil sump is being constructed. This is a concrete basin that will hold a car of oil and will facilitate emptying of oil cars. From the sump the oil will run by gravity into the storage tanks. Work is being done on the railroad between the smelter and mine, changing tracks and improving the grade. The company is operating all three of the old furnaces, says Smelter Superintendent Shelby, having blown in the third furnace last week.

In the San Carlos mining strip, above Dudleyville, the Saddle Mountain M. Co., of which G. B. Chittenden is manager, is opening up its properties. Low-grade ore running 4% in copper has been blocked out, and wherever shafts have been sunk below the water level black sulphide has been cut, going 12% copper, says Manager Chittenden. The company has been working twenty men, which will be increased. The Saddle Mountain Co. is also prospecting its claims in Deer Creek coal fields with a diamond drill. The drill has reached depth of 500 feet.

### Graham County.

G. T. Millner, manager of the Weaver mines, near Morenci, says he is shipping ore. He expects to put in a hand jig at the mines which will concentrate three tons into one and thus not only make a

higher product, but also save money in transportation and treatment charges.

### Maricopa County.

Wickenburg reports say a strike of free gold ore has been made on the Pittsburg group, 10 miles east of Wickenburg, by G. White, part owner.

### Mohave County.

S. C. Bagg, superintendent of the New Comstock mines near Kingman, says he has teams hauling ore from the Katherine and Sheeptrail mines to the mill. He reports that at the Katherine he has opened up a streak of ore that averages \$9 per ton. A discovery has been made on the Sheeptrail of another vein 2 feet in width that carries values. Specimens from this vein show free gold and horn silver.

The Swiss-American M. Co. in San Francisco district, near Acme, is putting up buildings for the new hoist, which will be placed on the Ben Doran mine. The ore shows free gold.

D. Slocum of Monrovia, who has properties on Silver creek, is taking in supplies and machinery, via Needles, Cal., to the mine over the Mohave & Milltown Railway and by wagon from Vivian station. The new road built from Vivian camp to the Silver creek country has added to the freight traffic from Needles. It is expected the Mohave & Milltown Railway will later continue the track from present terminus to Silver creek, near Slocum properties, and thence up the creek to the Gold Road camp, near Acme.

### Pinal County.

The Florence Blade reports a body of wulfenite has been struck in the '91 claim of the Troy-Manhattan C. M. Co. at Troy. Wulfenite is a molybdate of lead. The Troy-Manhattan C. M. Co. is said to have obtained a market for its product and is preparing to put in a complete concentrating plant. The '91 mine is operated through the Davis shaft, and Manager C. H. Cutting is setting up a steam hoisting plant at the Davis shaft preparatory to mining the wulfenite on a commercial scale. The concentrating machinery will be shipped in on the Phoenix & Eastern, as the track of the latter has reached Kelvin, 6 miles from Troy.

### Yavapai County.

President Miller of the Lion G. M. Co. says Superintendent M. Bradley is starting up work on the company's properties at Cherry Creek.

The Gold Bullion M. Co. has been organized in Prescott, by R. H. Miller, J. Hollingshead, J. A. Newman, G. N. McCullough and J. K. Oney to work mineral properties in the Hillside section, near Sultan.

## ARKANSAS.

### Boone County.

Superintendent Sandstrom, of the Susquehanna mine, is shipping concentrates from the mine at Harrison.—C. I. Page et al. of Rochester, N. Y., are reported buying a group of zinc and lead holdings, near Harrison.

The Harrison Times says five concentrating mills have been erected and commenced operations so far this year, and in each case the property is yielding a profitable output. In several instances it will be necessary to wait for completion of railroad lines already building before full operations are continuous.

## CALIFORNIA.

### Calaveras County.

(Special Correspondence).—Considerable new work is in progress in the vicinity of Angels. All of the old mines are in operation and the newer ones are being developed with encouraging results. The discovery that the ore bodies occur beneath the so-called "talc foot wall" is having an important effect on the development of mines all along the line in Angels. Many were at first skeptical of the finding of ore below the talc, but there are few who doubt it now. In the Smiths Flat section, west and northwest of Angels, some new development is reported. At the Demarest mine, near Fourth Crossing, work is to be resumed after an idleness of two or more years. The shaft is down over 700 feet. In the upper levels a good shoot of ore was worked over thirty years ago, but the recent development has been less fortunate. The formation is greenstone, and the distribution of ore shoots is erratic. At the Gwin mine the new shoot of ore discovered several months ago is being proven. A winze is being sunk in it below the 1700 level. It is known to be 150 feet high, but its depth still remains undetermined. This shoot is from 1 to 2½ feet wide, and the rock is said to average \$40 per ton; some handsome specimens have been found. The main shaft will be carried deeper and the new shoot opened more extensively. About Mokelumne Hill considerable prospecting both in gravel and in quartz is in

progress. The indications are that the early miners left numerous remnants of good gravel in the ancient river beds, owing to the fact that the deposits were not continuous, but were often found "cut out" by streams of more recent date. Some of these remnants, though not extensive, are rich. In the section north and south of Murphys prospecting and mining on the high-grade ores of that section is in progress as usual each summer, with the finding of some rich ore. Some of these undertakings are well organized, but most of them are small and are in the hands of men working singly or in pairs. Some good reports come from the region east of West Point in the Blue Mountain section. The ores there contain more silver and base metals than is usually found in the veins further west. Arsenic, in the form of mispickel, is one of the common occurrences in the Blue Mountain district. Some of the mispickel is said to be rich in gold. Capital has not yet entered this region, though there are some good opportunities in the eastern part of this county.

San Andreas, July 26.

The Demarest mine, near Fourth Crossing, on the road between San Andreas to Copperopolis, started up last week after being shut down for two years. The company has been reorganized and more machinery has been put in. The first work to be done will be unwatering the mine and retimbering the shaft. The shaft will then be sunk from the 200-foot point to 400 feet.

The Mokelumne & Campo Seco C. & M. Co. is putting in 2000 feet of iron pipe 22 inches in diameter, near Mokelumne Hill. The company has several thousand feet of pipe at various points along the line of the canal which has been in use for a number of years, and will now be taken up, repaired and tarred and relaid, as most of it is still good, says the Chronicle. The new pipe will be used temporarily while repair work is being done.

The Fannie Marie G. M. Co. has deeded to H. B. Chandler et al. the Jones quartz mine in Glencoe district, the Fannie Marie placer mine in same district, the Blue Jay quartz mine and Summit quartz mine in Fishers district, in trust, to carry out plan of reorganization. Chandler in turn has deeded the property to the Hesperus M. & M. Co.

The Utica G. M. Co.'s group, embracing the Stickle, South Stickle, Gold Cliff and Madison mines, at Angels, are all in full operation. At the Stickle mill work is progressing on construction of the additional forty stamps, which will make the Stickle mill 100-stamp capacity.—The Angels mine is running full handed and its 40-stamp mill is crushing steadily. Its milling capacity, it is reported, will be increased to eighty stamps, and other improvements made in and about the property to facilitate mining and reduction of its ores. J. V. Coleman is principal owner.

At the Black Oak mine near Hawkeye, near Angels, sinking is going on. The shaft is down 275 feet and from this crosscuts have been run cutting several veins, all of which are said to carry free gold and sulphurets. This property is 1½ miles from Angels.—The Maltman G. M. Co., of Angels camp, has consolidated with the Black Oak M. Co., says the Mountain Echo. Work will be resumed in the Maltman mine.

The Melones mine at Melones is turning out its regular supply of ore and keeping its 60-stamp mill running steadily.—The Metropolitan G. M. Co., having the Allison and Carson Creek mines, near Irvine, is keeping the water down to the 200-foot level in the Carson Creek (Jones) shaft, awaiting orders of the management.

At the Independence gravel mine, near Angels, the work of running the bedrock drift to tap the channel is progressing.—Everything is running satisfactorily at the Sultana mine at Angels and the mill is in steady operation. Milling facilities will be increased.

The Nellie mine, near Marble Spring, south of Angels, is under bond to the Edna M. Co., which will begin developments next week.—Work is going on in the Spring Gulch mine at Albany Flat, south of Angels. A crosscut is being run from the 100-foot level to reach the lode. W. V. Miller is superintendent.—At the Ultimo mine, near Albany Flat, the water is being kept from the mine pending resumption of work next week.—At the Lightner mine and mill operations continue steadily.

### Mariposa County.

The work on the pipe line to carry water from the spring near the Half Way house to the mill of the Princeton mine at Mt. Bullion is progressing satisfactorily, says Manager C. C. Derby.

### Mono County.

The Crystal Lake G. M. Co., at Lundy, started dropping twenty stamps last week.

### Nevada County.

The success of the canvas plant at the Mountaineer mine, Nevada City, has shown that much of the tailings contain slimes which are profitable to work, says Superintendent J. C. Campbell. He will add another plant, which will be operated in tandem with the present one.

The Union Con. G. & S. Co., N. J. Weber president and G. A. Nihell superintendent, is developing the Union mine at Banner hill, near Nevada City. The drain tunnel has been cleaned out to the shaft, which is tapped at a depth of 100 feet. The incline was found in good condition and will be retimbered to the surface. Hoisting and pumping machinery will be placed, after which the mine will be pumped dry and further opened up.

W. Wilson, superintendent of El Oro mine at Maybert, says the mine has been unwatered to the 400-foot level and is being drained toward the 500-foot level. When that point has been reached the bulk of the water in the mine will have been pumped out. The shaft of the Yuba has a depth of 600 feet on the ledge, which defects but little from the vertical, and as soon as the mine is entirely unwatered sinking on the shaft will be resumed. At least that is the present intention of the company which now has the El Oro in hand. The plan of further development includes drifting on the lower level and prospecting the ledge. The El Oro (formerly the Yuba) has a mill of fifteen stamps.

The Idaho-Maryland mine, at Grass Valley, is again assuming activity. Everything about the mill and hoist is being overhauled. Last week the water was turned on the 14-inch Cornish plunger pump and the machinery started up without a hitch, though flooded for two years. This pump insures the unwatering of the mine to the 1000-foot level, and it is said will not need the assistance of the 12-inch pump in the main hoist building. Men are at work laying the foundation for the 40-foot truss to which the shaft timbers are to be hung. L. V. Dorsey, when the mine was closed down, left everything in good condition, such as repacking pumps and repairing the shaft, without which precaution reopening the mine would have been difficult. The pipe line which furnishes power for the Idaho-Maryland mine and mill is being inspected, and bands of iron are being prepared to strengthen the points where a leak appears. All the water-ways leading from the several Pelton wheels which furnish power are being replaced by flumes built of first-growth spruce lumber. Several labor-saving devices have also been added to the machine shops and engineering department. The approaches leading to the mill and mine, such as roadways and bridges, have been overhauled and repaired.

### Plumas County.

W. V. Somerville, superintendent of the Midgemoola G. M. Co. of San Francisco, operating on an extension of the Malloy quartz location on Butte creek, near Quincy, says they are running a tunnel to tap the ledge running through the Malloy mine.

### San Diego County.

The mill of the California King M. Co. at Picacho is hung up, pending repairs. Last week the governor belt broke or was thrown off, removing the check on the flywheel, which weighed twenty-one tons, and the flywheel went to pieces.

### Shasta County.

At Delta, the California Advance M. & M. Co. has begun operations toward further development of its quartz mines on Dog creek, several miles west of Redding. J. T. Cooney, local manager, has put on eighteen men. He expects to have three full shifts in the several drifts. Cooney relocated the Gainey ledge, Nos. 1, 2, 3 and 4, under the title of the Main Strike, Belvedere, Oak and Mountain claims.

The Bully Hill M. & S. Co. reports over 300 men at work in the company's mines and smelter at De Lamar (Winthrop P. O.).

### Sierra County.

J. S. Herron of Reno, Nev., manager of the New Enterprise mine, near Downieville, of which J. Sparks of Reno, Nev., is principal owner, is putting on men and will run several hundred feet of tunnel. Three hundred feet were run last year. It is expected they will tap a gravel channel which is supposed to form a part of the mine, which was formerly the Rattlesnake mine. It is on the North Fork of the North Fork of the Yuba river.

The material for the Keystone 10-stamp quartz mill at Sierra City is being delivered and construction work started near the mouth of the tunnel.

### Slacklough County.

B. F. Bassford of Etna reports taking out gold-bearing quartz from a ledge on



Taylor creek, west of Etna, and a mill test is being made. The ore shows free gold. The owners have formed the Taylor Lake M. Co. and are arranging to place a mill on the mine. They have abundant water power at hand.

Harris Bros. of Etna, operating at their mine at Taylor creek on Salmon mountain, between Etna and Sawyer's Bar, report from 595 pounds quartz they realized \$4000, and most of the quartz taken out runs \$200 a ton. They are running a 1-stamp mill. The ledge is 6 feet in width. They have bought the 2-stamp U. S. Grant mill at the Meyers ranch on Yreka Flats, to be moved over to the mine. The Red Ant mine at Humburg, adjoining the Punch Creek mine, owned by A. Rosborough and Churchill Bros., will be developed. Men are being put to work. W. M. Ridenhour has put up a steam engine for running the pump and hoist at the Mono mine on Humburg, the water supply being too light at present for keeping the shaft clear of water. Machinery has been received at the Morrison & Carlock quartz mine in Quartz valley, near Fort Jones.

#### Tuolumne County.

The Alexandra, Little Blue, Happy Hooligan, Josephine, Swiss and Victor claims, between the North Fork and main Tuolumne rivers, near their junction, and near the Mohican mine, near Groveland, have been sold for \$60,000 to J. J. Smith, E. H. Cary, E. Cowperthwaite and L. M. Cutting, W. C. Stanley retaining an interest. The transfer also includes a four-fifths interest in a bond on the Marguerite quartz mine and a four-fifths interest in a bond on the Josiah and Venezuela quartz mines.

The Republican M. & D. Co. has bought the Campbell interests in the Orcutt quartz mine, near Jacksonville, and adjoining the Republican mine on the north. The transfer also includes 149.63 acres of land in the vicinity.

T. A. Piper of San Jose has bought for the Beehive G. M. Co. the Buckeye placer mine on Table mountain, west of Shaw's Flat, near Sonora, also certain mining rights in section 27, in the same vicinity, for \$20,000.

The strike of the union miners at the Jumper and Golden Rule mines at Stent, due to the "strip to the skin" order, has been declared off and work resumed on the "open shop" policy. Manager M. B. Kerr posted a notice including: "For the present and until further notice, as nothing but development work will be carried on, the order as to stripping is modified," so that the watchman at the change house will search each man "around his undershirt in such a manner as seems necessary." In the mill forty stamps are dropping.

The Jerome Canyon C. Co. of Arizona has bought the Badger quartz mine, 5 miles west of Jamestown and near Bear creek, for \$12,000. The company is to pay 20% of the products from working the mine, which is to apply on the purchase price.

A 110-light dynamo will be put in at the Draper mine, near Soulsbyville, to light the surface works.

The Mono M., M. & P. Co. has been incorporated by J. J. Smith, C. H. Cutting, E. H. Cary, E. Cowperthwaite and W. C. Stanley. J. J. Smith is president and W. C. Stanley manager, with principal place of business at Stockton. The company has bought the Gianelli group of six mines and the Marguerite mine. It also holds a bond on the Venezuela and Josiah mines. It is intended to extend the wagon road from the Baker ranch, near Carters, to the mines near junction of North Fork of Tuolumne river with the main Tuolumne river, and to build a dam across the North Fork and about 1000 feet of flume. With the water power thus obtained, the company will operate the mines with air drills, etc. A mill of ten stamps will go in when the road is built. Manager Stanley has started operations by putting men to work on the mines and the survey of the road.

The New Era reports a mining deal under way for combining the Providence, Starr King, Consuela, Bonita and Garfield mines, near Carters. W. W. Coe of Boston, Mass., is at the head of the deal. He has the Bonita, Garfield and Starr King properties under his control. An electric power plant on the North Fork is said to be included in the plans.

#### COLORADO.

(Special Correspondence).—It is announced that in a few days Governor Peabody will declare martial law at an end in the Cripple Creek district. The strike has never been declared off by the Western Federation of Miners.

Over \$7000 has been subscribed by the citizens throughout the State for the men crippled and for families of those killed by the dynamite outrage at Independence. A benefit picnic will be given at Cameron

in Cripple Creek district on August 1, to increase this fund.

The placer mines of the State report a good season up to date. So far the water supply has been ample, and it is believed the placers that have been obliged to close down early in the season heretofore will be able to run until cold weather sets in, so far as water supply is concerned. The water supply for many of the placers is obtained close to the source of supply, which makes the supply uncertain after the snow commences to melt and especially at this season of the year.

It is reported that the Colorado & Southern railroad has bought the Gilpin County tramway and that the same will be improved. This tramway circles the district of Central City, Black Hawk, Nevada, Russell Gulch and other portions of Gilpin county, hauling ore from the different mines to the mills at Black Hawk.

Denver, July 25.

#### Boulder County.

(Special Correspondence).—The Cold Spring M. & T. Co. is overhauling its mill and putting in new concentrating tables and jigs.

Gold Hill, July 25.

(Special Correspondence).—G. A. Kennedy is preparing to operate his claims on an extensive plan, 3½ miles from Boulder. He will build a mill for treatment of his ore at the mine.

Boulder, July 25.

(Special Correspondence).—J. G. Boundy, manager of the Burlington & Boulder M. & M. Co., intends putting up a plant to handle the output from their mine. This property is in the Gold Hill district and the outlook is reported promising.

Rowena, July 25.

(Special Correspondence).—The Fluorite M. Co. have opened up a body of lead and gold ore which runs \$33 per ton. This body of ore was struck 18 feet from the surface. They were sinking a vertical shaft to develop the claims when the ore was cut. It is 4 feet wide in the shaft. They will continue sinking the shaft and will put on a hoisting engine to facilitate the work. The company controls seven patented claims, and is owned by H. D. Milton, T. Phillips and M. Fitzgerald. The assays show up to 65% lead and three ounces gold.

Jamestown, July 25.

#### Chaffee County.

The Mount Antero M. Co. has been organized with main office at St. Paul, Minn. J. B. Dow is president, and T. O. Peacock of Cheyenne manager and superintendent. They have ten claims on north slope of Mount Antero and a mill site and placer property on Chalk creek, near Buena Vista. The property is developed by two tunnels, 40 and 80 feet respectively, on Copper Rock No. 1 and No. 2 lodes. While the vein carries values in gold and copper, it will be worked principally for molybdenum.

Machinery has arrived at Salida for the proposed leaching plant and thirty men are putting it in place. The building has been sold to the American C. M. & R. Co., of which A. Reynolds of Denver is president. B. Ross is vice-president and manager. A 90 H. P. boiler and a 60 H. P. engine are being set up and will be in running order by August 15. A No. 3 Gates crusher, capable of crushing thirty tons of ore per hour, and one set of rolls are ready for operation. The leaching tanks are being set up and the plant is expected to be running at full capacity next month.

#### Clear Creek County.

Georgetown reports say the management of St. Paul M. Co. is raising a working capital to develop its mining claims. W. L. Smith, of Osage, Kan., is interested. It will further open up the upper workings of the Little Jack and other claims, and also drive a tunnel to cut the veins several hundred feet below the present lowest workings.

J. B. Alliaude, of Denver, manager of the Specht mill at Dumont, reports he has a lease on the Live Yankee dump and he is treating the ore with satisfactory results. It is estimated there are 300 tons of concentrating material which can be handled. The Specht mill has been overhauled. The dump matter is hauled from Dumont to the mill at a cost of 65 cents per ton and after computing all costs of treating the same it is said a saving of \$7 per ton is the result. Only ore from the surface of the dump has been treated as yet.

Coal and other supplies have been taken in to the Stevens mine, near Silver Plume, and ore and lead concentrates are being shipped. It has been decided to increase the capacity of the mill by adding two more jigs, three now being in operation, and the mill building is being enlarged for that purpose.—It is reported work will be resumed on the Vice President

group near the Seven-Thirty property on Sherman and Brown mountains, near Georgetown. The Vice President was closed through litigation.

B. Boyer has a bond and lease on the Keystone group of claims on Leavenworth mountain, near Georgetown. As the mine has been idle for some time, a number of caves had occurred and it was necessary to retimber. The property is developed by the tunnel system.

#### Dolores County.

The work of reopening the Sydney group of mines, near Rico, through a shaft, started last week, under Superintendent J. W. Winkfield, is progressing. The shaft is in the upper contact formation and low-grade carbonate ore is being opened.—F. A. McNeill et al., owners of C. H. C. group of gold claims, in Mt. Wilson district, near Rico, are starting operations.—The Wellington group of mines, on C. H. C. hill, is keeping teams busy hauling ore from the mine to Winkfield spur, where it is loaded into the cars and shipped to the Durango smelter. Both the Habermann and Worthing blocks are shipping. The ore is an oxide of iron mixed with lead carbonates and carrying values in silver.—The water in the Argentine shaft is being pumped out, and the drifts are rapidly being freed from water.

F. Wakeman of Denver has started work of reopening the Princeton mine, on C. H. C. hill, near Rico. Owing to the mine having lain idle for a number of years and all of the track being removed from the main working tunnel, it will require some time to retimber and place new track in the tunnel. Wakeman intends driving the tunnel ahead into the mountain from where the drifts in to Ethlena and Crebec properties were made and will not follow the old tunnel, which was run on the course of a fissure.

The Beidler group of mines at the mouth of Horse gulch, near Rico, consisting of twelve claims, will be operated again, and the work of reopening the tunnel which enters Sambo hill from the northeast was started last week. This group is owned by W. F. Hall, W. G. Weaver, G. Beidler and G. E. Moore, but is under option to Rico men. T. R. Thompson, superintendent of the Intrinsic G. M. & M. Co., will superintend operations on the Beidler group.

#### Fremont County.

A copper strike is reported made in Muddy creek, 25 miles southeast of Florence, by J. Miller. The vein is 2 feet in width and has several streaks of copper ore that run 20%.

#### Gilpin County.

The Mountz mill on Pine creek, near Rollinsville, is running steadily. It is a mile from Apex. Two additional tables are being put in, and as soon as possible the 10-stamp capacity will be doubled. C. S. Palmer, of Kansas City, Mo., is interested. L. J. Mountz is manager.

Negotiations are under way for starting up the Pyrenees group on Quartz hill, near Central City, by Eastern parties. L. E. Tobias of Idaho Springs, manager of the Golden Cloud mine in Russell district, is manager. He is putting machinery at the Nimrod mine, adjoining the Pyrenees on the east, and the water is being hoisted. This shaft is down 560 feet. When the water is out an examination will be made to determine future operations.

Traffic Manager Wellington of the Colorado & Southern Railroad has announced that the freight rate has been lowered to 75 cents per ton on ore and concentrates which are valued under \$9 per ton, and a rate of \$1 per ton on all ores and concentrates which are valued at more than \$9 and under \$20 per ton. The old rate from Black Hawk and Idaho Springs to Denver on all ores and concentrates of a net value up to \$10 per ton has been \$1 per ton, and on the grades carrying net values of from \$10 to \$30 per ton the rate was \$1.50 per ton.

Eastern men are interested in the East Boston mine, near Central City, and they are intending to put in a sinking and stationary pump to unwater the lower workings after which they expect to start sinking. The main shaft is down 550 feet and it will be sunk another 100 feet. The company will also put in a boiler of 80 H. P. capacity. Operations are at present being confined to the 200 and 400 levels, stopping being carried on in the 200-foot level, while in the 400-foot level a winze is being sunk in ore and the west level is being extended. Regular shipments are being made of milling ores. The operations are under Superintendent W. Job.

J. Powers et al. of Black Hawk have a lease on the Caledonia 20-stamp mill at Wide Awake, near Rollinsville, and they are overhauling same and getting it in shape to handle the ores of the Stewart mine.

#### Gunnison County.

The Gold Links and Demurrers group

of sixteen patented claims in the gold belt near Pitkin, being secured by the Colorado S. & M. Co., will be worked in connection with other holdings of the company in the district under the management of J. F. Pearson, who says that as soon as machinery can be placed on the property development work will be started. Men are at work overhauling the machinery. Two shifts will be put on and two drills used in the breast of the crosscut tunnel. An electric light plant will also be put in. Work on the company's property in Hall's gulch continues and the north tunnel is getting near the contact.

#### Lake County.

Manager Pogue of Richmond, Ind., of the Russia mine on Mount Lincoln, near the Moose mine, near Leadville, has started work on the mine. Men have been put to work and the plan is to carry on extensive development.

The zinc interests of the Leadville district are improving. The tonnage of zinc from the camp this month will exceed 8000 tons, an increase over last month. The zinc is being taken principally from the Moyer and the Western mines, although there are several smaller producers which are sending out a considerable tonnage.

#### Park County.

(Special Correspondence).—The Ling-Star M. Co. is operating the Ling mine on North Star mountain, 10 miles from Alma. The company is working the Stonehouse level on the north side of the mountain overlooking Blue lake and the headwaters of the Blue river. They have 700 feet of work done on that side of the hill. About 300 feet more work and they will connect with the tunnel from the south slope of the mountain. They are driving a crosscut to open the vein. When connection is made with the tunnel on the south side all the ore will be taken through that tunnel instead of packing over the hill as they have to do at present. This is one of the old properties of the district, having been worked since 1884. Ore is said to average \$100 per ton in gold. It is intention of F. McIntyre of Fairplay, superintendent of the mine, to put in power drills.

Lerch & Ronfeldt are operating the Mattie and Last Chance claims in Montgomery gulch. One tunnel is in 90 feet and the other one 120 feet. These claims are on North Star and Lincoln mountains.—A. V. Holliday has a contract from the Montgomery G. M. Co. to drive a tunnel on its property on North Star mountain in Montgomery gulch 1000 feet. The tunnel is in 300 feet. He is using electric drills.

At Montgomery, the Minnesota M. & M. Co. is operating its 10-stamp mill and cyanide plant. This is said to be the first mill of its kind in that section, and the manager, A. A. Bissell, claims it is a commercial success. The mine is on apex of North Star mountain, part being in Summit and part in Park county, that mountain ridge being the dividing line of the two counties. The mill is operated during the summer months by water power taken from the Platte river, while steam is used in the winter.

Alma, July 24.

(Special Correspondence).—About midway between Alma and Fairplay is the Snow Storm Hydraulic Co., O. M. Yocom manager. This company has been operating for several years on the Platte river and owns 7000 acres of land. It also controls the Alma placers. The company is operating the Alma placers, but intends putting in larger ditches and will work on a larger scale. Most of the gold taken from the Snow Storm placer is coarse, though they have considerable fine gold.

The South Park Oil Co. is putting in a drilling outfit and expects to start operations about August 1st. It is thought that oil in commercial quantities can be found in South Park, hence the organization of this company to develop the oil prospects. Should oil be struck at that point it will be of benefit to the mines of the district.

Fairplay, July 24.

#### San Juan County.

The Gold Nugget group in Maggie gulch, near Silverton, has been sold to C. P. Campbell of Colorado Springs for \$35,000. The group consists of five claims. Its development is slight, aggregating only a few hundred feet in crosscuts and shallow drifts. Preliminary development is being done by Superintendent Van Meeker.

The breast of the 300-foot tunnel in the Spotted Fawn mine, near Chattanooga, is in gray copper and quartz, says Manager Haynes.—The Silver Ledge mine, near Silverton, is reopening. The four electric zinc separators and other machinery that has been added are in operation. With the starting up of the mill the number of miners will be increased.



**Summit County.**

(Special Correspondence).—The Mason-town M. & M. Co. is doing development work on the Victoria mine, of which they have control. This property has been idle for a number of years, and with the starting up of the Victoria it has created considerable interest in mining at this point. This mine is at Frisco, which is reached via Denver & Rio Grande and Colorado & Southern railroads. They have completed a 20-stamp mill on the property. After the ore passes over the plates it is put through cyanide tanks. They are sinking a shaft, and as soon as they strike sulphide ores will install concentrating tables. Will also put in a hoisting engine on the shaft. From the 100-foot level of the shaft they will drive a crosscut to the ledge, which they expect to cut at 130 to 150 feet. D. H. Lawrence is consulting engineer, A. E. Keables is manager. The mine is on Mount Royal, 1/4 mile above the town. Frisco, July 24.

(Special Correspondence).—The Washington M. Co., C. S. Newsom manager, has started to put the mine in shape to produce. The tunnel is being cleaned out and the mill will be started. The tunnel is in 900 feet. A larger crusher will be set up in the mill. Hoyle & Hoyle, who have a lease on the Puzzle mine, are taking out ore and keeping their mill running steadily. The sampling works at Breckenridge are averaging two carloads per day. Case & Kennedy are working their group of claims in McCullough gulch, 5 miles from Breckenridge, and are taking out ore.

Near the head of the Blue river, about 8 1/2 miles south of Breckenridge, is the Quandary Mountain M. & M. Co. new mill, which has a capacity of fifty tons per day. This mill, after running a short time, was found of too small capacity and they have added another set of rolls to the plant. The mine is a blanket deposit of lead ore running from 10% to 20% lead. The ore runs from 5 feet to 20 feet in thickness. The mine is about 1200 feet above the mill. T. J. Cooper of Denver is president and W. Nance is superintendent. Across the gulch from the Quandary Mountain mill M. Howe is putting in a compressor plant and intends driving a 1000-foot tunnel.

The American Gold Dredging Co. is owner of 2500 acres of ground, of which approximately 600 acres are dredging ground and about 1200 acres of high bar or hydraulic property. The dredging ground is in the valley of Swan creek. They own practically 5 miles of Swan valley. The high bars are on the benches above the Swan and in Gold Run, known as the Mumford & Peabody placers. The Mumford placers are worked by straight hydraulics with water furnished by the Gold Run ditch. The Gold Run ditch takes water from the Blue river about 3 1/2 miles above Breckenridge and carries it to Gold Run placers, a distance of 8 1/2 miles. The dredger which this company is operating is of the Bucyrus type, using a sluice instead of a stacker. The capacity of the dredger is about 2400 yards per day. The buckets carry 7 1/2 cubic feet each. The high bars in the Swan comprise the Galena, Ohio, Indiana, Delaware and Kentucky placers. The Galena has produced considerable gold and is noted for its nuggets. Two years ago they took out one nugget which weighed 29 1/2 ounces and another 7 1/2 ounces, together with smaller ones. This company intends putting in more dredgers to increase the work on its placers. W. W. Dyar is manager of the company.

The Providence M. Co. on Gibson hill is doing development work. It has a shaft down 150 feet and is driving from the 150-foot level and opening up ore.

Matthiesen, Griffith & Co., who have a lease on the Jessie mine and mill, are doing considerable work. It is intended to do development work and install new machinery. They have kept the 40-stamp mill running steadily. This property has been worked for several years and contains a large body of low-grade ore.

About 2 1/2 miles from Breckenridge, in French gulch, is the Wellington mine, owned and operated by the Colorado & New Mexico Dev. Co. J. F. Hight is manager. They have a crosscut tunnel in 865 feet and have drifted 600 feet on the vein. The vein is from 6 to 16 feet in width. Some of the ore is rich enough to ship, but remainder is being put on the dump with a view of erecting a mill to handle the same. They now have 6000 tons on the dump. The ore contains lead, zinc and iron. Stopes are opened, but they are doing development work at present.

The Old Union M. & M. Co., E. A. Keables manager, was organized last January to operate the Old Union group, which in the early days was one of the producers of Summit county, but owing to litigation has been closed down for several years. The company intends doing

considerable development work and has several bodies of milling and shipping ore opened. The old Union vein carries lead, gold and silver, shipping returns showing \$22 to \$60 per ton. The new Union vein is a milling ore of zinc, lead, gold and silver, running 20% to 30% zinc, 25% to 40% lead. The vein is from 3 to 4 feet wide. The company is sinking two shafts, one for a working shaft, 250 feet apart; also running a crosscut tunnel, which is in 250 feet. The company will erect a 75-ton mill.

The Lincoln G. M. Co. on French gulch has bought the Mecca property, which consists of 1000 acres of placer ground and water rights of 2000 inches volume. They are putting in a bedrock flume 2000 feet in length. They have abandoned the elevators for the present.

Breckenridge, July 25.

Last week the Gold Run ditch broke at a point 1 1/2 mile south of Breckenridge, which turned a large volume of water loose on the west side of Little mountain, causing damage to the amount of \$2500 at the site, besides loss to the American Dredging Co., which uses the water to operate giants on the Peabody placer in Gold run. The length of the ditch from intake to pressure box is nearly 10 miles. It constantly carries a large volume of water. South of Little mountain the pressure box and waste gate of another ditch—the Gold Pan—are located. The waste water from the Gold Pan ditch runs down a ravine and about half way down the hill crosses the Gold Run ditch by means of a frame apron. At the intersection of the two is where the break occurred. The break made a hole in the Gold Run ditch 200 feet wide and 15 feet in depth, which requires the building of an elevated flume to restore connections. The Alma wagon road below the ditch was also damaged.

**Teller County.**

The Mountain Lion Leasing Co., operating the Happy Year mine of the Central Con. Co. on Bull hill, Victor, will install a plant of machinery and air compressors. The company has 3 feet of ore, which is being broken down, which it is said will pay to ship. The ore is being mined 50 feet from the shaft at a depth of 285 feet. Development work will be done on several showings already found. The main shaft is down 400 feet.

J. Wright, who has a lease on the Zenobia mine of the Stratton estate at Cripple Creek, resumed work last week after having been closed down for two months. The mine was shut down, due to legal entanglements. Lessee Wright will start the men in each of the five crosscuts to make connections between the main workings and the incline shaft.

The Bull Hill M. & Dev. Co., operating the property of the Cresson Co., on Raven hill, Cripple Creek, has started excavating preparatory to putting in a plant of machinery. It will sink the shaft an additional 300 feet, which, when completed, will make the shaft 600 feet below the collar. With that work completed it is intended to drive the levels to determine whether or not the ore opened in the 300-foot level extends to greater depth. The lessees operating the lower Trail tunnel are putting in an electric hoist, with which they intend sinking below the tunnel level.

On the 26th inst. Governor Peabody issued a proclamation calling off military rule in Teller county and placing the Cripple Creek district in charge of the civil authorities. This action is said to have been taken by the Governor in face of opposition from influential citizens of Cripple Creek, who desire to prevent deported union miners from returning to the district. Before issuing the order, however, the Governor received assurances from Sheriff Bell that his men were able to control the situation. Over 4000 miners are working and nearly every mine is running full handed.

**IDAHO.****Boise County.**

Superintendent Stallings, of the Lincoln mine, at Pearl, says developments are progressing on the 350-foot level, where exploratory work has been under way. A 4-foot vein of ore has been disclosed. In the west drift on same level has been opened 7 feet of milling ore. Both drifts have been in ore all the way from the incline. Work is also being pushed on the 950-foot level east from the incline. The mill is running and turning out concentrates.

**Idaho County.**

(Special Correspondence).—It has been reported that freight rates into the Buffalo Hump section are excessive; but, while they are not as low as for more favored camps, they are still not so high as the reports would indicate. The cost of freight at the Jumbo mine is 2 cents per pound in summer, and 4 cents is the

highest paid in the winter season. There are two good roads into the camp.

Concord, July 20.

The Concord M. Co., operating in Buffalo Hump, is putting in a four-drill compressor. Machinery for the mill has been unloaded at Stites. W. Q. Brown, manager of the Concord, is employing twenty-six men. He has a shaft 100 feet deep on the Concord lode and has started drifting both ways. The ledge is 7 feet wide, carrying gold values. The late Jumbo cleanup was \$10,000 for a thirty-day run with twenty stamps. The property is working thirty-five men.

**Kootenai County.**

St. Maries reports say the Tyson G. M. & Dev. Co. has started preliminary survey for 60-mile ditch, for obtaining water for hydraulicking in their mines at Tyson next season.

**Owyhee County.**

Superintendent M. White has men working on the Homestake group of claims, near Silver City, bonded to S. B. Longfellow. They are doing work also on the Sunrise mine. Ore is being opened up.

Since burning out of the electric transformer at the Addie mine, near Silver City, a gasoline engine has been set up to supply air for the miners, and will do duty until another transformer can be obtained. The work in the mine is progressing, but the mill must continue its shut down until the electric power can be turned on again.

**Shoshone County.**

Wallace reports say the Bunker Hill & Sullivan M. & Conc. Co. filed twenty-eight locations with the county recorder last week. Of these, twenty-two were filed by C. M. Lindley for the company, while the remaining six were amended locations made by the company itself. All are in Yreka mining district.

The Little North Fork C. M. & M. Co., owned by G. Harris, D. Mason et al. of Wardner, has two shifts of miners at work. The lower tunnel is in 500 feet, and there are 3 feet of ore in the breast of the drift. Within 50 feet farther they expect to be directly under the ore shoot which was opened nearer the surface. The ore carries copper pyrites.

**KANSAS.****Cherokee County.**

H. Goodwin will sink a new shaft south of Baxter. There will be a dozen or more new shafts going down on drill holes near Baxter Springs. J. W. Perry, of Joplin, Mo., is putting down a drill hole on the Angel land and is 95 feet in good dirt. The Sunny Side plant is running steadily and has several carloads of ore on hand. L. J. Hainer and G. Boughton, of Galena, have leased ground near the Mission mine and have a hoist and everything ready to put up as soon as the roads are dried up.

The Ford & Troupe Mission mine plant at Baxter Springs is running steadily on payable ore. In running a drift on the east a vein of clear jack was opened which shows a 5-foot face 12 feet long and is increasing in depth as the drift advances. This company has a carload of jack and a carload of lead ore in the bins, and as soon as the roads are passable will make their first turn-in if prices of ore hold up.

Walker & Spiva, of Galena, have started a shaft on the Opperman lease, on Willow branch, at Baxter Springs, and a shaft at a depth of 4 feet from the surface, showed up pay dirt, both lead and jack. This is near where a shaft was formerly put down and was abandoned on account of a failure to beat the water.

The Baxter M. Co. has leased 200 acres of E. H. Tousey, west of Abram's, and will begin prospecting with the drill at once. This company has also leased 240 acres from R. Quapaw and 240 acres from Minnie Greenback—Cornor, the latter lying east of Spring river. Their drill prospect on the Dardenne land is showing values, and 15 feet of rich lead ore was passed through between 75 and 100 feet. The hole is now 150 feet and in flint and limestone.

Near Empire City, G. McCullagh is drifting at 120 feet and H. Poole & Co., on the Illinois Lead & Zinc ground, are sinking a shaft, says the Joplin News-Herald. Miller, Bally, Pickett & Pickett are sinking a shaft on the Illinois Lead & Zinc ground. They are down 16 feet. The Lockport M. Co. is running the old Lockport mill. Stone, Pinson & Hallam are taking out three and four tons a shift in the old Duck Pond mine, on the Lou Dillon lease. They are working at 114 feet with only one pump working. Some fine tailings pile ore was on exhibition last week at the Murphy crusher office. The ore was sold at \$36. The ore was originally put in the gravel pile by Sparks, Vest & Fulton, in Gin hollow, Empire City. The Owl mine, on Owl creek, is

working steadily at 100 feet. The water, though stronger than usual, has not been greatly increased by the flood. It is thought that the water from the flooded mines in the bottom will seep through and affect the mines on Owl creek.

Boughton Bros. on the Victoria ground at Empire have their new shaft completed and are drifting at 110 feet. They are cutting a small drift through the floor of old workings to have room underground to work their dirt, and expect to take up a 25-foot stope of rich ore.

**MISSOURI.**

The production of zinc ore in the Missouri-Kansas district during the first quarter of 1904 is reported at 65,000 tons. The production in the first quarter of 1903 was 58,381 tons. The average price reported for the output in 1904 is \$33.30.

**Jasper County.**

Wells Bros. have made a rich strike on the Allan Hardy land, northeast of Joplin. In a drill hole they struck lead at 100 feet, went through 25 feet of that ore and then into jack, where the drill now is. The lead cuttings are rich. C. and H. Wells have first lease on a 10-acre tract of the land, which is 1/2 mile north and west of the Independence mine.

E. Gates of the Gates-Nail M. Co., at Four Corners, south of Carl Junction, reports a strike of rich lead and jack in a stope from the mill shaft. Mr. Gates says it is the best dirt they have ever had.

The Alice H. M. Co. of Joplin has been incorporated. The shareholders, all of Joplin, are as follows: W. P. Leon, C. W. Power, O. H. McKennon and E. H. Mower.

At the Southside mining ground, near Joplin, says the News-Herald, the water is all out of the ground, and the miners are at work in every shaft worked before the flood.

The Good Eye mine, incorporated as Palmetto No. 2, is not working, as the old shaft nearer the mill site is being cleaned out and pumped to a depth of 150 feet.

Bullene, Huff & Co. are sinking a shaft on 5, west, and Swaney & Co. have installed a horse hoister and steam drill on lot 15, west. Garner & Co. are working at the 80-foot level and keeping mill No. 1 running. Tuthill & Co. have started a new shaft on 22 west.

Thirty-eight mining companies and leasers in the vicinity of Joplin report sales aggregating 2,209,740 pounds of zinc ore and 313,800 pounds of lead for the week ending July 16. The zinc was valued at \$39,775 and the lead at \$8,470, a total of \$48,245 for the week. The output for the entire zinc-lead field of Missouri, Arkansas and Kansas adjacent to Joplin is reported for the week as follows: Zinc, 7,913,590 pounds; lead, 862,280 pounds. Values: Zinc, \$133,315; lead, \$23,100; total, \$156,415. For twenty-nine weeks of 1904: Zinc, 289,298,140 pounds; lead, 36,250,470 pounds. Values: Zinc, \$4,766,870; lead, \$1,002,330; total, \$5,769,200.

**Newton County.**

At Sherwood, on the Creller & Young land, the Rice M. Co. is increasing production and reports an output of \$25,000 worth of ore since it started, February 1, last. This company has its second shaft sunk into the ore body which will furnish air circulation. Owing to the cheapness in breaking the ground, the ore is produced at an expense of about \$10 per ton, and brings the highest market price, as its metal contents have averaged 63% zinc. One car was 64 1/2% and several 64%. The Excelsior Z. & L. Co. has a block of the same number of lots on the south and is sinking two shafts on them to reach the same ore body that has been out to the line by the Rice M. Co. The Webb City Iron Works of Webb City, on the east of the Rice M. Co., is sinking its fourth shaft on a drill hole. When this reaches the ore body they will erect a mill. Varner & Co. on the Johnson land have their 100-ton mill in operation and are cleaning ore at rate of a ton an hour. The Utility & Gates, Nails & Martin on the Mitchell land, Smith & Stickney on the Smith land, Bailey & Stickney on the Bailey & Robinson land, McManamy & Co. on the Barbee & Connor land, the East Sherwood mines on the Hatfield land, and J. A. Hardy on the Allen Dickson land, are each developing deposits of ores.

**MONTANA.**

The report of B. H. Tatem, in charge of the United States assay office at Helena, for June shows the amount of gold received exceeded the receipts for June, 1903, by \$31,000, the amount for June, 1904, being \$202,153. Of the receipts for June, Montana contributed \$177,026, a gain of \$52,437 over same month last year.

**Beaverhead County.**

O. Quintrell, with M. Allen, has con-



tract for 800 feet of tunneling on the Pluto mine, near Dillon, and is putting in machinery with which the work is to be done. The plant consists of an air compressor, drill and boiler.—The Independence M. Co., of which E. W. Honchen is president and H. O. Granberg is secretary, has recently been organized and absorbed the Leighton-Gentry property. These claims end line the Congo.—The owners of the Congo are putting men to work to increase development.

#### Broadwater County.

R. A. Bell of Helena has resumed operations at the East Pacific mine, near Winston, and is again shipping high-grade ore after an idleness of several years. The new ore body was found outside the old workings. A concentrator will be built at the mine.

#### Deer Lodge County.

G. D. Curtis says the Red Lion mine, west of Anaconda, and near the Hannah group and the Gold Coin, will be reopened. The property has not been worked for several years.

#### Lewis and Clarke County.

The mill of the Bald Butte M. Co., near Helena, is again in operation. Development work will be continued in addition to regular operation of the plant. The drift on the vein recently struck is in 63 feet, showing 7 feet of ore, which assays \$25 in free milling gold. The vein is apparently a parallel to those which formerly made the Bald Butte a gold producer. B. H. Tatem of Helena is secretary of the company.

The Inter Ocean M. Co., operating near Rimini, has bought twenty-one full claims on Red mountain, and in driving a tunnel on one of them reports it has cut four leads, the ore being copper, gold, silver and lead.—Hoffman & Backen have made initial shipment from their group in Red Mountain district, which netted \$100 a ton. The values are in copper, gold, silver and lead.

#### Missoula County.

While waiting for a diamond drill with which to further prospect its ground, the Leslie C. M. Co., near the Idaho line, east of Wallace, Idaho, set up air drills and succeeded in getting through the fault on the south ledge, which had proved an obstacle, by running only 25 feet, and found the ledge to be 30 feet wide, carrying copper and galena values, says the Wallace Press. After crosscutting the ledge, a drift was started, which is in 60 feet, with the face of the tunnel in concentrating ore. The Leslie is 1 mile from the Northern Pacific Railroad, with a good wagon road to the mine, with only a 5% grade. The property is equipped with a compressor plant and other machinery and has water power.

#### Park County.

A Livingston report says that fire last week did damage to the Cokedale coal mines to the extent of \$4000 and for a time threatened the lives of six miners, who were brought to the surface in an unconscious condition. The fire originated on the fifth level. The Cokedale mines employ 100 men and will be closed temporarily as a result of the fire.

#### Silver Bow County.

At the Belmont mine at Butte on the 24th inst. three miners were drowned by the breaking of a bulkhead which held back the water of the Cambrus mine. The shaft is full of water.

Additional suits have been begun in the District Court at Butte by the Boston & Montana C. Co. on account of the alleged looting of large quantities of valuable ore from the adjoining mines through the Minnie Healy workings. In two suits judgments are asked to the amount of \$7,400,000. In the five suits begun against F. A. Heinze and his agents, alleging looting of ore from the Michael Davitt, Little Mina, Colusa, Piccolo and Gambetta mines, the judgments in damages that are asked aggregate \$16,850,000. The last two suits were against Heinze corporations alleged to have been in charge of the Minnie Healy at different periods in the complicated proceedings that have arisen through the litigation over the property. In the testimony given in court it has been stated by Heinze and his agents that during certain intervals, in turn, the Minnie Healy Co., the Montana Ore Purchasing Co., the Johnstown Co. and the Hypocka Co. were conducting the operations in the mine. In the complaint it is stated that the Colusa, Piccolo and Gambetta mines lie adjacent to each other, forming one compact body of mineral ground, and the properties are worked as such. At a point in the earth the three ore bodies unite and form one large vein. Prior to the time when Heinze secured possession of the Minnie Healy property, the mine had never been a paying one, although it had been ex-

tensively prospected at a large expense by experienced miners. The Boston & Montana Co. now claim that through the exploitation of adjoining properties the Minnie Healy has been made to pay richly.

### NEVADA.

#### Lincoln County.

It is reported J. Johnson of Salt Lake City, Utah, has an option on the Ryan holdings in Pennsylvania mining district, 20 miles from Caliente, for \$36,000. Development of the properties has exposed ore carrying silver and lead with copper and gold. Work will be increased.

The Portland & Boston M. Co. has been organized to operate the Baltimore, Radical and Porcupine mines, north of the Parallel and west of the Santa Fe mines at Searchlight. P. A. Dow, W. B. Currier, R. and S. Dennis, A. and H. Dow of Los Angeles, Cal., are officers. Work has begun on the Radical, with W. B. Currier in charge.

The last month's cleanup of the Southern Nevada mill, at Searchlight, amounted to \$12,174, says the Searchlight, and represented 370½ hours' run. The ore averaged \$21 a ton. The ten stamps are dropping sixteen hours a day, but by using a coarser screen and more water better results are said to be obtained than formerly. The McDonald incline is producing high-grade ore showing free gold. The vein is small. South of the open stope, a 2-foot vein has been uncovered which is being developed.

#### Nye County.

The railroad was completed to Tonopah on the 23rd inst. and the arrival of the first train was accompanied by a celebration. Ore shipments have been held back for the past few months waiting the coming of the railroad.

### NEW MEXICO.

#### Grant County.

The Burro Mountain C. Co. has started its concentrator at the St. Louis mine in the Burro mountains, near Silver City, says Manager G. Newcomb. The number of men working underground is being increased.

At the Comanche smelter, near Silver City, men are at work improving the water system at the old smelter site, preparatory to operating the new plant.—The Chatham smelter is again in operation after a temporary shut-down.

At Fierro, the Colorado F. & I. Co. has resumed operations in its iron mines, and has 100 men at work and will put on more. It is intended to ship 50 cars of ore per day.

#### San Miguel County.

The Pecos C. Co. is preparing to develop its claims, 7 miles south of Willis, in the Pecos forest reserve near Glorieta on the Santa Fe railroad. The mines are 22 miles from Santa Fe. Machinery will be put in. The main shaft is down several hundred feet and is connected with the dump on Willow creek by a tunnel. The vein has been entered 35 feet. Water in the shaft is being handled by a steam pump. The mine was formerly the Hamilton. The company has a power site on the Pecos river. This power will be supplemented by a steam plant. O. W. Alexander of Cerrillos is superintendent.

### NEW YORK.

#### Orange County.

Middletown reports say a strike of gold and silver ore has been made in an abandoned lead mine in the Shawangunk mountains, near Otisville.

### OREGON.

#### Baker County.

Development work has been resumed on the Minnie McDowell group of claims in the Cable Cove district, near Sumpter. Tunnel work will be carried on from the point left off last season.—L. V. Swiggett, who has bonded the Golden Chariot group, east of Sumpter, is preparing to increase development. A sinking plant will be installed. The first work will be sinking a 100-foot shaft on the ledge. Swiggett also has charge of the Constellation group, in Cable Cove district, and the Orleans, in Cracker Creek section. Both these properties will be developed with the Golden Chariot by the Philadelphia Co. A hoist will be put in at the Orleans and the main tunnel of the Constellation will be driven ahead.

Arrangements are being made for a cyanide plant at the E. & E. (Eureka & Excelsior) mill, near Sumpter, to handle the slimes from the 20-stamp plant. The leaching plant is to be placed on Big Cracker creek, a short distance below the mill, where a gravity discharge of the pulp will deliver it. Manager Wyatt is impounding the tailings, having a separating device which is a conical settler,

coarse sand going out at the bottom while the fines and slimes are discharged over the top. The fines are impounded in a dam and a second basin is also used to settle, as far as practical, such fine stuff as goes through the first. Operations at the mill are continuous. In the mine development is being done in the adits and 170-foot level of the shaft.

The operation of the Golconda mine of Sumpter has passed from the Golconda Co. to the Geiser-Hendryx Co. of Sumpter.

#### Douglas County.

J. H. Pearsons, secretary of the Oregon Securities Co., operating at Bohemia, says the tunnel which is being driven through the Champion to the Musick mine has reached a depth of 525 feet. A large amount of high-grade ore has been blocked out from the Musick mine, and by Aug. 1 the company's 30-stamp mill will begin grinding ore. The tunneling operations are being carried on through a ledge 45 feet in width.

#### Lane County.

S. Standish, part owner of the Great Northern mine at Blue River, says he will put in a Huntington mill at the mine. The new mill will increase the daily handling of ore from ten to thirty tons, turning out \$10,000 in gold every month. A tramway will be built to carry the ore from the mine to the mill, so that the property can be worked in the winter, when there is snow.

#### Malheur County.

W. Albrecht of Baker City, president of the Zenith Oil Co., reports that oil has been found in several localities in Malheur county, and that the owners of oil lands are waiting the experiments being made by Blood et al. of Boise, near Ontario. Ontario is in the gas belt, and to get oil it will be necessary to go deeper than farther up the basin; but, if Blood opens up producing gas wells, it is expected he will bore deeper to strike oil. The Malheur oil is said to have a paraffine base.

### SOUTH DAKOTA.

#### Custer County.

The Ruberta M. & M. Co., near Custer, is equipping its property with a stamp mill and cyanide plant. W. W. Olds is president and manager.

#### Lawrence County.

Deadwood reports say the Puritan M. Co. is working men on its property along Big Strawberry gulch grading for a mill and building a shaft house. The gallow frame for the latter is up. Machinery for the hoist and mill is on the ground. The company is composed largely of Kansas City, Mo., men, and owns acreage along Strawberry gulch. Machinery was bought of the North Star M. Co. and has been moved up from Custer county. There are ten stamps in the mill, also steam hoist, air compressor, drills, pumps, etc. A shaft was sunk to 90 feet. As soon as the hoisting machinery is in place sinking will be continued to depth of 500 feet.

The Tinton Tin Co. has appropriated \$500 to be used in making repairs on the wagon road between Iron creek and Tinton, necessitated by the damage of recent high waters. The company expects to increase its number of men at work as soon as the road is made passable, and will continue its production of tin. The plant treats the ore by concentration. It passes through Gates crushers and rolls and over table concentrators. The capacity is 100 tons per day. The concentrated product has been shipped for refining, and there is stored in the mill building a quantity awaiting shipment.

The Golden Crest M. Co. is resuming operations on its property in Two Bit gulch, near Deadwood. A heavier hoist has been set up at shaft No. 4, and this shaft is expected to supply the mill with ore. The opening is 80 feet deep and lateral work has shown ore above that level. The new hoist is of the double-drum type, and is housed by a frame building having a 20-foot gallow frame. A tram track has been laid from the shaft to the mill. Shaft No. 4 supplied the mill during the last few months that it was working, the ore being hauled in wagons.

The Goldstake M. & M. Co. last week made final payment on its property on Elkhorn gulch near Maitland, and is increasing operations. The company owns two water-rights on Elkhorn gulch which will be developed for use in a reduction plant. A tunnel is being driven convenient to the mill site. The company's holdings consist of the Rich Hill group, the Elkhorn and the Spokane groups, covering an area of 150 acres. O. V. Pryce of Deadwood is vice-president and manager; and G. W. Wilkins of Maitland is superintendent.

F. Groch has leased the Rossiter cya-

nide plant and tailings dump in Deadwood and the plant is in operation.

The Elliptic M. Co., on Miller gulch, 4 miles northwest of Deadwood and 2 miles east of Maitland, is increasing operations, says Manager Leming. A shaft house is being built. The two-compartment vertical shaft is down 125 feet, and it is expected to get the quartzite at between 250 and 350 feet. A horse whim is in use, but a heavy gallow frame has been built, as a steam hoisting plant is proposed.

The Alexander Maitland M. Co., at Maitland, in Garden City district, has resumed shipments of smelting ore via Deadwood to Denver, Colo. The low-grade ore is being treated in the Maitland 40-stamp, wet-crushing cyanide mill, which is in steady operation. A 24-drill air compressor is being put in at the mine. The other compressor has a capacity for eight drills. A tunnel is being driven southwesterly to crosscut a vertical ledge on False Bottom creek, below the mine and mill. It has been started on quartzite and, in addition to development of the vertical measures along the eastern side of the creek, will connect in time with the lateral workings from the Realization shaft, thereby furnishing ventilation and drainage. A. Maitland of Negaunee, Mich., is president.

The Homestake M. Co. has in operation 1000 stamps. The 100-stamp addition to the Amicus mill at Lead is completed, connections made, and they are now dropping. This increases the number of stamps in the Amicus to 240, making it the largest mill of the Homestake Co. The Amicus mill is supplied with power by an 800 H. P. engine of marine type. The transfer of operations from the old engine to the new was accomplished with only a slight delay, and the power and water connections with the additions of the mill were effected after a shutdown not to exceed two hours, says the Review. New shafting was placed in the mill at the end next the engine and the old shafting was moved to the section occupied by the new stamps. There are now two parallel shafts the length of the mill building, each shaft carrying 120 stamps. The stamps weigh 1000 pounds each and are arranged in standard Homestake mortars. Work is progressing steadily on the addition to the Homestake cyanide plant No. 1, whose capacity will be increased one-half. The capacity of the Homestake cyanide plant No. 2 at Black-tail is also being increased by enlarging the size of its tanks, and the company's ore tonnage in both the stamp mills and cyanide plants will be materially increased during the next few months. The Homestake's milling equipment is distributed as follows:

Mill.	Location.	No. of Stamps.
Homestake	Lead	200
Golden Star	Lead	200
Amicus	Lead	240
Monroe	Terraville	100
Pocahontas	Terraville	160
Mineral Point	Central City	100

### UTAH.

#### Beaver County.

A. B. Lewis of Salt Lake City, president and manager of the Monarch Con. M. Co., owning holdings extending from Copper gulch on the south to the Montreal group, near Milford, on the north, and also mines at Pioche, Nev., says they are preparing to increase development on all of their properties. Work will be put under way next month. Machinery will be put in.

#### Box Elder County.

The New Foundland mining district on the west side of Great Salt Lake, on the line of the Lucin cut-off, is developing as a copper camp, says C. T. Birchard of Boston, Mass., manager of the Boston & Terrace property. He is arranging for the shipment of ore as soon as the railroad opens the cut-off for local traffic. In the meantime development work is progressing favorably. The group is being opened by tunnels and the main one has been completed to 1089 feet. They are making a raise to the surface for air. The tunnel has tapped a 2½-foot body of high-grade ore, which is being extracted for shipment. Assays show values of 18% lead, 10% copper, 87 ounces silver and \$1.40 in gold. The property is 5 miles from Newfoundland station on the cut-off.

#### Iron County.

Operations at the Johnny mill at State-line are temporarily suspended pending connections between the new and the old ore bodies in the mine. It is expected ten more stamps will be added to the mill. W. J. Dooley of Salt Lake City is manager.

#### Piute County.

J. Long, Jr., manager of the Gold Mountain Con., whose properties adjoin those of the Annie Laurie at Kimberly, says the prospect tunnel has advanced 470 feet into the zone, where the ledge will be tapped 130 feet deeper. With satisfactory



results there the main tunnel will be started. At the Sevier the management is increasing work, with a method for overcoming losses in slimes to be installed, while at the Annie Laurie the production of gold bullion continues steadily under Manager A. E. Hyde, Jr.

#### Salt Lake County.

With a steady volume of high-grade copper, gold and silver-bearing concentrates coming from the mill in Bingham canyon, near Bingham, Manager D. C. Jackling, of the Utah C. Co., says four more Wilfley tables are on the ground to increase the battery at the company's mill to forty. Superintendent F. P. Janney is setting them up. The first carload of vanners, of which thirty-two will be added to the equipment, is expected this week. With this additional equipment, says Manager Jackling, the company will be prepared to reduce 600 tons of ore daily, and from that the means with which to construct other units until a capacity for reducing at least 5000 tons daily will be reached.

E. A. Wall has bought the Dewey mill at Bingham and will utilize it in the treatment of the second-class ores of the Kingston group of claims.

The capacity of the Yampa smelter, in Bingham canyon, at Bingham, under Superintendent H. C. Bellinger, is to be doubled, says the Tribune. To that end a second furnace, corresponding with that now in operation and at which an average of 200 tons of ore is being daily reduced, will be put in. With this additional equipment in commission, the management expects to produce a matte of quality that shall enable it to ship the product. Meanwhile the calcining furnace has been tried with satisfactory results and another will be added. It is a single-hearth machine with power-driven rotary rables. Meanwhile the company's mines are putting out as much ore as at any period since the company began to draw upon them. In addition to the tonnage going to its own plant, it is delivering ore under contract with the American S. & R. Co. The method improvised by the management enables it to move the output entirely by gravity to the main tunnel, where it is loaded on cars that are pulled out by mules and dumped into receiving bins on the line of the Copper Belt Railway, over which it is forwarded to the furnaces. It is expected the company will equip the main tunnel, 3000 feet in length, with an electric locomotive.

The waters of Adamson Springs, near Garfield Beach, are to be added to a supply that will enable the Utah C. Co. of Bingham to ultimately reduce 5000 tons of copper, gold and silver-bearing ores daily, says the Tribune. With this the copper company will have added 3000 gallons per minute to its resources, its contract with the Bingham Con. M. Co. for the output of the Dalton & Lark tunnel assuring it a minimum of 1600 gallons per minute, while from the shaft on the Old West mountain placer it is pumping 1000 gallons per minute. This supply, economically used, is expected to enable the company to reduce 1000 tons daily with catch basins and equipment for repumping. In what manner Adamson Springs shall be made to serve has not yet been decided, says President MacNeill. It may be piped and pumped to camp, where another mill, constructed entirely of steel, may be built, and again the ores may be taken to a plant near the springs, in which latter event they would be trammed to that point.

The Emily S. M. Co. of Utah has been incorporated to work the Emily silver and copper mine at Alta. The officers are J. P. Henderson president, M. Fargo, J. F. Baster and C. F. Harris.

#### Summit County.

Men have been taking out some of the machinery from the Old Marsac mill, near Park City, and what can be used of it will be taken to the Ontario mine and set up in the new works to be built there. At the Ontario mine the work started there, since the fire, continues. The gallow-frame is in place, and the engine at the old Daly has been taken down and is ready to be hauled to the new plant. The timbers in the shaft injured by the flames have been replaced and by September 15 it is expected the mine will be working again. About thirty men are working on top, and a little ore is being taken out on the 600-foot level.

T. M. Stringer has two jigs at work on the second-class ore dump at the Woodside mine, near Park City. The ore has been accumulating for five or six months past and a little is being taken out as development progresses.

#### Utah County.

The Clipper & Silver King Con. M. Co., which owns property in American Fork canyon, near American Fork, has been incorporated. The officers are J. Wooten president, J. Armstrong, E. H. Boyle, C. Armstrong and M. O. Randolph.

#### Washington County.

Approximately 6000 ounces of fine silver were shipped last week by the Brundage M. & R. Co., operating in Silver Reef mining district, from its mines near Leeds. This is the first shipment of any consequence made from that district for some years, says the Tribune. The Brundage Co. is increasing work. The company is developing the following mines: The Free Coinage, Walker, Jumbo, Barbee, Wonder, Lucky Boy, Jack Whacker Nos. 1, 2, 3 and 4. The property is equipped with a 5-stamp mill and an increase in stamps and productive power is expected.

#### WASHINGTON.

##### Ferry County.

The Copper Key mine, in Lambert creek section, near Republic, is being reopened. A winze sunk on the vein from the crosscut tunnel is to be sunk deeper. The Copper Key is on the Belcher vein and produces iron oxide. A wagon road has been built to the property which connects with the main road to the Belcher mine. Ore is being sacked for test shipments to the smelters.

##### Lincoln County.

The Providence mine at Cedar Canyon, near Davenport, has been taken over by the Providence M. Co., organized under Maine laws by W. H. Cornforth, Fitchburg; W. H. Gulliver, Portland, Me.; A. Vittum, F. E. Houghton, F. J. Parker and D. H. Whipple of Boston, Mass. The mine is 100 miles from the Minnehaha and Hercules properties, operated by the Houghton-Thurston Co. It will be placed in charge of S. L. Boywer, who is in charge of the other properties.

##### Okanogan County.

The Olentangy M. Co. has started men sinking on the Colon mine, northwest of Chesaw. The Colon is a high-grade gold property and is owned by Ohio men.

#### WYOMING.

##### Carbon County.

Encampment reports say R. Deal, T. Weldon and N. Land are taking out mica of merchantable quality from a deposit they have found in the Elkhead mountains west of Encampment. The deposit is about 200 feet in width and outcrops for 1000 feet and was found below timber line at a height of 12,000 feet.

The Beulah M. Co., operating in the Battle Lake region, has been reorganized as the Beulah C. M. Co., and the Finance group of claims added to the property. J. F. Ledbetter of Salt Lake City, Utah, is manager. H. Tibbals is also interested. Operations will be increased.

From the reduction works of the North American C. Co. at Grand Encampment there are shipped per week five cars of blister copper, which runs 99.5% copper. It is expected the output will be increased to six cars a week.

#### FOREIGN.

##### AFRICA.

###### Transvaal.

The monthly reports of some of the principal Transvaal gold mines for June show the following:

Mine.	Stamps Dropped.	Tons Milled.	Output.
Glen Deep	100	13,030	233,579
Jumpers Deep	100	15,658	22,027
Nourse Deep	75	9,760	20,414
Geldenhuys Deep	165	20,010	40,799
Robinson	165	22,993	59,754
Ponanza	55	8,100	22,610
Jumpers	55	7,230	10,449
Durban	55	7,920	15,769
Langlaagte	120	18,866	25,854
Geldenhuys Est	80	12,336	23,177
Ferreira	65	9,886	29,308
Crown Deep	145	19,720	37,885
Rose Deep	160	22,141	37,297

The management of the Geldenhuys Deep is the only one complaining of a scarcity of labor.

##### AUSTRALIA.

###### South Australia.

South Australia during 1903 produced minerals of the value of \$520,000. Mining on the largest scale was at the Wallaroo and Moonta copper properties, where 164,800 tons of ore, carrying from 2.92% to 3.13% copper, were treated. It appears that there is probability of the Burra copper mine being reopened, as prospecting work has given encouraging results. Tarcoola remains the most important gold mining field of the State, 4863 ounces having been won during the year, of which 4451 ounces came from the Tarcoola Blocks mine. The export of salt from the deposits on Yorke's peninsula was 40,000 tons.

###### Western Australia.

During 1903, at the Great Boulder Perseverance mine at Kalgoorlie, 132,593 tons of ore and 74,913 tons of tailings were treated for a return of 213,180 ounces of gold bullion of value of \$739,249, the

profits amounting to £396,567. The reserves of ore were estimated at end of 1903 at 401,677 tons to the 700-foot level, so that the mine is developed three years ahead of the plant. The main shaft is down to 1135 feet. Sulphide ore treatment costs have fallen to 19s 3d during the year, as compared with 22s 11d during 1902.

#### BRITISH COLUMBIA.

##### Boundary District.

Up to May 1, 1904, there had been done a total of sinking and raising, 5705 feet; drifting and crosscutting, 17,693 feet; diamond drilling 1493 feet at the Granby mines, at Phoenix. Up to the same date shipments of ore were 1,104,008 tons, says the Rossland Miner.

##### East Kootenay District.

A zinc smelter, the plant to cost \$100,000, will be built in Fernie by the Anglo-French Syndicate, reports the head office of the Crow's Nest Coal Co., which has entered into an agreement with Manager Ferneau, who will put up the works in return for obtaining land and slack from the company on favorable terms. Ferneau's principals in London have been in correspondence with the coal company and have obtained a site of several acres on north side of the Coal Creek Railway, near Fernie. Preparations are being made also for construction of a zinc-enriching plant at Rosebery, in the Slocan, from where most of the ore will be obtained. The Fernie plant will be the zinc reduction works, and there the concentrates will be reduced to zinc matte.

##### Nelson District.

At Ymir the Dundee, Foghorn and Porto Rico mines are announced to resume operations.—J. Gille is resuming development work on the Heatherdew group, near the Foghorn mine, on Wild Horse creek. It is a free milling proposition.—G. H. Barnhardt, who has the Porto Rico mine leased from the Canadian Pacific Ex. Co., of London, will resume operations there next month.—W. Walde, manager of the Queen mine, at Salmo, last week shipped a gold bar valued at \$2900 which represented a run of fourteen days at the 10-stamp mill. He has sixteen men at work on mine and mill.

##### Rossland District.

The pay rolls for last month at Rossland distributed over \$75,000. The details, says the Rossland Miner, are as follows:

Le Roi mine	\$14,800
Le Roi No. 2	9,400
Center Star	15,250
War Eagle	10,375
Rossland Power Co.	7,375
Jumbo	4,000
White Bear	3,000
Spitzee	1,700
Rossland-Kootenay	4,000
Velvet	3,000
Minor wage rolls, including Iron Mask, Cliff, ore teams, etc.	2,000

Total wage roll ..... \$75,300

In addition to the foregoing the mines specified have a salary list, probably aggregating \$15,000, which does not appear in the wage roll.

At the Canadian Smelting Works at Trail No. 2 lead stack has been blown in. The lead smelting capacity of the works will not be overwhelmed, for No. 3 lead stack will be still in reserve. An accident entailed closing down one copper furnace pending repairs.

##### West Kootenay District.

J. Gottlieb of Comaplix, at northeast arm of Arrow lake, Lardeau district, says mining operations at Camborne and Goldfields, in Fish river district, are being conducted with satisfactory results. The Great Western company, which is operating a 10-stamp mill, has completed excavations for placing ten additional stamps, which will be in operation this season. The Eva mill at Goldfields is running full capacity on ore that yields \$12 per ton. Gottlieb is developing his Little Joe group at Comaplix. There are four claims in the group, on each of which the lead has been opened. One is 22 feet wide and contains ore shoots that carry gold values. The ores are free milling.

#### MEXICO.

##### Chihuahua.

L. A. Beachel, of El Paso, Texas, and Chicago, Ill., men, have bought the Victoria mine, about 14 miles from the Barranca del Cobre copper mine, near Barranca del Cobre. Development work will start this week. It is intended to build a small smelter this year. The ores are silver-lead, with a small per cent of gray copper ore.

In the southern portion of Chihuahua, near Batopilas and Urique, cloudbursts are reported to have done considerable damage. The country has been dry for some time, and the rains will enable all mines to resume after a shutdown of many months as soon as the damage from

the cloudburst is repaired. No lives were lost.

G. B. Jacobs and S. Lawrence of Chihuahua City, who have a lease and bond on the Dolores mine in Santa Eulalia district, are putting in a concentrating plant of forty tons daily capacity. Hand jigs will be used.

At Santa Eulalia, W. K. Ryan of Ryan & Dudley, who are building the extension of the Chihuahua & Pacific Railroad, has bought three mining properties adjoining the Santa Juliana mine. The properties are La Ibera, La Isla and El Continente, aggregating 106 pertenencias. Ryan expects to start work next month and will make his headquarters at Chihuahua.

Four different outfits are working in Minillas camp, 15 miles from Chihuahua, says the Enterprise. S. Navarro has men working on the Minillas mines. The San Jorge-Minillas M. Co., an English corporation, is developing its property. F. Schmidt has started work on his 29 de Febrero and says he has payable ore.

At the silver-lead camp of Santa Eulalia, 15 miles from Chihuahua, in the Josefin mine, being opened up by the American & English Co. by Manager S. G. Burn, ore running \$10 per ton in gold has been cut, says the Enterprise.

A concession has been granted by the State Government to M. Krakauer of Chihuahua City for building an aerial tramway at Santa Eulalia, connecting the principal mines of the district with the mineral railroad at Santa Eulalia station. The tramway will be 4000 meters long, with an allowance by the concession for an additional 4000 meters.

##### Guerrero.

At San Nicholas del Oro the Balsas Valley M. Co. has its main shaft down 1200 feet and in ore. The Rosario M. Co., in same camp, is also in full operation.

At Campo Morado, the Reforma M. Co. is shipping \$20,000 of bullion per month.—La Dicha C. Co., near Chilpancingo, is blocking out its copper deposits preparatory to smelting operations.

The San Mateo and San Luis mines, near Naranjo, in Taxco district, have been sold to E. B. Lukis et al., who are preparing to put in pumps and other machinery and operate both mines.

##### Jalisco.

J. B. Izabal and R. D. Lauderdale, of Mexico City, are preparing to reopen and develop the Bolanos group of mines in northern Jalisco. There is a 20-stamp mill on the ground, but the workings are under water. The ores are said to carry gold and silver values.

At Bolanos the Zuloaga mine has been bonded for \$50,000 to F. J. M. Rhodes and J. McGrath. They intend to start operations at the mine next month.

A. M. Campanella, of Aguascalientes, says he proposes to establish a smelter at some point in Jalisco, probably Guadalajara, for which a company is being organized.

##### Nuevo Leon.

It is reported the Minas Nuevas group of mines on Mitre mountain, near Monterey, has been sold to the Minas Nuevas de Nuevo Leon Co., of which E. Doerr is president, F. A. Adams vice-president and F. W. Selover secretary. Some 550 men are employed at the mines and low-grade silver-lead ores are being shipped. It is understood the company will increase operations.

##### Queretaro.

The Ajuchitlan M. Co., of which B. Petersen, of Parral, is president, is building a 50-ton mill at Ajuchitlan for purpose of treating the ores from its gold property. It is expected to have the mill in operation in September. J. Brennon is manager and the mine has been under development for two years. A body of \$10 gold ore has been blocked out. The mine is three hours ride from the Mexican Central and the National railroads.

##### Tepe.

The wire rope tramways at the Buena Vista mines, near La Yesca, which were damaged by the fire several weeks ago, have been temporarily repaired. As soon as new cables and machinery parts reach the mines from the States, permanent repairs will be made. The production of the mill has been reduced as a result of the fire, as the entire supply of wood was consumed. The tramway used in bringing the wood from the mountain was damaged, and it was necessary to transport the fuel on the backs of mules. C. Gibson is manager of the Buena Vista properties.

##### Zacatecas.

The Mazapil C. Co. has put in power machinery at its mines near Concepcion del Oro. The plant consists of five gas engines 50 H. P. each, and they are to operate five electric motors of 550 volts and fifty amperes capacity. This is additional power to be used for hoisting and other purposes to relieve the power plant at the smelter.



## PERU.

A. W. McCune, manager of the Cerro de Pasco copper mines at Cerro de Pasco, reports the completion of his Peruvian railroad to its terminus at Cerro de Pasco. He says they were behind four months in completing the road because of the rainy season. This railroad will be 85 miles long on the main branch running from Oroya, the terminus of the present railroad, to the Cerro de Pasco mine and passing the smelter. Including the branches, the road will be 115 miles long. Its construction has been especially difficult because it runs for a good part of the way through low, swampy ground, where the work was completely swallowed up by the heavy rains until a solid road-bed was secured by hauling in gravel. Upward of 5000 men, entirely natives, were employed a portion of the time at the smelter, mine and railroad when the heavy grading was being done. They are rushing work on the smelter and expect to have it ready for operation with a 500-ton capacity in about a year. When completed it will be of 1000-ton capacity. Work continues at the mine in the way of getting out ore. They have five hoists constructed, three of them on shafts down a depth of 500 feet.

## SPAIN.

## Huelva Province.

At the Rio Tinto copper mine at Rio Tinto during 1903, there were 1,918,538 tons of ore extracted, of an average copper content of 2.39%. Of this quantity 688,919 tons were exported to Germany, the United Kingdom, or the United States, and the balance, 1,229,619 tons, was treated locally. Copper produced on the mines totaled 21,565 tons, while 14,245 tons were contained in the pyrites shipped. The revenue of the company amounted to \$8,245,000, and all expenses aggregated \$2,555,851. The dividends paid for the year aggregated \$16.98 per share. The company reports it has 130,000,000 tons of ore proved by workings and diamond drilling in its mine.

## Personal.

R. C. SPECHT has returned to Oroville, Cal., from San Francisco, Cal.

J. H. HOPPER, a civil engineer of Sonora, Cal., is in San Francisco, Cal.

A. J. MCCONE has returned to San Francisco, Cal., from Virginia, Nev.

J. B. FARRISH, a mining engineer of Denver, Colo., is in San Francisco, Cal.

W. E. DOWNS, a civil engineer of Sutter Creek, Cal., is in San Francisco, Cal.

ALVIN PHILLIPS, formerly of Denver, Colo., is about to locate in San Francisco, Cal.

E. F. FREUDENTHAL is superintendent of the Majestic copper mines at Milford, Utah.

B. S. REVETT left Breckenridge, Colo., last week for Alaska, to be gone several months.

F. F. THOMAS, manager of the Gwin mine, Calaveras county, Cal., is in San Francisco, Cal.

THOMAS CLARK, manager of the River Hill M. & C. Co. at Placerville, Cal., is in San Francisco, Cal.

A. R. BOYNTON, vice-president of the McKinnon G. M. Co. at Silver City, Ida., is visiting in California.

A. J. MALLOY is manager of the Bingham and New Haven Co. mines at Bingham, Utah, vice F. Benedict.

W. H. HARRISON of Grand Island, Neb., is looking after his mining interests in Summit county, Colo.

F. A. TAYLOR is superintendent of the Bingham & New Haven mines at Bingham, Utah, vice Coombs.

C. GIBSON is manager of the Buena Vista mines, near La Yesca, Tepic, Mex., vice J. McGrath resigned.

M. THOMPSON of Deadwood, S. D., is manager of the Columbus Con. G. M. Co., operating near Deadwood.

R. FRICK of Burlington, Iowa, is looking after his mining interests near Rowena, Boulder county, Colo.

E. J. BONSTELL, a cyanide operator of Sutter Creek, Cal., contemplates a trip to Mexico on mining business.

G. A. NIELL is superintendent of the Union mine of the Union Con. G. & S. M. Co., near Nevada City, Cal.

MANAGER STALLINGS of the Lincoln mines and mill, near Pearl, Idaho, has returned there from the East.

T. W. GALLIGER has been appointed superintendent of the Stockton mine at Stockton, Tooele county, Utah.

J. M. BENSON has been appointed master mechanic at the Oneida mine, near Jackson, Amador county, Cal.

EMERSON GEE of Los Angeles, Cal., is at La Paz, Lower California, where he is interested in copper properties.

LEONARD D. SIVYER has been examining mining property in Mexico and will now visit Tuolumne county, Cal.

C. E. GRUNSKY, member of the Panama Canal Commission, has been elected director of the Panama Railroad Co.

WILLIAM McDERMOTT of Salt Lake City, Utah, is general superintendent of the United Verde mines at Jerome, Ariz.

RICHARD A. PARKER of 217 Boston Bldg., Denver, Colo., is examining mining property in Guanacavi, Durango, Mexico.

J. R. B. TREGLOAN of Amador City, Cal., has been appointed engineer for the Shenandoah M. Co., near Plymouth, Cal.

L. H. CARVER, manager of the Mountain mine near Sierra City, Cal., has returned from the mine to San Francisco, Cal.

L. D. HUNTOON is now assistant professor of mining and metallurgy in the Sheffield Scientific School, Yale University.

W. B. JEFFS, a director in the Columbus Con. M. Co., operating at Bingham, Utah, is at the company's mines from Michigan.

F. VON FALKENSTEIN of Salt Lake City, Utah, has gone to San Francisco, Cal., en route to Valparaiso, Chili, to engage in mining.

W. T. BEANE of Deadwood, S. D., is manager of the Golden Empire M. Co., operating in Lawrence county, S. D., and Crook county, Wyo.

A. B. LEWIS, president and manager of the Monarch M. Co. of Beaver county, Utah, returned to Salt Lake City, Utah, last week after an extended trip East.

G. SNYDER of Salt Lake City, Utah, manager of the Balaklava copper mines of the Western Exploration Co. in Shasta county, Cal., is in San Francisco, Cal.

E. J. CALLAHAN has resigned as superintendent of the Santo Domingo mine of the Amparo M. Co., near Etzatlán, Jalisco, Mex., to look after private interests.

A. MIDDLEBROOK, manager of the Denver Branch of the Jeanesville Iron Works Co., was at Hazleton, Pa., July 27th, at the opening celebration of the Jeanesville Iron Works Co.'s new shops.

D. B. HUNTLEY, who has had charge of important mining interests in South Africa for some years, has returned to the United States. Mr. Huntley's present address is 1259 Webster St., Oakland, Cal.

S. L. BEYR, formerly superintendent of the Minnehaha C. G. M. Co., Washington, has been appointed general manager of all the Houghton-Thurston Co. properties in Washington and British Columbia.

GEO. L. FISHER, formerly engaged in mining in Colorado, Mexico and throughout the West generally, is now connected with the mining machinery sales department of the Allis-Chalmers Co., and is located at their exhibit in Section 82, Mines and Metallurgy Building, World's Fair, St. Louis, where he will be pleased to see his old friends and comrades.

## Trade Treatises.

"Westinghouse Industries" is an artistic treatise on the manufactures of the Westinghouse Electric & Manufacturing Co., as exemplified at the St. Louis Exposition, and elsewhere throughout the world. The booklet is for distribution at the St. Louis Exposition and is worthy of a place in the file of the company's similar publications.

The Cockerill gas engine is finely described and illustrated in a handsome quarto by the Wellman-Seaver-Morgan Co., engineers and manufacturers, Cleveland and Akron, Ohio. They are sole American licensees for this engine, which they present as being specially adapted for blast furnace blowing engine service, and for heavy duty electric light and power transmission.

Catalogue No. 6 from Pacific Tank Co., San Francisco and Los Angeles, Cal., contains prices of cyanide plants and supplies, and tanks for mining purposes. Considerable information is also furnished

regarding copper leaching and treatment of gold-copper ores by the ammonia-cyanide process. The catalogue also contains a telegraph code of every item listed which simplifies business communications. It is believed no other telegraph code in use mentions such items as used in connection with cyanide plants. The catalogue will be mailed free of charge to anyone on request.

## Commercial Paragraphs.

HENSHAW, BULKLEY & CO., San Francisco, Cal., report an order for nine more Kinkead mills to be added to four recently shipped to the same customer at Pachuca, Mexico.

THE Allis-Chalmers Co. is credited with having secured the contract for equipment and furnishing of 100,000 horse power by a turbine plant for the Brooklyn, N. Y., electric roads, which represents an outlay of more than \$2,000,000.

THE Redfield Drill Co., 1606 Blake street, Denver, Colo., have recently shipped one of their drills to Red Cliff, Colo., and one to Portland, Or. This company is getting up a new electric drill, which they will soon be ready to place on the market.

THE Little Wonder rock drill, manufactured by Martin Hardsocg, Ottumwa, Iowa, is reported as giving satisfaction wherever put in. The manufacturer has commendatory letters from California and other American States, and also several foreign countries, where the drill has been used with good practical results. Mr. Hardsocg guarantees "satisfaction or no sale."

THE National Wood Pipe Co. of Los Angeles and San Francisco, Cal., has finished a pipe line, 5 feet diameter at the mouth and 52 inches the remainder of its length, for the Imperial (Cal.) Valley irrigating ditch. They are also constructing a 5-mile pipe line for the W. & O. Power Co., Walla Walla, Wash. They are now putting in the entire pipe system for the Diamond Match Co. at the new town of Stirling, Cal., and recently supplied the town of Silverton, Colo., with several miles 10-inch patent machine-banded, redwood water pipe. The National Wood Pipe Co. further report supplying the Cleburne W. I. & L. Co., Cleburne, Texas, and making a shipment of their pipe to South Africa.

THE Progressive Concentrating & Milling Co., Boulder, Colo., manufacturers of the Tetrault improved concentrating table, has an order from the Cold Spring M. & T. Co., Gold Hill, Colo., for four of their improved tables and two Tetrault jigs, and have the contract for remodeling their mill. They report they have been able to make a saving on their improved Tetrault tables from 83½% to 87% on sulphide ores. They state they are getting in shape to manufacture the tables in larger quantities. Before selling their tables to a mining company they prefer to make a thorough mill test on the ore. They have a complete milling plant in connection with their table factory. They also handle the Tetrault jigs. E. C. Pohle is president and Alex. Tetrault superintendent. They also state they have a device for saving free gold without the use of plates. This device is made up of a series of riffles at the head of the table which they call a "gold trap."

THE well known firm of James L. Robertson & Sons, New York, manufacturers of Eureka packing, Robertson-Thompson indicators and many other useful steam specialties, in their desire to keep themselves and their goods before the public, started in February last a guessing scheme, offering three prizes—\$200, \$75 and \$25 in gold—to the engineers who guessed nearest to the number of admissions to the St. Louis Exposition on July 4th. Naturally, there were a great number of contestants. On receipt of the official figures from the secretary of the Exposition—namely, 179,258—a committee composed of the publishers or managers of the five most prominent engineers' papers examined the records and awarded to the following gentlemen: Joseph Carson, engineer for the Pennsylvania R. R. Co. (Market St. Station), Newark, N. J., who guessed 178,986, 1st prize; Mason Chilcoat, engineer American Sewer Pipe Co., Akron, Ohio, who guessed 179,738, 2nd prize; Albert Schmith, engineer American Multiple Fabric Co., Providence, R. I., who guessed 180,210, 3rd prize. The bags of gold have been sent forward to those persons and no doubt satisfactory acknowledgment of same will be returned. It is pleasant in this age of catch-penny prize schemes to note this substantial offer and the conscientious carrying out of same in a prompt manner.

## Latest Market Reports.

SAN FRANCISCO, July 29, 1904.

## METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c, refined (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 45½c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$13.00; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £57 11s 3d spot per ton.

LEAD.—New York, \$4.25; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 13s 9d long ton.

SPELTER.—New York, \$4.85; St. Louis, \$4.75; London, £22 ½ ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$26.87½@27.05; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, \$30@32½c. London, £122 10s spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$44.50@45.50, large lots; London, £8 San Francisco, local, \$43@43.50 per flask of 75 lbs.; Denver, \$46.00, Export, \$43.00@43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, \$3.10, 50c; dust, \$3.10; sulphate, \$3.10; .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

## STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.60 @12.85; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c per lb.

## CHICAGO CURRENT QUOTATIONS.

Bessemer	.....	\$14 75@15 00
Pfoundry Northern 1	.....	13 75@14 00
Northern 2	.....	13 25@13 50
Northern 3	.....	12 75@13 00
Southern 1	.....	13 40@13 65
Southern 2	.....	12 90@13 15
Southern 3	.....	12 40@12 65
Forge	.....	11 65@11 90
Charcoal	.....	14 50@15 00
Billets, Bessemer	.....	23 00@24 00
Bars, iron	.....	1 30@1 35
Bars, steel	.....	1 51@1 51
Rails, standard	.....	28 00@30 00
Rails, light	.....	23 00@25 00
Plates, boiler	.....	1 91@2 01
Tank	.....	1 76@1 81
Sheets, 27 store	.....	2 25@2 31
Angles	.....	1 76@—
Beams	.....	1 76@—
Tees	.....	1 81@—
Zees	.....	1 81@—
Channels	.....	1 76@—
No. 1 railroad wrought	.....	10 50@11 00
No. 1 cast, net ton	.....	9 50@10 00
Iron rails	.....	14 50@15 00
Car wheels	.....	10 50@11 00
Cast borings	.....	3 25@3 50
Turnings	.....	6 00@6 50

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

## GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

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## Algonkian and Archæan.

There has been much discussion over and some confusion in the use of the terms Algonkian and Archæan. All geologists realize the difficulty of accurately classifying the pre-Cambrian rocks, as they are absolutely devoid of fossils, and classification can only be attempted on lithological grounds. As the character of the really primitive rocks has only been assumed to have been granite, and as granite is known to exist in different conditions, due largely to rate of crystallization, it is evident that an arkose rock, formed directly and wholly from the degrada-

age. The Huronian and Laurentian were divided into several separate periods, and this classification was adopted throughout America and Europe, as they were separated from the Cambrian rocks by at least one pronounced non-conformity. As it was recognized that in rocks of this character there might be represented several ages, J. D. Dana proposed that the name Archæan be given to the several groups of pre-Cambrian rocks, including Huronian and Laurentian. This name supplanted the term Azoic previously employed for non-fossiliferous rocks antedating the Silurian. In 1889 several members of the United States Geological Survey suggested

have been named Ontarian. Succeeding the Huronian was a long period during which no sediments were deposited, and this Professor Lawson has suggested be named the ep-Archæan interval. Following this is the Algonkian, divided into two members with an unconformity between them, followed in turn by the Cambrian, from which the upper Algonkian is also separated by unconformity. Some of the leading American geologists have already recognized this claim of the Archæan to retain its place in North American geology, not only because of priority, but for stratigraphical reasons, as it is a well-recognized fact that the Algonkian does not embrace all of the



A Prospector's Camp in Rhodesia.—(See Page 85.)



Ancient Workings Being Reopened by Modern Miners, Rhodesia, S. A.—(See Page 85.)



The Ruined Walls of Kahma, Rhodesia, S. A.—(See Page 85.)



Inside the Zimbabwe Ruins, Rhodesia, S. A.—(See Page 85.)

tion of the original granite, must vary in character with the character of the original rock. These arkose rocks must also vary more or less with the distance at which the material is deposited from the original source, that at a greater distance being, of course, finer in grain than that deposited near the source.

Laurentian is a name proposed fifty years ago by a geologist named Logan for the crystalline schists in Canada along the St. Lawrence river. These rocks comprise limestones, quartzites, and conglomerates, and were known to be of fragmental origin. Later large areas were included under the Laurentian, embracing a variety of rocks other than those mentioned. Huronian is the name given to the rocks on the north shore of Lake Huron, and to some rocks on Lake Superior supposed to belong to the same

that the term Algonkian be substituted for Archæan to designate all clastic pre-Cambrian rocks. There is a series of rocks in the Lake Superior region which is clearly immediate between Archæan and Cambrian, and it has been suggested by A. C. Lawson in Bulletin of Geology No. 3, Vol. 3, of the University of California, that Algonkian might properly be applied to this particular formation, but objection is made to the substitution of Algonkian for Archæan which has become to be well recognized as a term covering the clastic rocks of pre-Cambrian age, although it was also known that these formations included igneous rocks which had been metamorphosed, and in some instances were mistaken for metamorphic sediments. In more recent years rocks have been discovered on the south shore of Lake Superior which are believed to be older than the Huronian or Laurentian, which

pre-Cambrian clastics. From the standpoint of practical mining, perhaps, the identification and differentiation of these several ancient formation is of less importance than would be the case in the confusion of rocks of any subsequent geological age, but unless it be understood that Algonkian does not embrace all pre-Cambrian rocks, but has a particular horizon of its own, there will continue to be confusion in the classification of these old non-fossiliferous rocks. There are many valuable mining districts in which Archæan rocks predominate. Noted among these are the schists of the Black Hills of South Dakota, portions of Colorado, much of Arizona, a large portion of Rhodesia, S. A., and the gold region extending along the Appalachian chain from Virginia southwesterly into Georgia, the predominating rocks being crystalline schists.



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SOMETHING of the disadvantages under which the mining industry has labored in the Buffalo Hump region of central Idaho may be gained from the statement of a correspondent at Concord, who says that the cost of freight during the summer months to the Jumbo mine has been 2 cents per pound, and in winter 4 cents per pound. It requires good mines to endure such charges, but the development of the mines of that district continues and mills are being taken into the country, and no doubt within a short time railroads will be extended into that progressive district, which will permit the extensive development and equipment of many mines now considered too low grade to be operated under the conditions at present obtaining there.

SINCE the recent successful experiment of sending a diver in armor down into the lower levels of the Draper mine, near Soulsbyville, Tuolumne county, Cal., to repair a mine pump which had suddenly refused to work, a similar task has been given the same diver in one of the mines of the Utah Copper Company at Bingham, Utah. The successful termination of this second experiment will probably be sufficient to establish a precedent that the submarine diver is to become an important factor in the unwatering of flooded mines through the failure of mine pumps. The diver will soon become expert in this line of work, and success will doubtless usually attend his efforts; but he would probably draw the line in the lower levels of the Comstock, should they ever desire to avail themselves of his services, as he would be unable to protect himself against the hot water there. In working under water in a mine, the diver has the advantage of the absence of swift currents, but is somewhat hampered by unfamiliarity with his surroundings, particularly about sinking pumps, as these being located in the shaft, the footing is somewhat insecure, though better conditions obtain about station pumps. In modern diving outfits the electric light and telephone have become important attachments, which go far toward simplifying the difficulties.

## The Extralateral Right Law.

The law of the extralateral right is one which has been a source of more litigation than any other of the laws of the American mining code. There was something analogous to it in the mining laws of Germany during the sixteenth and seventeenth centuries, where an inclined location was permissible wherein the miner was allowed to take a claim, the side lines of which were inclined, conforming as nearly as possible to the dip of the vein, the miner being permitted to take all the valuable mineral found within 30 feet of the foot or hanging wall of the vein. It is not apparent that the adoption of a similar law in the United States would simplify existing conditions. When gold was discovered in California it quickly became necessary to adopt some code of laws to govern the appropriation and operation of mineral lands in the public domain. In framing the early mining statutes the mining laws of Spain and Mexico were followed to a great extent, and from these, with the customs and usages of the miners, the mining statutes were evolved, with numerous changes from time to time. Among the earliest and most pronounced exception to the Spanish and Mexican laws was that of giving the quartz miner the right to follow all the "dips, spurs and angles" of his vein, to indefinite depth in the direction of its dip, absolutely regardless of the surface underneath which it might penetrate. The first mining laws enacted by Congress were those adopted as the local rules and customs of the miners of California. Later, when mining law became more clearly defined but when, evidently, the knowledge of mining geology was somewhat clouded, the law of the extralateral right was passed—the law of 1866. This law presumably conceived a condition, which, geologically speaking, approached the ideal—a series of veins essentially parallel in dip and descending into the earth at an essentially uniform angle. Unfortunately for the quartz miner, this ideal is rarely found, though not without example. The copper-bearing conglomerates and beds of the Lake Superior region, and the gold-bearing reefs of the Witwatersrand, in the Transvaal, are typical examples. But in a district like Butte, Mont., Cripple Creek, Colo., or Rossland, B. C., where the geology is complex, and where veins strike in various directions, with variable dip and often connected by a system of reticulated smaller veins, the identity and continuity of any particular vein often becomes a matter of great difficulty and uncertainty. This complex geological condition and its bearing on the extralateral right has in some districts been the cause of expensive and seemingly almost interminable litigation.

Despite this there is that about the extralateral right which makes it attractive. While the fact that a change in the law which would operate to confine mine owners to the planes of their boundaries drawn vertically downward would put an end to that litigation over the much disputed right in newly located claims, yet it is a noticeable fact that in those countries where the extralateral right is not in force there is less activity in mining. There is something alluring in the condition which permits a miner to pursue his vein to illimitable depths if he desires, and he objects to being hampered in his search for ore by the intervention of an imaginary line or plane. As a matter of course he is limited by his end line in following the strike of the vein; but this he may overcome by taking up several claims adjoining each other; but stopping at the side line seems different. Owing to the uncertainties of the continuation of payable ore bodies, there is little incentive to sink shafts through the barren hanging-wall country rock to ascertain whether or not a vein successfully exploited at and near the surface will continue to be equally valuable in depth, and, as a rule, where the extralateral right is not in vogue mining is less active than in those regions where the law is in force. Elsewhere herein a correspondent makes a forceful argument in favor of the extralateral right, and argues a deadening effect in a law which limits the pursuit of ore to the boundaries of claims on all sides.

IN the matter of conflicting mineral claims, where the conflict is on paper in the land office only, due to inaccurate surveys, it is now clearly established that the monuments must control, and errors in sur-

veys must be corrected to conform to the facts. Recently, Acting Secretary Ryan of the Interior Department, in one of the Leadville cases involving this question of inaccurate survey which resulted in a conflict of claims on the land office maps, decided that in the designation of the position of mining claims two elements are involved in patent proceedings—first, the course and distance from a corner of the claim to a corner of the public survey, or a United States mineral monument, and the designation of the boundaries by courses and distances; second, by reference to and description of the monuments on the ground, by which the boundaries must be distinctly marked. These different elements should coincide, but cases are many in which they are at variance. With such variance always possible, the mining claimant who fails to mark distinctly upon the ground, before the survey of his claim, the boundaries thereof, with the monuments of fixed and enduring character and zealously thereafter to preserve them intact and in place as they are described in the patent, takes the consequences of his omission.

THE three active months of a presidential year are always marked by a business depression. Timid people and scary business men are always ready during the next ninety days to imagine all sorts of dire happenings and from their number they have a deterrent influence on general business. Those who find profit in panics now do their best or worst to precipitate what they are fond of calling "hard times." Times are always hard with some people, who find excuse for failure outside of their own lack of ability or their own timorous dispositions. Prosperity is based on public credit, and that is primarily a matter of confidence. In the mining world there is more than ordinary activity. Investments continue with profitable result and reports from all parts of the field show that mining machinery and appliances are in usual demand. Indeed, the incipient dullness in other branches of business induces even more than ordinary onward movement in everything pertaining to the mining industry, for, happily, this department of public activity tends to profit by the efforts of a fearful few to predicate disaster. Not in many years has there been more development with just promise of profit, forming a pleasing contrast to other forms of business which at present are temporarily quiescent because of this prevalent habit of dismal prophesy, which every four years partially paralyzes so many enterprises in the business world. That there is no real reason for cessation of prosperity in any department of general business is manifest, but despite this fact the regular quadrennial scare shows itself here and there, to be dispelled as usual when, after the November election, the croakers and Cassandras realize how baseless were their fears.

CRUDE petroleum has been applied to ore reduction in a variety of ways—in chlorination roasting, in ore drying and otherwise, but as yet it has not been attempted in the reduction of quicksilver ores in furnaces of the ordinary type—that is, in upright shaft furnaces such as are employed in the reduction of quicksilver ores. At the Socrates mine, Sonoma county, Cal., crude petroleum has been used in the reduction of cinnabar in the rotary furnace of the White-Howell type, which is the only place where oil has been employed for this purpose as far as known. It is the intention of the management of the New Idria mines in San Benito county, Cal., to make experiments with crude oil in the ordinary vertical shaft furnaces. No difficulty is anticipated in the coarse ore furnaces where the intense flame of the petroleum blast will impinge directly on the ore, but in the fine ore furnaces in which there are numerous arches, ports and baffle plates, the necessity for experimentation is evident. It is thought the application of oil to quicksilver reduction will result in cheapening the cost of the process.

WHERE there are State laws requiring that mines be operated along certain lines—as to timbering, ventilation, etc.—and the management slight these necessary requirements so far as it safely can without actually disregarding the law, the result is usually, sooner or later, a serious accident. If such regulations are considered essential to the safety of men, there should be some means of enforcing the law.



## CONCENTRATES.

A SMALL HAND JIG may be made for testing ores by this method of concentration. These jigs may be bought ready made, with instructions as to method of operating them and testing the ores.

IN Mexico tin is found in the States of Guerrero, Durango, Zacatecas and Jalisco and in the Territory of Tepic. In Jalisco it is associated with copper and iron. Nearly all Mexican tin carries small values in gold, especially that which is known by the Mexican miners as "estano colorado," or red stone tin ore.

IN the "Concentrates" of July 23, in re. the losses of mercury by pan process and subsequent treatment of tailings by the cyanide process, the second chemical equation should have read:  $2\text{Hg}^{++}\text{Cl} + 4\text{KCy} = \text{Hg} + \text{K}_2\text{Hg}^{++}\text{Cy}_4 + 2\text{KCl}$ , indicating the formation of potassium chloride, which was omitted in the former "Concentrate."

THAT there is any actual relation between the value of ores in veins and the formation in which they occur is not demonstrated by experience in the development of mines in many different kinds of rock. The statement that the wall rocks are of this or that character is not an index of the values in the veins. Good mines are found in almost every kind of rock.

THE appearance of metallic copper on the sides of an iron mortar in which copper-bearing ore was being ground in the presence of water was no doubt due to the fact that the ore contained some copper in the form of sulphate, and this being soluble was dissolved by the water and immediately precipitated on the iron sides of the mortar and also doubtless on the pestle.

OCCASIONALLY minerals are found so light as to float on water. Among them are some varieties of pumice, infusorial earth and quartz which has become cellular by reason of the decomposition of the sulphides or other soluble constituents, leaving spaces filled with air, the walls of which being impervious to water, the air has sufficient buoyancy to cause the entire mass to float.

MANY millmen burn the tin screens used in the battery before tacking them to the frame. The burning removes the tin and anneals the iron plate, making a tough and durable screen. The annealing renders the screen much less liable to breaking—a fault not uncommon in brittle screens. The burning can be best accomplished over a moderate charcoal fire. Care must be taken not to overheat the screen.

ASBESTOS is a calcium magnesium silicate. It is purely mineral and in no sense of "vegetable" or organic composition or origin. Its separation in some varieties into silky fibers is a natural property of the mineral, as much as the separation of mica into plates of extreme thinness. Asbestos of good quality is unaffected by heat, and for this reason is utilized in making fire-proof and refractory materials.

IN hoisting engines the brakes should never be neglected. There are several types of band and post brakes, but the post brake is most in favor because of its somewhat heavier construction. The hoisting engineer should at all times know that the brakes of his engine are in first-class condition. It is unwise to allow the shoes to go too long without renewal. On the brakes depends the lives of the men and their failure means disaster.

"CHINESE TALC" is a name given by Leadville, Colo., miners to a white, compact, semi-translucent mineral, found between the limestone and porphyry, and sometimes with the ore in that district. The mineral greatly resembles in appearance the material from which miners' candles are made. It is a silicate of alumina, with usually more or less sulphate of alumina, but is of variable composition. It is hygroscopic (absorbs moisture from the atmosphere), and hardens on exposure to the air.

THE Bunsen method of separating arsenic and mercury is based on the fact that when hydrogen sulphide is passed into an acid solution containing pentad arsenic and pentad antimony, and then the hydrogen sulphide driven out by air under pressure, antimonious sulphide ( $\text{Sb}_2\text{S}_3$ ) only is precipitated. The arsenic is reduced also, but much more slowly; but if the hydrogen sulphide is promptly driven out when the precipitation is complete, a satisfactory separation of the two—arsenic and antimony sulphide—is effected.

AT the last session of the California legislature three companion bills were introduced amending Section 3 of the code of civil procedure, the passage of all of which would have been to render mining claims liable for labor performed on them, and rendering of no effect the notice posted by the owner to avoid responsibility of debts contracted by bonders or others. All of these bills passed and one of them was signed by the Governor before any objection was made to the same, the other two being pocketed by the Governor. The precise effect of

the amending of a single section without amending the other two has not been passed upon by the Supreme Court of the State, and there is every reason to believe that at the next session of the legislature the coming winter the section amended will be restored to its original form, to obviate all doubt on the subject. The act, as it was intended it should be amended, would make it possible for the person having a bond on a mine to connive with several workmen to defraud the owner out of his property under the lien law.

IN Mexico miners are called "mineros," "barretaros" and "trabajadores de minas." In any particular mine the foreman is known as the "minero" and the miners as the "barretaros." The mine laborer is classed as a "peon." The timekeeper is the "rayador" and the mechanic is the "maquinista" or "mecanico." In a small mine the superintendent is called the "administrador." This name is also given to the paymaster of a larger mine. A prospector is a "prospetador" or a "rumbiador." Placer miners and chloriders are termed "gambucinos." Tin miners, both quartz and placer, are called "estaneros."

THERE are a number of laws on the statute books of California relative to mines and their operation, but none relating to safety appliances in shafts. The laws requiring a second means of exit from a mine over 300 feet in depth; the law providing for a uniform code of bell signals, for mines and other similar legislation, have no provisions for their enforcement, but they all depend upon the fact that failure to comply with the law deprives the owner of the mine of a defense in the event of the injury or death of workmen occurring through failure on the part of the mine owner (company or individual) to comply with the law. Thus Section 3 of the Bell Signal law says: "Any person or company failing to carry out any of the provisions of this act shall be responsible for all damages arising or incurred by any person working in said mine during the time of said failure."

ONE atom of copper passing into solution "cyanides" 3.5 to 4 molecules of KCN, forming a cuprosocyanide, probably  $\text{K}_3\text{CuCy}_4$ . As the atomic weight of Cu is practically equal to the molecular weight of KCN, a pound of copper would decompose, as a maximum, four pounds of KCN, or an ore carrying 0.1% Cu might decompose as much as eight pounds per ton. This, however, would be in an extreme case, when all the copper is in an oxidized form, such as the carbonate, when mechanical conditions also favor its rapid dissolving; the sulphide ores, especially when compact, are much more slowly attacked. The cyanogen in this double cuprous cyanide is not shown by the silver nitrate titration and is valueless as a gold solvent. Zinc will precipitate copper partially from solutions which contain but little free cyanide, but not from strong solutions.

THE terms "blanket vein" and "bedded vein" are synonymous. Often veins in crystalline rocks like schist, granite, diorite, etc., which lie at a low angle, are referred to as blanket veins, though originally "blanket vein" was the name given to "beds of ore" which were of chemical origin, as bog iron ores deposited in shallow lakes, etc., and to ore bodies in sedimentary rocks (sandstone, limestone, etc.) as the result of the deposition of mineral in those rocks by mineral solutions. These bedded deposits may be formed in any one of a number of ways. 1. By selective porosity, where the mineral deposits in a porous rock, such as the silver ores of Calico district, California, or of Silver Cliff, Colo., where the ore occurs as chloride in a porous rhyolite breccia. 2. As a residuary deposit, from the evaporation of water containing mineral in solution, such as beds of salt, soda, calcium borate, gypsum, etc. 3. As the result of the replacement of country rock by minerals deposited from percolating waters. Among these are the lead-silver zinc and iron deposits found in limestone, such as those at Leadville, Colo., and elsewhere. The Cambrian ore deposits in the Black Hills are impregnations in quartzite and lime shale, and may properly be considered as typical bedded veins.

WHERE contractors and company employees work in the same mine, complaint of misappropriation of tools and supplies, one from the other, is of frequent occurrence. This can be obviated by stamping tools—such as picks, shovels, drills and hammers—with the company name, these to be given to the company's men, and stamping a different device or none at all on the contractors' tools. At Morenci, Ariz., this misappropriation of tools but more particularly of supplies, led to the expedient of having colored candles made for the use of men on contract, the company's men using the plain white article. The fuse and powder are also marked in some way that it may be readily distinguished. Another idea, often prolific of good results to the management, is the numbering of all the machine drills and keeping a check on the disposition of every drill sent into the mine, its destination, etc. Then if the drill is carelessly broken it can not be taken to the surface, thrown out at the collar of the shaft, for repairs or the junk pile, and another machine taken down, possibly to share a similar fate in incompetent hands. All the wrenches, oil cans and other tools should be numbered to correspond with the drill to which they belong. This plan will often put an end to the petty annoyances of having the men appropriate

tools and supplies belonging to others, and the marking of machines will usually result in the men taking better care of the machines entrusted to their care. Where this has been tried it was found to operate satisfactorily in every case.

A DICHRSCOPE is an instrument used for the purpose of testing the dichroism of minerals. Dichroism is that property of a mineral which causes it to seem to have two different colors when viewed from different directions. Zircon is an example. A transparent crystal of this mineral viewed in the direction of its principal (vertical) crystallographic axis is a pinkish brown, but when viewed at right angles to this direction seems asparagus green. Light-colored tourmalines viewed in the direction of their vertical axis are opaque, and viewed at right angles to the vertical axis show some color. The dichroscope consists of an oblong rhombohedron of Iceland spar with a glass prism of 18° cemented to each extremity. This is placed in a metal case provided with a convex lens at one end and a square hole at the opposite end. When looking through it there appear to be two holes, due to the double refraction of the Iceland spar. When a dichroic or pleochroic mineral (one presenting three colors when viewed in different directions) is examined through the dichroscope, by means of transmitted light, on revolving it the two squares at intervals of 90° in the revolution have different colors, according to the vibration planes of the ordinary and extraordinary ray in the calcite. As the two images are side by side, a slight difference in color is perceptible. The instrument is often employed in the examination of gems.

THE 4-inch pump with 10-inch stroke, operated at Grass Valley, Cal., in which the "water hammer" is causing too much vibration, could be improved by placing an air chamber on the upper part of the pump, in addition to that on the pipe line. The object of an air chamber is to change the intermittent motion of the water moving with the pump piston or plunger into a uniform flow in the discharge pipe, and to reduce the shock of water hammer. Where water is forced through a column pipe by a reciprocating (not a rotary) pump, and where, therefore, the water in the pipe is alternately started and permitted to come to a state of rest, the velocity of flow cannot be allowed to be great; otherwise, the column of water will continue in motion for a short interval after the pump has reached the end of the stroke, and will then start back when the piston is on its return stroke. The effect of this is to cause the outlet valve to close suddenly, arresting the movement of the column of water with the consequent shock. In the pump in question, as the discharge column is but 2 inches in diameter and the pump cylinder is 4 inches, the relative area is as 4:1. Consequently the water moves four times as fast in the discharge column as in the pump—in this case nearly 300 feet per minute. If the additional air chamber, as suggested, fails to stop the hammer, a somewhat larger discharge pipe may help it.

THE NAMES of many of the subdivisions of the geological ages are derived from the name of the locality in which typical occurrences of the rocks were first studied. Azoic means without life, and refers to the earliest Archæan. Archæan means old, being the oldest formation known to geological science. Laurentian and Huronian are divisions of the Archæan; Laurentian being named after the Laurentian hills on the river St. Lawrence, Canada, a typical exposure of the rocks in question, and Huronian is the name given to a large area of ancient schistose rocks near Lake Huron, Canada. The Algonkian rocks were formed during a period intermediate between Archæan and Cambrian, and was named from a once powerful tribe of Indians that wandered from the Carolinas to Hudson bay. The typical exposures are near the shores of Lake Superior. Silurian is from the ancient Silures, a Celtic race, who at one time inhabited Wales where these rocks are prominently exposed. Cambrian is the lowest member of the Silurian, though sometimes separately considered, and is named from Cambria, the ancient name for Wales. Devonian is from Devonshire, England. The Carboniferous is named from the large amount of carbon (the coal measures) occurring in certain localities in some portions of the rocks of that age. The Jurassic (usually called the Jura) is named from the Jura mountains, between France and Switzerland. The Triassic is from the Greek, meaning three, in consideration of the three distinct divisions of this formation in Germany. The Jurassic and Triassic are usually considered together as the Jura-Trias. The Tertiary means the third (in point of classification). Formerly the Mesozoic, which includes the Jura-Trias and Cretaceous, was known as the secondary period. The Paleozoic—the period of old life—includes the Cambrian, Silurian, Devonian and Carboniferous. The Permian is the uppermost division of the Carboniferous. All of these divisions of geological time, together with the numerous subdivisions, will be found in any geology, unabridged dictionary or encyclopedia. Rock formations are usually identified by the remains of plant or animal life (fossils or fauna) contained. These are known as fossils. Where fossils are absent, the classifications are generally made on lithological grounds. The latter has led to many disputes among noted geologists in the identification of the older crystalline rocks and in some instances a certain confusion of identity and names, as, for instance, the relation of the Algonkian to the Archæan.



## Mining Potentialities of the Zambesi Valley.\*

Written for the MINING AND SCIENTIFIC PRESS by  
THEO. F. VAN WAGENEN.

The geography of South Africa, from the Zambesi valley to the Cape, is simple. A chain of mountains, ranging from 2000 to 8000 feet in altitude, and from 40 to 100 miles in width, follows the coast line clear around the sub-continent. In places it is within a short distance of the sea, as around the Cape, while elsewhere it lies from 10 to 50 miles or more back from the shore. The greatest elevations are on the Indian ocean side, back of Delagoa bay, where altitudes of 8000 or 9000 feet are attained. The lowest are on the Atlantic side, in German West Africa. Within this rim is a vast table-land, the higher parts of which are naturally at the base of the most elevated points of the circumscribing mountains, and from them slope away gently and almost imperceptibly to the west and the northwest. Innumerable minor ranges of hills rise from the surface of this plateau, but they are of insignificant height, are rarely persistent in length for over 100 miles, and are generally little more than mere crumpings of the crust of the earth. A hill, or range of hills, with an extreme altitude of 1000 feet and a length of more than 20 miles, is a notable projection upon the face of the South African upland.

At the broad southern end of the continent the great enclosing range is parted into several parallel ones, forming valleys between, or stretches of semi-upland. The Karoo desert is one of the latter, simply a rather long shoulder on the north and south profile of the continent.

Through this semi-circular rim three large rivers have cut their way from the interior to the sea—the Orange, which rises at the western base of the high range along the east coast and flows into the Atlantic; the Limpopo, heading in the same region and flowing at first westward, then northward and finally eastward and falling into the Indian ocean, and the Zambesi, which derives its main sustenance from central Africa, but also has a few strong tributaries coming in from the uplands north of the Limpopo. The Zambesi also empties into the Indian ocean. Thus the South African continental divide is a very sinuous line. It begins at the southern ocean about midway between Mossel and Algoa bays, and running north joins the main range at Beaufort on the edge of the Karoo. From there it follows its crest northward for a thousand miles to a point about midway between Delagoa bay and Pretoria, where, turning sharply to the west, it runs directly through Johannesburg and passes away between the upper tributaries of the Orange and Limpopo and along the east side of the Kalihart desert to the northwest and around the headwaters of the Zambesi.

These geographical conditions have had much to do with the slow progress of settlement by Europeans. Of the three rivers mentioned only the Zambesi is navigable for a considerable distance from its mouth, and for many years a safe entrance through its delta was unknown. Consequently the country had to be conquered by the deliberate methods of overland occupation. The lands at the southern end of the continent were naturally at first taken over. From these settlements slowly spread northward through and across the hills into the headwaters of the Orange river, forming the Orange Free State. Later the emigration advanced across the Vaal into the table-lands around the sources of the Limpopo, forming the Transvaal colony, and, still later, but along a more central route, into Rhodesia, which is practically such parts of the Zambesi valley as had not meantime been occupied by the Portuguese, who for over three centuries have claimed the regions around its mouth.

Rhodesia consists politically of two divisions, viz., southern Rhodesia, extending from the Limpopo northward to the Zambesi and covering an area about as large as Montana, and Northern Rhodesia, which includes the country north of the great river to the divide of the Congo on one side and the basins of the great lakes on the other. This area is about as large as the State of Texas.

Beyond a doubt South Africa is to become one of the great mining regions of the world, and to those Americans who are looking this way for professional work a correct understanding of the main topographical features of the region will not come amiss. This will be my excuse for the foregoing rather extended geographical statements. We who have done much wandering among mineral regions know that the trend of mountain ranges and divides and the general lay of the land has more or less bearing on the question of commercial success. Many will object to the statement that the country is "to become one of the great mining regions of the world" on the ground that it has already attained that position. So far as gold and diamonds are concerned, the objection holds good. But nearly all of the precious metals and gems come as yet from only two small points on the map—Johannesburg and Kimberly. The remainder of the

vast region, excepting a small part of Rhodesia and a little spot near the southwest coast where copper has been found, is almost totally unprospected. The Johannesburg mines are now yielding gold at the rate of about \$70,000,000 per annum. The diamond product foots up about \$25,000,000 in value; the Rhodesian gold mines are outputting about \$5,000,000 and the Cape copper field under \$500,000 worth of the red metal. If these represent all the mineral wealth of South Africa, the country will certainly flourish for a time, but only for a time. My opinion of its future, however, is based upon the indications and knowledge of abundant resources in other mineral substances, and to call attention to them is the main object of this paper. Gold and diamonds are good, but the history of all mining regions shows that more true and permanent prosperity results from the production of the base metals and of the long list of other mineral substances that are of economic value.

Very little is known of the geology of the sub-continent, except at a few scattered points where local investigations have been made. Writing broadly, one may say that the uplift along the eastern side has been sufficiently pronounced to bring a long line of the deep underlying granites and the Archæan schists, gneisses, etc., to the surface; while elsewhere, and particularly along the west coast, the mountains are made up of the later sedimentaries. Between the two there has been enormous erosion, which has carried away the bulk of the secondary and Tertiary rocks. The trend of this erosion has been to the Zambesi valley. At one time that valley (or much of it) has been a vast fresh water lake, or an arm of the sea. As its bed was filled up by the debris poured in from the south, it gradually assumed its present form and outlines. In the valley are very extensive areas of basaltic flow, one of which has caused the Victoria Falls, which is a remarkable natural phenomenon. But, in spite of the great erosion and degradation that has taken place, enough of the mineral-bearing rocks and formations remains to furnish work for the modern miner for many centuries. One can not help thinking, however, of the vast amount of good stuff that has been swept away through the ages via the Zambesi route into the Indian ocean, where it is now wholly beyond reach. We should have come here a few million years earlier.

To the traveler with a penchant for archæology and the pre-historic, there are overwhelming evidences that the valley has at some period of the past been very extensively prospected by a race of people searching for gold, and that a vast amount of the metal has been taken away by these ancient miners. Some South African, with a statistical turn of mind, has attempted to cipher out what has gone, basing his calculations upon the size of the excavations that have been found, and has arrived at the figure of \$375,000,000 or thereabouts. I am not yet sufficiently posted to either controvert or confirm this conclusion, and will simply turn it over to the reader for digestion at his leisure. The Portuguese were the first of modern people to enter the region. In 1498, I think, Vasco de Gama made his first memorable trip from Lisbon around the Cape of Good Hope to India, and early in the following century landings were made at several points along the east coast to the north and south of the mouth of the Zambesi, where several small Arab settlements were still existing, and to which every year small quantities of gold were brought by the natives of the interior to be exchanged for such wares as the traders had to offer. A glance at any good map of Africa will show that the Zambesi escapes from the continent between two rather notable mountain masses, viz., the Blantyre highlands at the foot of Lake Nyassa, and the Manicaland range, culminating in the Inyanga hills. Between the foothills of these two summits the valley is contracted to a width of less than 30 miles. Once past them, it broadens out into a vast area of low-land and flats constituting the delta. This delta is occupied by tribes of blacks that differ in physiognomy and language from all others in Africa. Instead of being black in color, they are distinctly brown and even yellowish brown. Their features are a great improvement on those of their neighbors towards the interior, and their profile has often a Semitic cast. Their language contains many Arabian words and forms, and altogether the conditions indicate centuries of association and admixture with whites from western Asia, combined with a long period since their departure, during which the original negro strain has been recovering itself. According to both history and tradition, the Arabs have for at least 3000 years past traded down the west coast of Africa, and one of the chief articles carried back to the north was gold. During those far away centuries when Tyre and Sidon, and later Alexandria, at the mouth of the Nile, were the financial centers of the nations, this trade was not only a large one, but South Africa must have been the only part of the then known world that was yielding the metal in any considerable quantity. At any rate, history does not point out any other place. But from the time that the wand of commercial supremacy crossed the Mediterranean to Venice, the bullion trade of Alexandria began to decline. During the Middle Ages Africa was almost forgotten by the nations, and certainly the geography of its east coast was unknown to Europeans. When, therefore, the Portuguese rediscovered it, few traces remained of its former importance. But what did remain, and

what could be ascertained, indicated points in the interior back of the coastal mountains where mysterious architectural ruins and vast mining excavations existed. The tales of these inspired the Portuguese to explore. Such of their records as have come to light tell of a number of expeditions into the Zambesi valley in search of the fabled gold mines, and of genuine and interesting discoveries of apparently very old human structures and great excavations along the croppings of quartz veins, all of which reports have since been fully confirmed. There is no doubt that the Portuguese made great efforts during the earlier period of their occupation of the coast to revive the industry of gold mining, and that they met with some success. A number of their forts, cannon and muskets have been since found at scattered points of the interior. But the general incompetence and brutality of the Government officials of that day soon roused the hostility of the natives, and in a short time the explorers were driven back to the sea shore. Unfortunately, the records of these expeditions were either very badly kept or have been lost or are still buried among the mass of Government archives in Lisbon.

Twenty-five to thirty years ago tales of these ancient structures and diggings began to come to the English and Dutch settlers in Cape Colony, and in 1885 a deal was made by some friends and business associates of the late Cecil Rhodes with the principal native chief of the region, one Lobengula, by which the latter sold to the whites the mineral rights of the region. Following this a party of occupation came up from the south and took possession. In due time, as is usually the case with such matters, conflicts arose between the whites and the natives, which resulted, after much bloodshed in the defeat and subjugation of the latter. Meanwhile Mr. Rhodes and his friends had organized the British South Africa Company, which, under a charter from the British Government, took over the administration of the country and has since retained it. The capital of the province is at Salisbury, where the chief governing officer, known as the Administrator, resides. There also resides the High Commissioner, acting as the representative of the English Government. The laws of the country are in the main the same as those that are at the foundation of the structure of Anglo-Saxon communities in all other parts of the world, but with some notable and fundamental differences. The country is actually owned by the administering company, colloquially called "The Chartered Co.," or, more briefly, the "Charter," who have been granted by the Imperial Government the right to dispose of the lands, mineral deposits and other natural resources and franchises very much as they saw fit. The results are not always satisfactory. The land is nominally open freely to the farmer and miner for occupation and usage, but the regulations and restrictions connected with the processes of settlement and occupation are often so complicated and onerous that commercial success in mining or almost any line of business is an extremely difficult achievement. For mining, prospecting licenses are required, and a rather stiff annual fee (about \$125) is necessary to keep claims current, besides which the Government retains an interest. This interest can be commuted upon flotation of the property into a company by giving the "Charter" a goodly slice of the vendor's stock; but if the owner does not care to capitalize his property and wishes to work it himself, he has to do a large number of bothersome and complicated things precedent to and during such a course, which, in most cases, effectually deters him from making the attempt. No fee simple title of any kind is obtainable for any class of realty. There is always some form of perpetual quit rent that must be paid. There is a procedure for mining claims, that is akin to our patenting proceedings, which is called "special registration." But, after one acquires it, the costs of maintaining the title are just as much as they were before; so that its advantages are not always apparent to the naked eye. In the early days of the country much of the best land was given away to the great mining companies that were organized, and while the miner can prospect and locate claims on these farms, many of which cover hundreds of square miles, he has to pay the land owner for his fuel and mine timbers. The water laws are also involved and difficult to get any satisfaction from. This is due to the fact that in such matters it has been decreed that the old Roman-Dutch law should govern in place of the English common law. As a consequence of these unfavorable conditions, there is little if any place in the scheme of things for the individual miner or the small capitalist. Those who framed the laws evidently did not contemplate him as a necessity or a probability. The capitalist and the company were believed to be more desirable. It was thought that the native would be the laborer and that the white workman could be dispensed with. The result is that Rhodesia presents the singular spectacle of a country without a laboring class; for it would be a joke to call the black man, even at his best, a workman. One white American or Canadian or Australian miner, applying his brains as well as his muscle, will do as much as ten of them. In some of the mines, which in other lands would have a force all told of 100 to 150 men, one finds it necessary to employ 50 to 75 whites as underground and surface bosses, and then from 1000 to 1500 blacks to keep, for instance, a 40-stamp

\*See illustrations first page.



mill in ore from a 3-foot lode. Operating expenses are therefore enormous.

It is only right to say, however, that the Rhodesians are waking up to the discouraging conditions under which they have to operate, and are making strenuous and successful efforts to change them. The laws are being altered as fast as the Government can learn of and understand the disabilities they impose upon the community. The fact is already well recognized that the individual makes a far better foundation for a nation than companies and capitalists, and steps are being taken to attract him by throwing open the resources of the region to his enterprise. The example of Canada is being watched with great interest, and those of the citizens who have the future of the country at heart and propose to establish a home in it, as well as the Government, are making a study of the mining laws of other lands with the idea of incorporating into the Rhodesian statutes all those provisions that have been found to work well elsewhere. An example of this is the fight that occurred in the Legislative Council a year ago to prevent the deletion from the law of the principle of the "extralateral right" for lode claims. By good fortune this provision existed from the first in the law, but certain interests sought to eliminate it. We have men among us who would do the same for the American law if they could. To such I would say that it is only necessary to live in a mining region where vertical boundaries prevail and observe the deadening influence on the community, to become a convert to the other system, in spite of all the legal difficulties it involves. And by the way, right here let me say that one of the very best possible advertisements that a mining camp can get, is a real, first-class, twenty-story, steel-frame, lawsuit.

At the base of every healthy mining community is the prospector, as an absolute necessity. And the prospector can only be induced to work actively in those places where he can own (solely and indefinitely) what he finds. The Western States of America (including Alaska), and Rhodesia, are the only two regions of the world, so far as I know, where the extralateral right of pursuit of lodes exists, and the former is the only nation possessing the prospector in real numbers. Rhodesia would have him also if the remaining provisions of the law were equally liberal—as they will be shortly. Compare the army of prospectors, fully 100,000 strong, that starts out each spring to search over the public lands of the West and Alaska, with the insignificant numbers of the same class abroad in British Columbia, the Northwest Territory, Mexico, Australia, the Transvaal, New Zealand and the Andean regions of South America. Compare the number continually at work in New Mexico with the few who are to be found in Texas, where claims have vertical side lines; those who are at work in northern Washington, Idaho and Montana, with those in British Columbia just across the line; the thousands that are tramping over the frozen surface of Alaska with the hundreds that may possibly be exploring the British Northwest Territories, and the wisdom of paying his price to the prospector will be at once apparent. That is, for those States that really wish to have their mineral resources discovered. I venture the opinion that if the American prospector were turned loose in Spain, with the same rights and opportunities he has in the Western States, he would transform that hoary old mining region in a dozen years into the richest and most prosperous corner of Europe.

So, by a lucky chance, the Rhodesian mining law contains the germ of success and prosperity, and this germ will sprout and bear fruit as soon as other conditions are made equal, for the land contains mineral resources of the best kind. Not by chance, but because of its inherent merit as a mineral field, were the ancients attracted here centuries ago. Whether or not it was the real, old, original "land of Ophir" from which King Solomon, assisted by his chum Hiram of Tyre (and no doubt Hiram Abiff was also of the firm), obtained the gold that gilded the dome of the Temple of Jerusalem may never be known; but the fact remains that in the region between the Limpopo and the Zambesi wherever the Archæan schists and gneisses are exposed they are found to be charged between their bedding planes with thousands and thousands of quartz lodes (here called "reefs"), and where these appear on the surface and have been softened and decomposed are remains of excavations dug by some people in the far past, and pushed down into the earth until either the zone of free ore was passed or water in unmanageable quantity was encountered. A few of these have been found to extend to depths of 100 feet or more, but the majority are under 50. They range in length from a few feet up to several hundred, and in width from 10 to 30 feet. All are more or less filled up with debris washed in from the surrounding country by the rains, and but for the banks of broken quartz alongside, and the fact that they follow each other along well-defined straight lines, marking the strike of the veins, might often be supposed to be simply natural depressions. (See illustrations on front page.) When these old excavations are cleaned out the quartz lode is found in the bottom ends, and with often a thin but continuous layer of charcoal lying upon it, showing that the method of working was by building fires against the rock and afterwards throwing water upon it. No tools of iron or other

metal have been found, but stone hammers (or mauls) are often picked up. These are of quartz or diorite, about as large as the double fist, well rounded, and apparently were held in the palm of the prehistoric miner and so used to batter down the shattered rock. Human remains such as bones or clothing are never found, though many individuals must have perished by the caving of the walls or through other accidents. The roughly broken quartz, after being carried to the surface, was evidently first sorted over very carefully and the fragments of low value disposed in long piles by the sides of the trench. Many thousand tons of these waste heaps have been milled by the modern miner. They may generally be relied upon to yield from \$3 to \$5 per ton. The richer portions were evidently carried a little distance away and distributed to individuals (perhaps women), whose part it was to grind the quartz to a powder so that the particles of gold were freed. This was done on slabs of hard diorite 18 inches to 2 feet long and half as wide, on one face of which a shallow depression would be made by grinding out with another stone. In this depression a handful of quartz at a time could be pulverized. Around all the ancient workings these grinding stones can be found in great quantity. Finally—at the nearest water, no doubt—the metal was washed from the pulp.

At a few places the remains of old smelting establishments have been found. These are great curiosities, and seem to indicate that a class of workmen existed who were acquainted to a certain extent with the art of recovering the gold from pyritous ores. They accomplished this in cylindrical clay crucibles 10 to 12 inches long, 2½ to 3 inches in diameter outside, and with a bore of 1¼ to 1½ inch. The vessel was, of course, closed at one end. A half dozen or so of these would be assembled in a bundle while moist, so that they would stick together, and when dried each crucible was filled with a mixture of ground pyrites and quartz, and the bunch so charged was made the center of a charcoal fire. Presumably the ancient metallurgist surrounded his fuel with a ring of stone, and urged its combustion with a skin bellows. In due time the charge would melt, a slag would form, and the gold, settling through it, would accumulate at the bottom. When the operation was complete and the crucible was cold, a tap on the base of each would break it off and reveal the little golden button that had settled there. At one place that I visited the ground for an acre or two in extent contains thousands of these bunches of crucibles, each with its end chipped off and its shaft still filled with the cylinder of slag. Evidently such a spot was a branch establishment of the genuine, original "smelter trust." If I could have found some evidence among the ruins of a "zinc penalty," the identification would have been complete. But perhaps the microbe of that original sin of the modern metallurgist had not at that time become active. I have tested the slag in several of these pots and found it very clear of gold. The African smelterman, like his modern successor, was an adept at his work.

At many points throughout this gold-bearing country are remains of old buildings, possibly forts, or central collecting stations. What remains of the walls shows considerable architectural skill, but the use of mortar was unknown. The largest is called the "Great Zimbabwe," and within its extensive enclosure several hundred thousand dollars worth of little golden beads and tacks have been washed out of the accumulated debris of the centuries. The structure is beyond question over 2000 years old, and how much more no one can tell. (See engravings front page.) A few inscriptions have been found and recognized as Himyaritic, and the style of architecture resembles in many points those ruins that still remain along the southern coast of the Arabian peninsula that are attributed to the Himyarites, a people who antedated Admiral Noah by several centuries, according to the authorities.

But what of the present? While the climate of Rhodesia is the most perfect that can be imagined—for I have not seen either a hot nor a cold day during the two years of my residence—the scenery is rather monotonous. According to our western conception of things, mines should only occur in mountainous regions, places where Mother Nature has had "throes" and has suffered more or less in the way of uplifts and contortions. Doubtless she has enjoyed some of these sensations here, but there is little evidence of it so far as the surface goes. Here and there are small hills, or ranges of them, but quite as many of the mines have been found on the flats between them as on them, if not more. Adit or tunnel work is rarely possible. Shafting is called for at once, and water may be expected within 100 feet. On the other hand, the mines are almost invariably dry below 400 feet. The bedrock in the gold-bearing regions is generally a hornblende schist, between the bedding or cleavage planes of which are lenses of auriferous quartz. These schist areas are generally bounded on all sides by uplifts of gray granite (in which no veins occur) and are of all dimensions, from 1 to 50 square miles in extent. Generally the Archæan rocks are tilted up at a high angle, giving the veins a steep dip. Usually—one might almost say invariably—there is a dyke or boss or intrusion of dark-blue diorite in the vicinity, which faults or disturbs the vein, causing the ore shoots to be of moderate length; but explorations have shown so far

abundant stability in depth, several of the mines having already been pushed down to 1000 feet and over. I have not yet seen any fissure veins in the true sense of the term, but the lodes give every promise of permanence and a few carry payable lenses of good average length (500 to 700 feet). Taken as a whole, however, it is a country of small mines, or rather short ones, but when the vast number of these outcropping lenses are considered, all deficiencies as to length may be safely overlooked. They are simply innumerable. A few spots in our West (like Gilpin county, Colo., for instance) can match their profusion, but only a few. The surface wash is generally less than 5 feet deep, and so the veins are easily discovered and traced. Within certain definite areas, known as the gold belts, the soil will always yield gold to the pan, and the debris consists mainly of vein quartz, much of which could profitably be milled. There are miles and miles of payable croppings in small patches 100 to 300 feet long, separated by other miles of unpayable "bull" quartz, which is here called "buck" quartz. Thus the country should be a perfect paradise for the individual miner and custom millman, and it will be as soon as the owners modify the laws so that they can operate. And here and there Nature has planted out a long and wide lens of good ore, or a succession of them, which affords the basis for a good company proposition, but, as elsewhere, these opportunities are few, as compared with the vast number of little things that cannot be handled under the complicated and expensive methods of corporate management.

Some, who I think must have examined the country in a cursory sort of way only, believe that the ancients have discovered it all, and that there is no room for the modern prospector. With this view I do not agree. I have personally seen a number of good and obvious chances that were entirely overlooked by them. Though they must have been here in great numbers, or through a very long time, to accomplish what we find, they were most casual and ignorant miners and missed many good pockets that have since been found and that were covered by only a foot or two of dirt. They had some faculty, however, as placer operators, for there are regions where the surface soil over hundreds and even thousands of acres under and alongside lines of outcropping quartz and in certain river valleys has been turned over and washed for its golden sands. But the amount that he has left and that is most easily available is enormous. I have seen much country that could be gone over with a plow and scraper, and the surface wash put through a mill or sluice box with profit, if the laws permitted of the operation. In time they will; in a short time too, for the citizens of a country belong to a race that works and succeeds as soon as the conditions permit of the exercise of energy and enterprise.

The list of Rhodesian mineral resources contains many items besides gold. Iron exists in great abundance and of good quality. Numerous coal beds have been found, and more will be reported as soon as the prospector can secure transportation for his product. This is at present an impossibility because the railroad lines are Government monopolies, and the Government itself is interested in coal mining. Enormous deposits of copper ore have been found in the divide between the Zambesi and the Congo, and on the ridge between the Zambesi and one of its main branches, called the Kafue. Argentiferous lead and zinc ores have been located in quantity at several points. Nickel has been discovered; tin is reported, and there are strong indications along at least one long range of hills of platinum placers. But there is not a single active prospector in the land. Vast areas have never been even looked at by the few that were here in the early days. Mineral oil is one of the certainties of the future. There are regions of the province now called desert that will turn out as rich as the forbidding parts of Arizona and New Mexico did when lines of communication were opened across them. So far the companies that have been organized to operate in the country have confined their attention wholly to gold, just as was the case in the early days of the West, and the only scheme of ore treatment that is known of is the stamp mill and the cyanide tank. But now at several of the mines sulphides are beginning to appear, and the ore is becoming rebellious, as we used to say in the West thirty to forty years ago. Concentration is, therefore, in order, but it will not pay to ship anything but a high-grade product to Swansea or Germany, so affairs are gradually approaching a deadlock. Coke and carbonates are wanted, as with us between 1870 and 1880, to constitute the working basis for a smelting industry. Both are here, and will appear just as soon as the laws and conditions will permit of their manufacture and production.

In a review of the mineral resources of the Zambesi valley, something should be said of the Victoria falls, for in time a part of the energy there going to waste will be employed, directly or indirectly, in exploiting them. For miles above the cataract the great river travels along the floor of a broad and almost level valley, the bedrock of which is basalt. Its course is from west to east, its width nearly a mile, and its depth from 10 to 20 feet during the flood season. Directly across the channel there must have been at some time in the remote past a dyke of some softer rock, with a width of 100 feet or



more. This has been bodily mined away by the continual flow of the water, till now there is simply a deep gash 150 to 200 feet broad and 300 to 400 feet deep clear across the channel of the stream. Into this chasm the water plunges and disappears, and when you examine the place where it should be traveling and where it undoubtedly did travel at one time, you find simply a narrow, tortuous and deep gorge 300 to 500 feet wide leading away eastward from the gash into which the water has fallen. At its bottom is the foaming stream, a wonderful and terrible sight as one looks at it from the brink of its nearly perpendicular walls. The very gentle slope of the valley at this part is proven by the fact that the gorge is over 30 miles long before it ends, and the water again spreads itself out and assumes the habits of an ordinary river. It will not be so easy to harness the Victoria falls for the services of the future South African, but it can be done.

To sum up, Rhodesia—the Zambesi valley—is one of the coming great mining regions of the world, in spite of the tremendous disappointments that have so far attended its development, and which have been caused almost entirely by trying to organize and operate the country under the same laws, systems and methods that were employed at Johannesburg. Moreover, the valley, though it lies along the 16° of south latitude, is for the most part a true white man's land, and certainly so as to its uplands where the mining regions are. Even as far north as the Congo divide and the Lake country, the altitude and the distance from the sea make the climate cooler than that of many parts of our own southwest, and far more bearable than central, western and northern Australia. It has but one great drawback, the curse of the unfortunate black man, the influence of an inferior and servile race in such numbers that their extermination is an unlikely eventuality, while their civilization is perhaps the most tremendous human problem at present before the world. On the other hand it is a problem that is thoroughly worthy of the splendid innate qualities of the Briton, and one that he will solve, or die in the attempt. Those of us who have watched the Englishman at his self-imposed task of reclaiming the waste places of the earth and the inhabitants thereof, though we may at times differ somewhat with the methods he employs, have almost unlimited confidence in a successful outcome.

### Production of Coal in 1903.

Returns made to the United States Geological Survey show that the United States has again exceeded all previous records in the production of coal. The forthcoming report on the country's coal production, which Statistician E. W. Parker will soon make, will show that the total output of the coal mines of this country in 1903 amounted to 359,421,311 short tons, an increase of 57,830,872 short tons, or 19%, over the production of 1902. The coal production of the United States in 1903 by States was as follows:

State.	Total Product.	Total Value.
Alabama.....	11,832,124	\$ 14,374,746
Arkansas.....	2,293,593	3,372,536
California and Alaska.....	105,620	306,118
Colorado.....	7,689,308	9,109,810
Georgia and North Carolina.....	434,240	546,759
I Idaho.....	13,250	13,250
Illinois.....	37,206,667	43,559,691
Indiana.....	10,906,812	13,367,859
Indian Territory.....	3,517,388	6,386,463
Iowa.....	6,852,686	11,304,638
Kansas.....	5,867,308	8,930,271
Kentucky.....	7,431,016	7,877,382
Maryland.....	4,783,083	7,084,453
Michigan.....	1,410,909	2,787,742
Missouri.....	4,303,332	6,913,444
Montana.....	1,505,576	2,472,822
New Mexico.....	1,543,466	2,105,885
North Dakota.....	301,105	456,315
Ohio.....	25,004,893	32,195,275
Oregon.....	91,144	321,631
Pennsylvania.....	103,271,057	121,832,439
Tennessee.....	4,797,346	5,978,555
Texas.....	926,758	1,505,383
Utah.....	1,681,409	2,036,038
Virginia.....	3,511,307	3,305,149
Washington.....	3,196,273	5,384,939
West Virginia.....	30,250,408	34,758,490
Wyoming.....	4,709,393	5,916,351
Total bituminous.....	285,107,393	\$354,154,285
Pennsylvania anthracite.....	74,313,919	152,036,448
Grand totals.....	359,421,311	\$506,190,733

Of the thirty States and Territories which contributed to the output in 1903, increased production over 1902 was shown in all but four. Two of those in which the production decreased were among Eastern States, Maryland and Georgia, and two were in the Rocky mountain region of Colorado and Montana.

THE next meeting of the Society for Western Chemists, Assayers and Metallurgists will be held in the Chamber of Commerce, Denver, Colo., on the 15th inst. This organization was first proposed last March and a preliminary meeting held on April 29, 1904. Since that time a charter membership of 400 has been secured, and the purpose of the present meeting is the adoption of a constitution and by-laws. It is the intention to publish a journal of proceedings. The move should meet with hearty and practical co-operation.

COPPER ORES containing gold with galena, pyrite and blende may be concentrated. It is sometimes advisable to hand-pick the copper ore, and then roast the remainder and treat with magnetic separator to remove zinc.

### Recovery of Bullion From Zinc - Box Sludge.\*

NUMBER II.—CONCLUDED.

Written by E. H. TAYLOR.

One experiment, wherein was used no borax, but niter = 90% and sand = 45%, yielded a mixture which fused only very imperfectly even at the highest temperature of the wind furnace.

In another experiment there was used niter = 55% and sand = 40%, with the same result.

In both cases the percentage of sand and niter was so adjusted as to yield slag containing 33% "acid radical."

TABLE I.

Reference Number.	Weight of Sludge, Avordupois Pounds.	Fluxes Used at Roasting.		Fluxes Used at Smelting.		Bullion Produced.		"Slag Values."	
		Sand per Cent.	Niter per Cent.	Sand per Cent.	Borax per Cent.	Per Cent.	Base Parts per 1000.	Gold (Au.) Ozs. per Ton.	Silver (Ag.) Ozs. per Ton.
1.....	157	10	10	10	30	33.4	27.2	291.8	46.2
2.....	250	10	10	10	34	24.8	26.2	57.6	46.2
3.....	241	10	15	10	40	17.7	19.6	57.5	115.0
4.....	121	25	20	nil	40	30.8	23.9	35.6	.....
5.....	150	20	20	nil	40	31.4	23.7	62.4	.....
6.....	231	20	25	nil	50	24.9	24.1	35.6	21.1
7.....	231	20	30	8	35	22.7	16.4	39.9	24.9
8.....	186	25	30	nil	40	25.4	22.9	30.3	20.9
9.....	121	25	30	nil	40	37.3	30.2	10.7	13.1
10.....	277	25	30	nil	40	19.8	29.5	30.8	25.0
11.....	250	nil	30	25	40	23.1	18.8	17.5	36.5
12.....	126	nil	30	25	40	41.2	23.9	11.4	17.1
13.....	235	nil	35	25	35	21.6	17.8	7.4	20.3
14.....	239	nil	35	25	35	20.6	23.5	14.7	20.5
15.....	189	nil	35	25	35	33.0	27.8	5.5	15.7
16.....	168	nil	35	25	35	32.0	27.7	6.1	15.9
17.....	171	nil	35	25	35	31.3	25.7	3.2	13.8
18.....	114	nil	35	25	35	43.7	18.2	4.1	.....
19.....	241	nil	35	25	35	24.0	17.8	12.2	18.2
20.....	131	nil	35	25	35	45.4	26.7	2.1	17.6
21.....	100	nil	35	25	35	49.7	21.9	10.4	26.5
22.....	114	nil	35	25	35	35.8	39.2	10.0	15.8
23.....	158	nil	35	25	35	40.9	38.0	11.8	16.1
24.....	110	nil	35	25	35	50.4	24.9	3.2	10.0
25.....	124	nil	35	25	35	49.8	25.8	3.1	21.5

TABLE II.

1.....	574	12.5	20	12.5	40	7.3	98.6	No records.	
2.....	437	12.5	20	12.5	50	8.7	49.5		

TABLE III.

Reference number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	93	10	15	10	35	41.6	88.3	126.0	76.6																
	98	10	15	10	35		36.9	77.8	50.2																
	52.5	10	15	10	30	65.0	31.1	21.0	15.8																
	52.5	10	15	10	30		23.9	12.0	13.6																

All the preceding determinations of "finenesses" and "slag values" were made at the assay office of the Great Boulder Perseverance G. M. Co., Ltd.

With reference to Table I, results 2-25 are those from successive cleanups during the past several months, and in every instance the material was passed through a 300 mesh screen prior to smelting.

Generally speaking, the results show, regardless of variations in the relative amounts of the fluxes used, that the proportion 1 flux : 1 "base" in sludge is too low in flux, slags of high "values" being produced consequent upon more or less imperfect fusions.

That the "finenesses" show only constant relative variations tends to emphasize the fact that in all instances the zinc must have been fairly well oxidized, regardless, seemingly, also of the percentage of niter used.

As the proportion increases to 2 flux : 1 "base" in sludge, so practically do the "slag values" decrease. A comparison of the average of results 8-12 = 13.1 ounces of fine gold per ton slag, with that of results 13-25 = 7.3 ounces, discloses the possible fact that, even within very small limits, the percentage of "acid radical" has a material bearing upon the resultant "slag values," manipulations being practically similar throughout.

In the case of results 8-12 the average percentage of "acid radical" in the slags = 31.7, and in the case of 13-25 = 33.8.

The "fineness" of bullion does not seem to be materially affected within such small limits, as the average "fineness" in both cases = 975.

At the time of obtaining the results in Table II there was no sludge filter press available, and in consequence acid treatment prior to roasting was not applied.

This accounts for the presence of visible "short zinc" in the two operations.

As regards Table III, results 1 and 2, operations were carried out on the sludge produced at a cleanup, and divided into two equal portions and treated side by side throughout.

Results 3 and 4 were obtained at another cleanup, the sludge being divided into two equal portions as before.

Regarding the screens used in operations (Table II), the material, prior to roasting, was passed

through a screen with meshes as indicated, except in the case of 4, which was passed through a 64 mesh screen. Then, after mixing, and prior to smelting, all material was again passed through screens with meshes as indicated in table.

All things considered, then, the results prove that a set of conditions whereby bullion of a high degree of "fineness" and slags of "low values" may be produced is:

1. That the material should be well oxidized.
2. That the proportion of flux : "base" should be not less than 2 : 1 (the contained borax not less than 35%), and so arranged that the percentage of "acid radical" in the resultant slag be not less than 33%.
3. That all material prior to smelting should be passed through a screen with at least 300 meshes per square inch.

### The Ore Deposits of Bisbee, Arizona.\*

NUMBER IV.

Written by F. L. RANSOME.

In the present workings of the Copper Queen mine the bulk of the cuprite occurs in the earthy condition mixed with limonite, pure crystalline masses of any size being comparatively rare. In stope 27, in the southwestern part of the mine, just above the second level, distinctly crystalline cuprite was noted, associated with limonite, malachite, brochantite, melano-chalcite and a little quartz. At the time of visit this was the only place in the mine in which any quantity of the mineral was seen in other than the prevalent impure earthy matter.

In the Calumet & Arizona mine, however, new stopes had been opened in ore bodies containing cuprite in large crystalline masses, usually associated with native copper, and in beautiful druses of ruby-red isometric crystals, usually in the form of simple cubes, or of cubes modified by the octahedron and dodecahedron. It is particularly abundant in the fine stope on the 950-foot level about 650 feet northeast of the shaft, where it occurs in glittering bunches in the more earthy ore, penetrated by dendritic masses of bright metallic copper and spotted with little vugs of acicular malachite. It has been found also on the 850-foot level in irregular bunches surrounded by melano-chalcite, chrysocolla, malachite and calcite.

TENORITE.—The crystalline form of the black oxide of copper was not observed in the course of the present investigation. The earthy variety, however, commonly known as melano-chalcite, occurs in some of the soft clayey ores, usually mixed with the black oxide of manganese in the form of a light sooty powder. Ore of this character containing about 5% of copper was observed on the 1000-foot level of the Lowell mine. In the Calumet & Arizona mine, about 30 feet above the 850-foot level, there is a natural cavern in the limestone, whose damp walls are covered with a black moss-like botryoidal growth. This material is apparently still being deposited, for the fragile stems of the dendritic efflorescence break off by their own weight when they reach a length of over ½ inch, and the floor of the cavern is deeply covered with a fluffy carpet of this black material. Inspection of the walls shows that they are composed of alternating irregularly overlapping layers of the black efflorescence with druses of calcite. Chemical tests of the black material, made by W. F. Hillebrand, show that it is a mixture of the oxides of copper and manganese, probably melano-chalcite and bog manganese, or wad. According to Foreman J. G. Merrill, some of this mixture contains as much as 15% of copper.

Koenig in 1891 described some small black crystals from the Copper Queen mine, and concluded that they were essentially a mixture of cupric and cuprous oxides, and were tetragonal in crystal form. He considered that they represented a distinct mineral species, for which he proposed the name paramelaconite. It appears, however, that more chemical and crystallographic work is necessary before paramelaconite can take final rank as a species distinct from tenorite, the crystallographic symmetry of which is still in doubt.

FOOTEITE.—This mineral, a deep blue chlorhydrate of copper occurring in minute monoclinic prisms implanted with paramelaconite on limonite, was first described and named by Koenig, from a specimen said to have come from the Copper Queen mine. Footeite is evidently a rare occurrence in the Bisbee mines and was not seen in 1902.

GANGUE MINERALS.—Of the various minerals associated with the ores, calcite, in its role of principal constituent of the limestone in which the important ore bodies occur, is the most abundant. It is seldom, however, that the mineral forms so large a part of the altered limestone in the immediate vicinity of the ore as it does of the unchanged rock in which mineralization has not been active. As will presently be shown, it has been largely replaced in the process of mineralization by pyrite, amphibole, pyroxene, garnet, chlorite, quartz, vesuvianite and other minerals.

In the form of stalactites, often beautifully colored with salts of copper, and in showy crystalline masses, calcite was abundant in the bodies of oxidized ore

\* Report Chamber of Mines, W. A.

\* Abstract Professional Paper No. 21, U. S. G. S.



worked in early days in the Copper Queen mine, and is still encountered to some extent within the oxidized zones. It is rarely, however, a conspicuous gangue mineral in the ores now exploited.

The unoxidized pyritic ores, particularly those too poor for working, are intimately associated with several minerals, chiefly silicates of calcium, magnesium, and aluminum in varying proportions, which so far as observed occur only in crystals of microscopic size. Their identification accordingly depends upon the microscopical investigation of thin sections. Of these minerals probably the most common is the calcium-magnesium amphibole, tremolite, usually occurring in aggregates of minute radiating prisms, which under the microscope show the characteristic cross sections, cleavage and optical properties of this mineral. Nearly or quite as abundant, and usually accompanying the tremolite, is a colorless pyroxene in microscopic grains, usually less than  $\frac{1}{10}$  millimeter in diameter, rarely showing sharp crystal outlines, but exhibiting a distinct tendency to the development of stout prismatic form. This mineral has the optical properties of diopside. Although neither tremolite nor diopside, so far as observed, occurs in the Bisbee quadrangle in crystals large enough to be seen with the naked eye, their presence in the altered mineralized limestone can generally be recognized by a faint greenish tint in the rock, joined with a certain compactness of texture that is unlike that found in any of the unaltered limestones. Most of the limestone encountered in the Spray workings from the fourth level down, and in the Calumet & Arizona mine from the 850-foot level down, exhibits this development of tremolite and diopside, and all gradations may be studied, from limestones consisting almost exclusively of calcium carbonate to those in which all of the carbonic anhydride has been replaced by silica.

A colorless garnet, probably the calcium-aluminum garnet, grossularite, occurs in some of the altered limestone, associated with tremolite and diopside. This mineral, associated with tremolite, diopside and calcite, was particularly noted in the altered limestone from the new station on the 1150-foot level of the Calumet & Arizona mine (the deepest point reached in the underground exploration of the district) and on the fifth level of the Holbrook, northeast of the shaft.

Quartz varies greatly in abundance in different portions of the ore-bearing ground. A few small veinlets of quartz, carrying pyrite, were observed in the altered limestone on the 950-foot level of the Calumet & Arizona mine, but vein quartz is exceptional in connection with the cupriferous ore bodies. The mineral, where it occurs at all, usually has the form of fine-grained aggregates that have replaced the calcium carbonate of the limestone or the feldspars of the granite-porphry. Small amounts of quartz may usually be found as a microscopic constituent associated with tremolite, diopside, garnet and pyrite in the altered limestones of the locally prevalent type. Near the porphyry mass of Sacramento hill quartz is more abundant than elsewhere. Much of the rock in the vicinity of the Gardner shaft, for example, originally limestone, now consists essentially of a finely crystalline granular aggregate of quartz with varying amounts of pyrite and chlorite. The bottom of the shaft, at the time of visit, was in such material. Quartz of the same fine-grained granular character associated with pyrite, sericite and kaolin also makes up much of the altered and mineralized granite-porphry of Sacramento hill.

On the 800-foot level of the Lowell mine the greater part of the west drift is in a mass of loosely coherent pulverulent silica, much of which, when dry, runs like sand. This material is associated with some yellow clay, a little decomposed porphyry and occasional bunches of oxidized ore. Embedded in the sandy material are occasional very irregular harder masses composed of finely granular quartz. These are cavernous and drusy on their peripheries and lie in the loose siliceous powder much like flints in chalk. The microscope shows that the pulverulent silica is composed of grains which are neither rounded by attrition nor yet bounded by crystal planes. They are rough in outline, showing either that they have undergone corrosion or formed part of a fine-grained aggregate from which some more soluble constituent has been removed. It is probable that this saccharoidal quartz represents a zone of fissuring and brecciation in the limestone, along which some silicification took place. The calcium carbonate of the shattered, partly silicified limestone was then dissolved away, leaving the quartz in its incoherent condition.

Most of the soft, earthy oxidized ores mined in the Copper Queen and Calumet & Arizona mines are accompanied by, and more or less intimately mingled with, limonite and clays of various colors. The limonite sometimes occurs in stalactitic or botryoidal form, but in the present workings is more often earthy and mixed with ore or clay.

The clay is sometimes white, sometimes pink or greenish-gray, but more often it is yellow or reddish from the presence of limonite. A snow-white waxy variety, beautifully diversified by little veinlets of light-green malachite, was collected on the second level of the Copper Queen mine, about 250 feet south of the Holbrook shaft, and subjected to chemical examination as representative of the purest form in which these clay-like secondary products occur.

(TO BE CONTINUED.)

## Emergency Treatment for Cyanide Poisoning.

H. C. Jenkins of the Institution of Mining and Metallurgy, in his paper on this subject, dealt mainly with the preparation of the antidotes which are recommended by the State of Victoria. The chief points are first to have the solutions always ready for use and to keep them unchanged perhaps for years—conditions that plainly indicated that they should be sealed hermetically in glass—and then to provide for their being mixed together and administered without loss of time, or the risk of administration of broken glass in a mixture full of precipitate. The gram and a half of caustic soda was made into a solution with 300 c.c. of water; this was a solution that would keep for a great length of time in a sealed flask of suitable glass. The two grams of magnesia would be perfectly safe in a sealed tube, but the seven and a half grams of ferrous sulphate that had to be in solution in order to prevent waste of valuable time when wanted most, presented difficulty, and even when made distinctly acid with sulphuric acid in 30 c.c. of water and sealed up in glass it deposited in a few weeks or months the usual precipitate of basic ferric sulphates.

The author found, however, that by using freshly well-boiled distilled water for the solution, boiling it in the tube and then sealing it before aeration of the solution could occur, that the action was stopped; its commencement appears to be dependent upon the oxygen dissolved in the water.

The exterior containing case is made of tin, 5 inches diameter and 7 inches high, painted red on the exterior to attract attention, and fitted with simple compartments arranged to keep each tube and the flask in place. There is also a filtering shelf of finely perforated sheet metal made strong enough to be used in the fracturing of the glass vessels when the antidote is required, and serving to keep back any tiny fragments of glass that might be so produced, there being no time for any more elaborate manipulation for this purpose. The case serves as a containing vessel of the mixture for administration. It is intended that this case be kept on a special shelf or hook in a prominent position, with the sheet of instructions permanently displayed near to it in full sight of the workmen.

The author cites the case of a Kaffir poisoned by cyanide who was successfully treated by means of ferrous sulphate and sodium carbonate administered off the laboratory bench in somewhat indefinite quantity. Cases such as this would alone justify some dependence on this antidote.

Below is given instructions how to treat a case of cyanide poisoning in the absence of medical assistance. Everything depends on prompt action, for the chance of recovery is extremely small after the lapse of a very few minutes if a fatal dose has been taken. One person should be dispatched for the nearest medical assistance that is available, but no delay in treatment should be permitted to occur on this account. The first care must be to neutralize the rapid poison by the antidote, and then to empty and wash out the stomach as soon as is possible.

The antidote consists of two solutions sealed up in bottles, and a sealed powder. The two solutions are to be first mixed together in the tin vessel in which they are packed by breaking off the sealed ends of the bottles. The tube containing the powder is also to be broken, and the whole of the powder added to the mixture, and the dose is to be administered as soon as possible. If the patient is still conscious he must drink the antidote at once without waiting for the insertion of the stomach tube; but if not conscious or not responsible then a small gag must be firmly inserted between his teeth, so as to prevent the stomach tube from being bitten off, and the tube is then to be passed down his throat and into his stomach. The antidote is to be poured down the tube, and is then to be followed by some water.

In any case, either before or after the antidote has been taken, the stomach tube (found in the set), is to be inserted, and about half a pint of water is to be poured down it, the patient being placed in a reclining position, a little raised from the ground. The insertion of the tube may produce vomiting; this, however, is entirely favorable to the course of the treatment. When the last of the water is placed in the funnel, and before it has all descended into the tube, the funnel end of the latter is to be lowered so as to cause the tube to act as a syphon, and the stomach emptied as much as possible of its contents. Fresh water is to be poured down the tube, and the stomach again emptied, and this is to be repeated several times so as to thoroughly wash out the stomach. When this has been done the tube can be withdrawn.

If the tube be not at hand every endeavor must be made to induce vomiting after the administration of the antidote, while an equal endeavor must be made to cause the patient to swallow more of the antidote between the intervals of vomiting, if the administration be not already and completely made.

Vomiting may be induced by an emetic, like mustard, or by tickling the back of the throat with a clean feather, or a piece of clean india rubber tube, or the finger. An ample quantity of warm water should be swallowed and vomited, so as to wash out the stomach as in the previous case. Should warm water be not at hand cold water may be employed in its place.

As soon as the stomach has been satisfactorily emptied and washed and the stomach tube withdrawn, steps should be taken to bring about artificial respiration should the patient appear to be in a state of collapse and should his breathing cease to be noticeable. The application of smelling salts or of ammonia to his nostrils may itself induce breathing again; but if this be not immediately successful, the patient should be treated as is done in cases of partial drowning or suffocation.

The package for treatment should consist of a tin vessel with lid, in which are packed:

(a) A hermetically sealed bottle, containing  $7\frac{1}{2}$  grams of ferrous sulphate dissolved in 30 c.c. water; and

(b) A hermetically sealed bottle, containing  $1\frac{1}{2}$  gram of caustic soda dissolved in 300 c.c. water; and

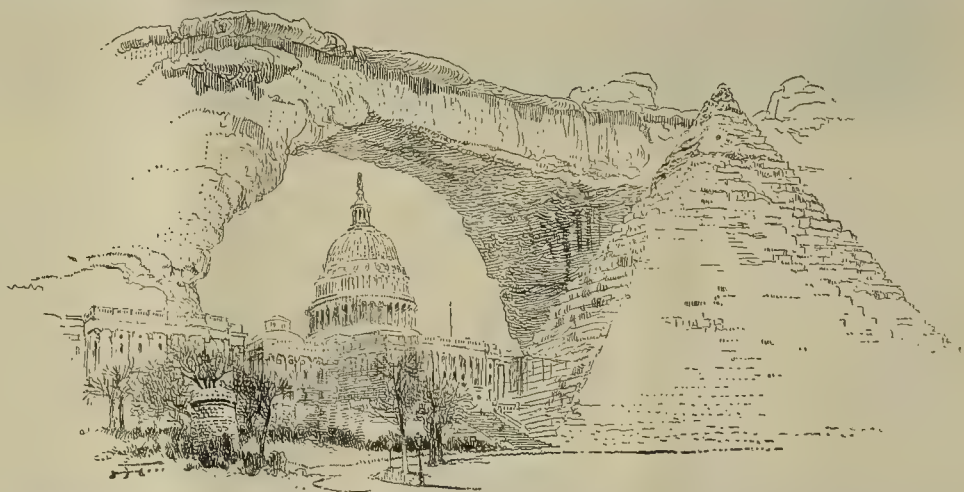
(c) A tube containing 2 grams of magnesia.

There should also be a gag for the purpose of opening the clenched mouth of an unconscious person, and a stomach tube, that can be passed through the gag and down into the oesophagus into the patient's stomach. This is very easy to effect, but several persons in charge of the plant should receive instructions from the nearest medical man as to how to insert a stomach tube, so that they know how to use it should occasion at any time arise.

The apparatus should never be allowed to be removed from its place, but always kept complete and ready for emergency. It is advisable to keep it in duplicate, in plainly marked positions in the works.

## Natural Bridges in Utah.

There exist to-day in San Juan county, Utah, three notable natural bridges. The largest of these bridges spans a canyon 335 feet 7 inches from wall to wall, and is a splendid arch of solid sandstone, 60 feet thick in the central part and 40 feet wide. Underneath it there is a clear opening 357 feet in perpendicular height. The accompanying cut shows the dimensions of this bridge as compared with the Capitol at Washington and the Great Pyramid. The other two bridges, while of proportions somewhat less massive, are worthy of note. They have been seen by few white men. The August Century contains an account of a visit made to these natural bridges in 1903 by H. J. Long and a cattleman named Scorp, with pictures of the colossal bridges, one in color, from drawings by H. Fenn from photos by Mr. Long.



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THE AUGUSTA NATURAL BRIDGE IN UTAH, COMPARED WITH THE CAPITOL AT WASHINGTON AND THE GREAT PYRAMID.



## Mining and Ore Treatment in Western Australia.\*

NUMBER IV.

Written by DONALD CLARK.

In the chloridizing furnace the fire-box of the ordinary furnace is used as an auxiliary source of heat. The ore, after leaving the fourth hearth, slides into the cylinder, where salt is added, and the gases from the movable fire-box pass through and over it. Air is admitted also at the end of the cylinder.

An ore like that from the Boulder does not roast in the same way as the ordinary pyritic one. The finely powdered ore clings in dusty clots; it is light and fluffy, and like flour will not flow freely. Its penetration by air is slow, while any attempt to stir it vigorously or to cause it to flow in heated air leads to an inordinate amount of dusting. From a few experiments made with similar material, it was found that as soon as the calcium carbonate was decomposed the resulting oxide was acted upon by sulphur dioxide, giving calcium sulphite. Calcium sulphide also formed from the inter-reaction of pyrites or ferrous sulphide and calcium oxide. These in their turn slowly oxidized to calcium sulphate. Certain it is that the Boulder ores give on a bad roast a considerable quantity of alkaline sulphides. This may be due to the reactions given above, or more probably to the alkalies and alkaline earths in the ore reacting with ferrous sulphide direct. The product from all the furnaces on the field has a slight alkaline reaction.

The method of testing the roasted product is done, I was informed, by adding lead carbonate to the aqueous extract from the ore; this shows soluble sulphides if the black or brown lead sulphide is produced. A further extension of this is to boil the ore with caustic potash and then filtering; lead carbonate added to this solution will show the presence of sulphides, which may not be soluble in water. I have confirmed this test, which is a very useful one, so far as ferrous sulphide is concerned, although finely ground disulphide or pyrites only gave a faint sulphide reaction.

The quantitative method of ascertaining the state of the roast depends upon the termination of sulphur present as sulphide. This is done by determining the total amount of sulphur present by fusing the material with sodium carbonate and some oxidizing agent, thereby transforming the whole of the sulphur to the form of sulphate of sodium. The fused mass is disintegrated and filtered; the filtrate evaporated to dryness with HCl to render silica insoluble. The solution is taken, treated with barium chloride, and the sulphur determined from the weight of the barium sulphate produced. The sulphates are determined by boiling some of the ore with sodium carbonate; this serves to transform the sulphates into sulphate of sodium. The ore is filtered, the filtrate acidified, evaporated to dryness, and the solution treated as before, and the sulphur present as sulphate determined. The difference between the two amounts of sulphur is attributed to sulphides. The process can be shortened materially from that given in this description, but it cannot be said that such a mode of determination is altogether satisfactory. The difference in the two amounts is but small, and this small amount has to carry all the errors of both determinations. Further, the presence of a small quantity of barium sulphate in the ore would not be decomposed by boiling with sodium carbonate, and the sulphur in it would consequently be counted as sulphide.

The estimation of the sulphur as insoluble sulphide is not an easy matter on such an ore as this. The method of fusing with a known weight alkaline carbonate and some oxygen-supplying compound, and estimating the alkalinity afterwards, fails in the presence of easily decomposable sulphates, e. g.,  $\text{CaSO}_4 + \text{Na}_2\text{CO}_3 = \text{CaCO}_3 + \text{Na}_2\text{SO}_4$ ; each molecule of calcium sulphate neutralizing one of carbonate of sodium.

As the sulphur as sulphide has not only all the errors of determination, but also all of a bad extraction laid on its shoulders, it is necessary to state that this is not the case, but that all other reducing agents must be looked upon as equally bad; and even the oxidation of such agents may not suffice to correct the evil. The sulphur as sulphide, then, can only be looked upon as an accompanying evil, and a simpler test might be devised to show the state of the roast relative to the consumption of cyanide. For example, the KOH extract might be acidified when diluted, and its reducing power estimated with a standard solution of  $\text{KMnO}_4$ .

The same samples might be tested with KCy shaking test to determine the consumption of cyanide. From the two on ores of a similar nature a table could be readily constructed showing the relationship between the reducing power of the ore and the consumption of cyanide. The most direct test as to the state of the roast is tried now at test mines, and also at the Great Boulder. This is the shaking test with cyanide on a sample of the ore.

Although such tests are useful for the same class of ore, and while they may give good results so far as showing the state of the roast is concerned, they

may be of little or no use in guiding the metallurgist as to his probable extraction. Very often a roast that will respond to all tabulated tests will fail to give a good extraction, and one reeking with basic and other sulphates, which the text-book authorities are so strong on, may be made to give a first-rate extraction. The cause of the non-extraction of fine gold by solution is either due to the destruction of the solvent by some other agent in contact with the gold or by want of contact of the solvent with the gold. The latter includes cases of bad percolation where certain patches of ore are not acted on at all, and the more common cases of the gold being locked up in some other material, either physically or chemically. It may exist in fused oxide of iron, or in some easily fusible silicates; it may exist in a telluride naturally, or may be locked up in some metal or metallic sulphide formed in a roasting furnace. In the case of some solvents, such as chlorine, the outer coating of many of the reducing agents will be destroyed, and the gold, whether locked up physically or chemically, will be dissolved, the exceptions to this being the case of an insoluble compound forming and enveloping the gold, such as chloride of silver. Even this material does not prevent the entire solution of the gold, provided the latter is present in the alloy to the extent of 60%. Should the particles enclosing the gold be too coarse, then the solvent action may be too slow, even if in course of time a perfect extraction might be obtained. While the solvent is dissolving the particle it is being destroyed as such, and consequently can not attack the gold, so that there must be an ever replenishing supply to all such particles. It is very often forgotten by the metallurgical engineer that he is dealing with masses which may only be very imperfectly represented by molecular formulae. He forgets that every change that takes place is between molecule and molecule, and that in the smallest particle visible there are some myriads of molecules, and in the time given for action a comparatively small number may be acted upon. Chlorine is able to penetrate and dissolve gold out of material impervious to cyanide; so that when the latter solvent is used on rich ore which is likely to frit in any way, it is necessary to grind the product very finely, and thereby expose as much of the metal as possible. This is an accepted axiom on the Kalgoorlie field.

After leaving this furnace the roasted material is sent along by means of push conveyors, two for every six furnaces, to a bucket elevator. There are two of these elevators, each delivering ore continuously into a mixer. Each mixer is a small steel vat, 4 feet in diameter and 2 feet deep, fitted with a movable cover, through which a shaft fitted with paddles works. There are six discharge outlets near the top of the mixer, through which the pulp flows into the amalgamating pans. The hot sand is churned up with the stream of solution supplied from the wash water and excess cyanide solution from the filter presses. The object of the mixers is to damp the ore without creating much dust; in this they are partly successful. The pulp flows from the mixers into twelve grinding and amalgamating pans. These are of the usual Wheeler type, and are arranged to have a continuous overflow from sets of three into a large settling pan. The contact of the dry, hot sand with water causes a solution of many soluble materials present in the roasted ore. The two which have the most influence on subsequent operations are calcium and magnesium sulphates. The former exists in the mine even at low levels, in the form of gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ), while it is also produced from the interaction of calcium carbonate, sulphur dioxide and oxygen of the roasting furnace. The magnesium sulphate is produced in a similar manner.

The anhydrous calcium sulphate is very slowly acted upon by water. It is practically dead, burnt plaster of paris, but in course of time it becomes  $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$ , or the ordinary plaster of paris, which, under ordinary circumstances, sets very rapidly, becoming  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ , or it goes back to gypsum again. This action is more or less retarded by the presence of other salts, but appears to be going on at almost all stages of operations at the Boulder. The settling takes place to such an extent in the pans that all parts become coated with a crust of material which has to be chipped off from time to time. For the same reason, it is useless hanging amalgamated copper plates in the pans, the amalgamation being done by adding large quantities of mercury, somewhat after the fashion of silver amalgamation, and periodically replacing that amalgamated. Whether the crystals of gypsum, as they form, are able to lock up gold and prevent it from further attack I was not able to discover, but should this be the case it would be preferable to allow sufficient time for the crystals to form and then grind them, it being obvious that when once the compound formed regrinding would reduce it to a slime, which would not reset. The chipmings from the pan bottoms have a high value, but this is due to the amalgam entangled. The pans are cleaned up twice per month. By starting at one end of the series and doing one pan per day, then on the thirteenth day the first pan would be again cleaned up, and so on.

The amalgamation which takes place is very good, while the loss of mercury is small. This is no doubt due in a great measure to the fact that hot alkaline

cyanide solutions are used in place of water in the pans, thereby keeping the mercury and gold bright, and also to the fineness of the product fed into the pans. A pulp which contains from two and one-half to three parts by weight of water to one of dried slime has been found to be fluid enough for the operation. Under ordinary conditions a pan is not a suitable amalgamating contrivance if worked with a continuous supply and discharge. In the first place the finer particles, including the fine gold, are washed out without ever getting to the bottom or coming in contact with the mercury. Secondly, the fine gold present only amalgamates with great difficulty, and even if amalgamated plates are hung on the baffles or sides of the pan the bulk of the fine gold will pass out. Thirdly, a reducing action appears to be always going on, and hydrogen is always evolved in appreciable amount, while with arsenical ores arseniuretted hydrogen is given off freely. Fourthly, the pulp has to be so diluted that practically all the mercury fed in periodically immediately falls to the bottom, where it becomes covered with all the heavy metallic minerals present. It should not be necessary to point out these simple facts, but in parts of Australia the system of pan amalgamation is still believed in as the most perfect of all methods. It is a different proposition altogether to take a thickened pulp and have globules of mercury disseminated evenly through it, to add chemicals to assist amalgamation, and then to thin down so that mercury and amalgam sink to the bottom and the thin fluid pulp overflows. The pan amalgamation process at the Boulder serves to eliminate the coarse specks of gold from the pulp, while only the finest or that capable of being dissolved by cyanide solutions in a limited time is carried over into the settlers. Solution of gold is, in fact, going on all the time. The amount of gold recovered as amalgam varies from 30% to 60%. The amalgam caught by the pan is treated in an amalgamating barrel and thereby cleaned. The cleaned, well-squeezed amalgam contains from 25% to 33% of gold. The pulp overflows from three pans into a settler. This is of the usual type, having suspended paddles working from a vertical shaft. The duty of the settler is to allow the fine globules of mercury carried over to subside. The pulp is so fine when it leaves the pan that 98% of it will pass through a 120-mesh screen, the balance through a 100 mesh. From the settlers the pulp passes into a sump, from which it is pumped up 48 feet to two distributing tanks, each having four discharge holes leading to four small conical spitzkaste, from which it overflows into a series of spitzkasten. The former serves to eliminate any coarse or heavy particles which may have come over with the slime. These are led back again into the pans; the latter are for the purpose of thickening the pulp and clarifying the solution. So effectively do the spitzkasten do their work that clear water is drawn away from the top of the final one, while a pulp having a consistency of one of water to one of slime by weight is drawn off below. The clear water from the spitzkasten is led back to the mixers, while the thickened pulp is led into the agitation vats. The strength of the solution is now made up to from .01% to .08% KCy, and the paddles are started and as a rule kept going from sixteen to seventeen hours.

Tests are frequently made to see if the gold is passing into solution. Since the weight of pulp and solution is nearly equal, by taking samples and filtering and determining the amount of gold in the solution, the decrease in the slimes may be readily inferred. This result is checked from time to time by assaying the slimes themselves. The ordinary method of determining gold in cyanide solutions by evaporating to dryness with litharge, and then running down the lead button and cupelling, is not looked upon with favor by some of the metallurgists on the field. It is held that large losses take place on account of the solutions being saturated with chlorides and other salts. Mr. Goldstein of the Great Boulder No. 1 is positive that this method of assay is misleading, and seeks to lessen the error by adding charcoal as well as litharge to the solution to be evaporated. He also fuses at a low temperature.

(TO BE CONTINUED.)

### Unscientific Gold Milling.

TO THE EDITOR:—I recently returned to the city from a few months in the mountains where I was employed as an assistant to the millman. After being there a week or two I found it necessary to remove the cam shaft in order to replace a broken cam. To do this it was necessary to remove the stamps, and this, owing to the peculiar construction of the mill, could not be accomplished without first removing all the stamps of the battery. To make matters worse I had to knock off the boss heads. I had taken one off after much difficulty, and was engaged on a second one when the boss millman came in. He looked surprised and asked, "What are you trying to do? Don't you know those things are put on to stay—they are not intended to be taken off." On explanation he agreed that it seemed the only course, but he could not see how we were to put them back again so they would stay. On cleanup day the coarse sands were taken from the battery and put in the cleanup barrel, which the boss ran steadily for over thirty-six

\*Abstract Australian Mining Standard.



consecutive hours, at the end of which time he had as "fine" a lot of quicksilver as one would wish to see. "Somehow," he said, "it don't seem to get together." Finally he turned the barrel with the man-hole uppermost, and then called in the stable man to help, and the two "agitated" the mass, each armed with a 4-foot piece of 2x4 scantling, for three solid hours. Then being satisfied that the "quick" was all right, or too tired to "keep up his lick," I don't know which, he turned the barrel over, and with a small stream of water and scraping with his hands, he finally got the stuff out of the barrel. He panned the grit then to recover. It took him the best part of three days and he felt proud of the result. He probably got about 50% of the "quick" and amalgam. The tailings, together with sweepings, "concentrates" from cleaning plate, amalgam, etc., he sent to the smelter, instead of treating the material as he should have done at the mine. It was a daily thing to clean up several ounces of "quick" and amalgam from the concentrators. I saw things done at that mill unlike I ever saw before elsewhere, or ever heard of, and when the "boss" ordered me to feed the rock breaker, and at the same time keep my eye on the feeders and the machines, I found I was unequal to the requirements of the place, and that is why I am in the city—looking for a new job.

MILLMAN.

### Underground Electric Haulage.

In extensive mining operations the transportation problem is always one of importance and of economic

the following portions of the system to be in operation:

	Feet.
The main tunnel from its entrance at the Economic mill to the Gold Coin shaft over 1000 feet of which tunnel is 8x14 feet with double tracks, the remainder single track	3,808
Bull Hill lateral	2,000
May B lateral	223
Gold Coin laterals	370
Sidings	991
Economic mill tracks	405
Dump tracks	1,395
Total tracks	9,402

It is proposed to extend the main tunnel and its branches several thousand additional feet, the total system to be about 20,000 feet when completed. The tunnels are electrically lighted, as well as the buildings. The power is supplied by the Pike's Peak power plant of the Pueblo & Suburban Traction & Lighting Co.

### Sampling Ore Shipments.

Written for the MINING AND SCIENTIFIC PRESS by  
W. J. ADAMS, E. M.

It is a frequent belief among mine owners and leasers, and almost accepted as axiomatic by some, that custom works, whether smelter, chlorination or amalgamating, are often unfair, even though owned and managed by men of the highest integrity and technical skill. This slur is constantly thrown at them, because, forsooth, the ore shippers do not get the returns expected according to their own sampling and assaying.

Why these discrepancies occur, is the object of this

or even more frequently, the errors of values would balance themselves in the course of time—perhaps in six months, perhaps in a year—but if the market price of the metal was fluctuating, each individual lot must stand on its own valuation.

It is not a good thing to cheat oneself, and yet this is what many miners do, partly due to human nature, but mainly to negligence. Important shipments are made and the values determined by the assays of grab samples, and it is human nature to pick out, perhaps unconsciously, the better class of rock and certainly clean ore, and not the fines which probably are much poorer or much richer, from the waste which must get into the bulk if worked on a commercial scale. Or a grab sample is taken from the top of each sack of concentrates, which are usually damp when put into canvas bags, and always unequally mixed, the finer and generally richer sulphurets collecting on the top in settling the mineral by jumping the sack. Perhaps a little more physical exertion and supposed carefulness is employed. The ore is of all sizes from ten pounds weight to dust, and each day's product is dumped together, from which an occasional shovelful is thrown on the sample pile while filling the sacks. At the end of the day this is taken to the assay office and found of sufficient value to ship. The same operation is repeated each day, and at the end of a week sufficient has accumulated for a carload and is sent away; but a different weight has been sacked each day, and there have been appreciable differences in the daily assays. Yet the shipment is valued on the average of the assays and perhaps also checked (?) by the assay of all these samples mixed together. With such absurdity, can



Office and Tunnel House of the United Mines Transportation Co., Victor, Colo.

interest. Large operations require for the purposes of economy that mechanical haulage of some sort be employed. At Cripple Creek, Colo., this problem has received much attention, and one of the most complete installations is that of the United Mines Transportation Company. This is a common carrier, the electric system being employed. The company has extended its system on both the surface and underground, hauling the ores of its own mines as well as those of other companies whose properties are situated along the line of transportation. The underground features of this scheme are of importance, as the extension of the tunnels not only makes accessible the resources of the mines, but affords an outlet for water and improves ventilation. The accompanying illustration shows the buildings of the United Mines Transportation Company at the mouth of the main tunnel. The last official report of the company shows

article, being brought home to the writer very lately when a dispute came to his knowledge, due, as far as can be learned by correspondence, to errors in sampling on both sides, but mainly to the faulty method pursued at the mine.

After years of experimenting by competent metallurgists, in all parts of the world and on all classes of ore, one method was devised which gave as nearly accurate a sample of the ore tested as it was commercially possible to obtain, and this has been now universally adopted by all sampling works, even those under the ownership and control of the mine owners themselves. Unless a similar procedure is carried out at the mine, the resultant values will not tally, except by accident or when the shipment is absolutely uniform in size of rock as well as in the distribution of its valuable contents. However, it is very probable that with regular shipments, weekly,

there be expected any agreement between mine and reduction works? Perhaps only concentrates are shipped, but the ore has come from all parts of the mine, and there is a daily difference in the values of the sulphurets, depending on whether the bulk of that day's output came from the oxidized ore of the upper levels or the sulphides of the lower levels, whether, also, taken from the pay shoot or outside of it. Then occasionally the settling boxes are cleaned out and mixed with the concentrates of that day's run of the mill. These concentrates are dried and sacked each day and graded according to the assays into different lots; but even in each lot there is often a variation of values between the contents of the sacks of ounces of silver and dollars of gold. Can a true estimate be made by averaging these different assays, or assaying the mixture of all the samples, with the variations of weights of each day's run, as



well as the difference in value? It is an absurdity, and yet all of these methods are employed, and by men known to the writer as intelligent, good practical miners and superintendents, with other methods just as ridiculous.

Twelve years ago the writer was employed as metallurgist by two companies in Placer county, California. One of the mines produced high-grade shipping ore in addition to that worked in the mill, the grades typically distinguished by the eye. Within a half mile of this was another mine, the ores of which when compared side by side to ocular demonstration looked identical, and on this appearance the second mine was taken under bond by outside parties, and the writer was requested to oversee a test on 100 tons of milling ore in the company mill. About twenty tons were hauled to the mill to start on; but an examination of this caused the writer (owing to the waste and "bull quartz" mixed with it) to call the bonder to one side and tell him that before the test was started he must remember that a "custom mill sometimes cheats." No further explanation would be given, but as a result three "samples" were brought for assay to serve as a guide to the large values in the ore. One piece, four ounces in weight, represented an average sample of the ore sorted out for shipping, and supposed to be worth \$1500 or more; the second was one piece of the milling ore, clean quartz and one pound in weight; while the third consisted of three pieces of clean quartz, each the size of a walnut, which constituted the "average sample" of the twenty tons sent to the mill. The shipping ore assayed \$10 per ton instead of \$1500 as in the ore of the company's mine identical in looks; No. 2 gave \$8 and No. 3 \$6. The test was made, amalgam saved, retorted and assayed, concentrates dried, weighed and assayed, and the tailings during all the run systematically sampled and assayed, and the total value of the original ore, combined from these several items, gave only \$3.50 per ton. Then the bonder wanted to know what became of the values, as the average of the three samples was \$8 per ton, and if the writer had not shown him while on the ground the true facts of the case—a minute quantity of clean quartz assayed and a working test of a large quantity taken out of the mine just as blasted and carrying waste and barren quartz—he would never have been persuaded but that the mill owners had absorbed for their own benefit the difference of \$4.50 per ton. This is by no means an extreme case, and though this gentleman was a shrewd and successful business man, he knew nothing about sampling, and all rocks looked alike to him.

In general a mine has not the proper facilities in regard to floor room, crushing devices, storage bins and the other adjuncts to allow the operations of systematic sampling such as is employed by a smelter or a custom sampling works; but even with limited ground, a really accurate sample can be procured by exercising care and judgment.

Before entering into the various ways this can be done, it will be well, even though accused of explaining something every mining man knows, to describe briefly the regular custom sampling.

The ore is emptied from the sacks on the pinnacle of a cone, or, if of several tons, on the edge of an extended wedge, and the large pieces are broken with a hammer to a nearly equal size, not to exceed 2 inches in diameter. When all the ore of this shipment is emptied, and the sides dressed to a uniform slope, the sampling is begun. Depending on the intrinsic value of the lot, from nine to two shovels of the material are thrown on the shipping pile and one shovelful on a cone, so that, with the samplers starting from each end, there remains after all the ore is shoveled, two cones, which contain from one-tenth to one-third of the original bulk. This is then put through a rock crusher and reduced to a size not to exceed that of cherry stones. If no crusher is available, it must be broken to at least one-half its original size by hand. An iron cross is now laid on the sampling floor and all the material again shoveled alternately from each cone, one-half to the shipping pile and the other half on the cross. When this is completed, the men with square-pointed shovels walk around and around the cone, gradually flattening it and drawing the ore uniformly to the outer circumference till the top of the iron cross appears. Then opposite quarters are shoveled to the shipping pile, and the remaining quarters reconed in the same way till the bulk is reduced to about fifty pounds. This is then put through a fine grinder, screened through a sieve of 50 or 100 meshes, and further reduced by quartering to the assay sample. The final work must be done in a room free from draughts and separated from the main sampling room.

In the case of concentrates or precipitates no crushing of course is needed; but the operation otherwise is the same. Should the material be of very high grade it is advisable, after the first coning, to separate the two quarterings and make a duplicate sample which should check in value on assaying.

At the mine, where this complete method is not available, either take every tenth bucket or car, or every tenth shovel, according to bulk of the shipment, and put into a coning pile, breaking up the large pieces. When the shipment is complete, crack the rock into halves, and take every other shovel, break again and reduce one-half till the sample is small

enough to be manipulated in the assay office; but never reduce for assay sample till the shipment is complete. Only in this way can the proportional weight of each day's production be included in the sample.

In regard to concentrates, when filling the sacks take every fifth or third shovel and proceed as above; but, as they are ground uniformly fine, a very accurate sample can be conveniently taken after sacking.

Fill the sacks and sew them ready for shipment. Then, after laying them horizontally, open the two corners very slightly, till a "trier" can be introduced. Shove this diagonally through the sack from each corner till the bottom is reached, and quarter down the sulphurets withdrawn. Given a piece of gas pipe  $\frac{1}{2}$  to  $\frac{3}{4}$  inch diameter, any blacksmith can make a "trier." Split off one-half the pipe for 6 inches to 1 foot, then round and sharpen the lower end, and bend over the upper end for a handle.

As the trier is inserted it is twisted around like an auger; and, in fact, if no trier can be procured, a small ship's auger will answer the purpose, but it is harder to clean off the sample after each boring.

So far everything written above has been to the benefit of the reduction works as against the shipper, but it can be stated that some reduction works also are faulty in their work, where they follow out the nearly obsolete custom of taking every fifth or tenth sack from a shipment, sampling them only and basing the values of the entire lot on these returns. That style of sampling is only guess-work, no more, no less, and should under no circumstances be countenanced.

There are some points hardly in the province of sampling, but they should be included in this article, where the reduction works cling to some old customs by which the shippers are unjustly treated and do not get the full value that is due them, considering the small losses incurred in modern metallurgical works.

Granted that the sampling is fair to both sides and the actual value of the metallic contents determined, the smelters ask a stated sum for working charges, which is also fair to both sides.

Now, in addition to this, on copper ores there is arbitrarily subtracted 1.3% of the copper, because in years gone by there was that difference between the assay and smelter returns, owing to loss in slag, etc. At the present time there is never a loss greater than .3% or the furnace manager is discharged, but the shipper is still taxed with a loss of 1%, or twenty pounds of copper to the ton, without any recompense. To still further discourage him, he is also given a price per pound for the remaining copper contents which is 5 cents less than the current market quotations, and with copper at 10 cents per pound only gets 50% of its value. Yet he pays a working charge that alone gives a profit, and would not grumble at an increase if he received the full value which the ore calls for. This 5 cents is supposed to be for refining charges, and is also based on the cost of expensive methods now obsolete.

Suppose it is a lead ore. The smelters pay on the returns from a fire assay, which has been proven time and again to be lower than the actual output of the ore, so that the returns should be made on the wet assay.

Suppose it is gold and silver. Such assays are made which give an excessive loss. Nitre is used in the crucibles, and gold with silver volatilized. Cupellations are carried out in muffles at such high heat that the cupels absorb an excess of the silver; in addition to this, whether the ore carries twenty ounces or 10,000 ounces of silver, an arbitrary reduction of 4% is taken off the number of ounces for refining charges. These refining charges are certainly a legitimate and necessary expense, but should be given at the proper cost per ounce and the full value of the silver stated. The difference in returns would be considerable under the fluctuations of the silver market.

Years ago the writer was connected with a small smelting and refining works in San Francisco, Cal., where very high-grade concentrates, 2000 ounces to 10,000 ounces silver, were reduced.

These concentrates were assayed by crucible and cupel, and the returns based on the direct assay. As a matter of curiosity, the cupel was ground up and re-assayed, when there was found to be a loss, or rather gain, over the returns, absorbed by the cupel, of forty ounces to the ton, and, as the owner of the works remarked, "that constituted the smelter's profit."

Times and methods have improved since then and no such losses are now allowed, but still, as shown by this extreme case, there is danger of unaccountable losses, even under most honest management.

As shown above, custom works are not swindling concerns, but in these progressive times, should change some of the arbitrary rulings founded on obsolete methods. Even if increased working charges are necessary to carry on the business at a profit, the smelters should keep from antagonizing their customers by billing these excesses.

The United States laws provide for adverting the claim of any person who attempts to appropriate mineral lands under agricultural filings.

## THE PROSPECTOR.

The statement made last week in the "Prospector" to the effect that the Laramie epoch was at the base of the Cretaceous was an oversight. The Laramie is at the top of the Cretaceous and extends upward into the Eocene—the lowest Tertiary.

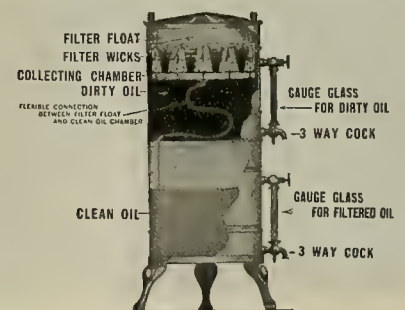
There are dry washing machines which work as perfectly as a device of this construction can be expected to work. They are all constructed and operated on the action of an intermittent current or blast of air. This may be of varied volume and intensity and is usually supplied by a bellows. In conjunction with this a shaking screen is actuated by a cam or eccentric device. The result is the blowing away of the lighter particles of earth and dust and the screening out of the larger pieces of rock. Should gold be present in pieces so large as to remain on the screen, it is presumed the operator will see them, while the smaller nuggets and flakes will pass through and be concentrated with a comparatively small amount of material of high specific gravity, such as "iron rock," garnets, etc. The field for the dry washer is in dry desert regions where the "wash" contains the minimum of moisture. It is not the best device for a wet country like Alaska. In such regions water is usually available, and a rocker, sluice box or some similar "wet process" is productive of better results than those obtainable with a dry washer.

The mineral specimens from Baker City, Or., are determined as follows: No. 1 is a quartz rock, seemingly quartzite—a sandstone silicified by the infiltration of silica. No. 2 is a dense flint-like quartz rock and possibly is a portion of the same reef as No. 1, though the latter is somewhat decayed, and contains a few small grains of magnetite. No. 3 is also quartz stained with iron oxide and contains veinlets of quartz. The red portion is porous, and has been subjected to some agency which has leached out some former constituent, possibly pyrite. This rock may contain precious metals and should be assayed for them. No. 4 is flint and may come from a limestone formation somewhere in the neighborhood. A prospector would be justified in having each of these rocks tested for gold, though No. 3 is the most promising in appearance.

The rocks from Holmes, Wyo., are: No. 1 basic gneiss, largely composed of hornblende and its alteration products, with feldspar and quartz; mica is also present. No. 2 is similar, though more massive than gneissoid. Both of these rocks have resulted from the alteration of some basic rock, possibly like No. 3, which is gabbro, and No. 4 is diorite-aphanite. Although No. 4 contains visible iron sulphide, it can in no sense be considered an ore. However, this and similar rocks, under the influence of hot mineral solutions, may be so completely changed as to become unrecognizable, and may also become a carrier of valuable minerals to a sufficient extent to entitle it to be classed as an ore.

## Capilar Oil Filter.

An old and simple principle, that of capillary attraction, is utilized by the Capilar Co., 138 South Fourth street, Philadelphia, Pa., in the filter here-with illustrated. The company claims that the



CAPILAR OIL FILTER

Capilar will maintain an even flow of filtered oil under all conditions of service. They say that a filter having a capacity of one gallon an hour at a temperature of 100° F. gives a continuous flow of oil irrespective of the ratio of clean or dirty oil in its tanks. The oil passes upward through a series of wicks, as shown in the illustration, leaving the dirt behind. The heating coil of the tank is so arranged as to prevent overheating of the oil. Neither water nor impurities of even microscopic fineness can be carried over into clean oil storage, according to the manufacturer's claim, and that the oil, after passing this filter, is as efficient as it was originally.

So confident is the company that its claims will be substantiated that they offer to send a filter of the required size to any responsible concern on thirty days trial, free, and if found to be unsatisfactory it may be returned, the Capilar Co. assuming all expenses of shipment.

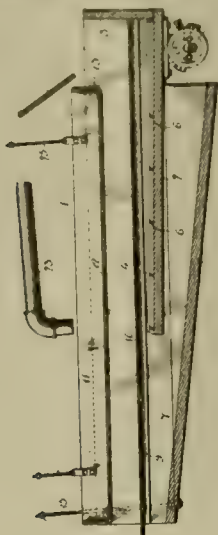


## Mining and Metallurgical Patents.

PATENTS ISSUED JULY 26, 1904

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE WASHER AND SEPARATOR.—No. 765,801; S. B. Wise Whiteoaks, N. M.



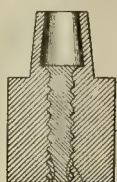
Ore washer and separator comprising longitudinally inclined box or casing provided with a screen above riffled bottom, screen and bottom discharging at upper ends, adjustable hangers supporting box at upper end, means at lower end supporting and imparting vertical and horizontal movement to box, whereby material under treatment is tossed toward upper end thereof, in combination with water distributing pan supported above and adjustable independently of box or casing.

APPARATUS FOR HANDLING MINE CARS.—No. 765,902; W. J. Patterson, Pittsburg, Pa.



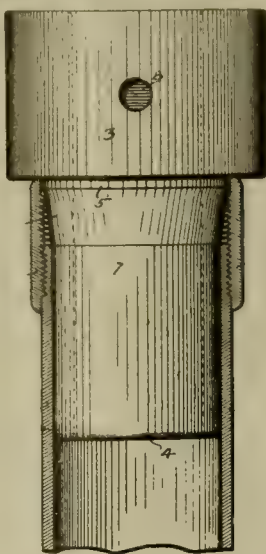
In apparatus for handling mine cars, combination with elevated structure and shaft therein, of elevator in shaft, track in proper position with reference to elevator, carriage adapted to travel to and from elevator, yielding pusher on carriage in path of car, mechanism for moving carriage.

STAMP SHOE OR DIE.—No. 765,876; W. Brinton, Highbridge, N. J.



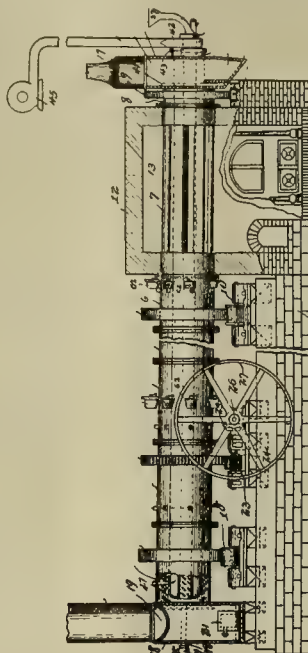
A stamp shoe or die comprising outer body of cast and toughened manganese steel having central opening throughout its entire length walls whereof are corrugated; and plug of cast and toughened manganese steel having its surface in engagement and interlocked with corrugated walls of central opening of body.

DRIVE HEAD.—No. 765,864; C. R. Thomas, Hartford City, Ind.



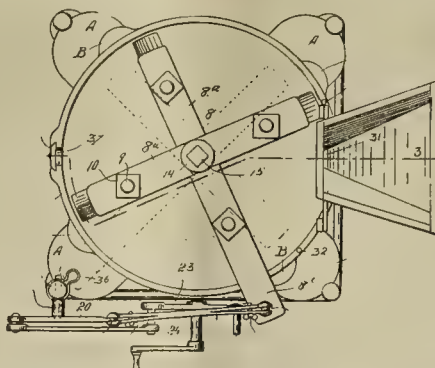
Pipe, collar on end of pipe, drive head bearing upon collar, head having shank which passes through collar and enters pipe, shank next to head being of diameter next to head to make close fit inside of collar.

ORE ROASTING FURNACE.—No. 765,997; G. Shellabarger, Dekalb, Ill.



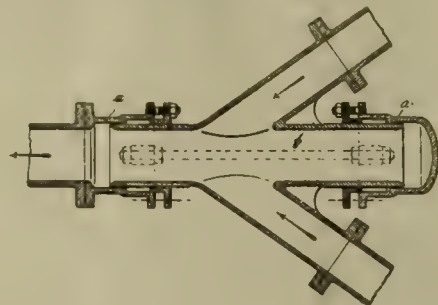
In ore roasting furnace, furnace body comprising plurality of longitudinally extending separate ore chambers, one of chambers constituting primary ore chamber and others constituting return or secondary ore chambers in communication with primary ore chamber, ore chambers being sealed against admission of products of combustion thereto, plurality of interspersed air passages, and means for supplying air to each of return ore chambers.

DRY PLACER MACHINE.—No. 765,811; J. J. Callahan, Pueblo, Colo.



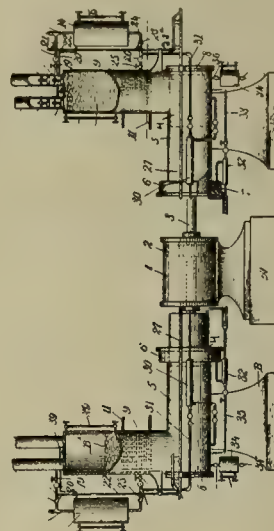
Combination with suitable support, of tank mounted to rotate thereon and having central post, cruciform frame mounted on post and provided with agitators, one arm of frame projecting beyond periphery of tank, and means connected with projecting arm and acting on tank for simultaneously actuating tank and agitators.

COMPENSATING PIPE JOINT.—No. 765,484; L. Hochstein, Dietrichsdorf, near Kiel, Germany.



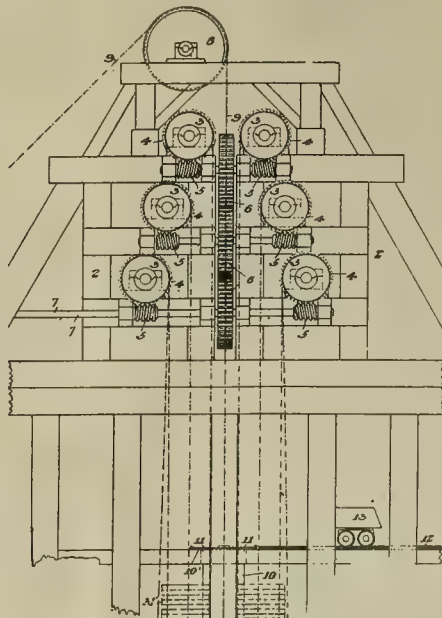
Compensation device for pipe conduits, combination with two stuffing boxes connected with each other, of free lying pipe fitting in boxes and open at both ends, and means for leading and carrying off fluid into and out of pipe.

COMPRESSOR.—No. 766,017; I. Carlier, Denver, Colo.



In compressor, combination of motor and fluid chamber, plunger moving in chamber adapted to be reciprocated by motor, tube for admission of air to fluid chamber, second tube for escape of air compressed in chamber by fluid, valves in tubes, coil arranged in fluid chamber and adapted to have liquid circulating therethrough for cooling fluid in chamber, supplemental fluid-receiving tank arranged adjacent to chamber, pipes connecting said supplemental tank with air-discharge tube and with fluid chamber, valves in pipe, and means, including rod, movable vertically at predetermined times for controlling valves.

SAFETY SHAFT FOR QUICKSAND OR OTHER DANGEROUS GROUND.—No. 766,132; R. Baggaley, Pittsburg, Pa.



Means for sinking shafts, comprising casing composed of sections adapted to be successively attached, supporting cables, and wall which is built within casing as it is lowered; casing having a cutting portion at its end.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

The report of the United States Geological Survey shows the output of the coal mines of the United States during the year 1903 was 359,421,311 tons, an increase of 58,000,000 tons, or 19% over the preceding year. The value of the product is given as \$504,190,733, an increase of 38%.

## ALASKA.

Berners Bay reports say the property is showing up satisfactorily. Superintendent J. MacDonald, of Treadwell, says the machine drills have entered 35 feet of solid ore. The quality of the ore in the Kensington mine has increased with depth. The plan is to erect a 300-stamp mill and make other improvements. A townsite has been laid out.

J. Maglott, vice-president of the Mansfield G. M. Co., and G. A. Rusk, treasurer, report the work progressing satisfactorily. About twenty men are employed, and as they have an abundance of water, they will open up several more pits. The Mansfield gold mines (placer property) are on McGinnis creek, near Juneau.

C. H. Cosgrove of Ketchikan reports mining works in that district improving. The Laskawanda G. & C. Co. is increasing work and has its tram, built to get machinery to the property, nearly finished. The tram is 1½ miles long. Assays show the ore to average \$10.

## ARIZONA.

### Coronino County.

The Brannen-Stanley group of mining claims and locations in the White Mesa mining district has been sold to E. T. Merritt of Duluth, Minn., for \$25,000. These claims are about 17 miles southeast of Lee's Ferry and 38 miles northwest of Tuba. Work will start by Sept. 1.

The Hermit G. & C. M. & S. Co. has been incorporated at Salt Lake City, Utah. It owns the Hermit Nos. 1, 2, 3 and 4, in Coconino county. J. W. Lee is president, A. R. Teepler, E. W. Lee and F. J. Barber officers.

### Gila County.

The Pacific M. Co. having deeded in trust to E. Wilder the Clipper group of mines, 8 miles west of Globe, he and associates are forming a company to exploit them. J. D. Copen of Denver, Colo., is manager and is preparing to start work.

The Pasquale Negro group of four copper claims, at head of Pinto creek, near Globe, have been bought for \$17,500 by L. S. and C. W. Gibson. They now own eight claims in one group. The Gibson mine is operated through a shaft 200 feet deep, on which they propose to put a steam hoist. On the Negro group there is a tunnel 500 feet long, and they propose to drive this tunnel 3000 feet or more and by a raise connect with the shaft. The tunnel will strike the ledge 130 feet deeper than the bottom of the shaft at present, giving them that much more stoping ground, and will enable them to run the waste rock out of the tunnel. There is also ore developed on the Pasquale Negro claims, and this will be handled more cheaply through the tunnel and shaft than is possible at present, as it now has to be packed up the hill on burros to be loaded in wagons at the shaft. The Gibsons are delivering ore to the Old Dominion smelter.

### Graham County.

The June output for the Arizona C. Co. of Clifton is reported at 1148 tons of Bessemer copper.

The Detroit C. Co., near Clifton, is enlarging and improving its concentrating plant, which, when completed, will double the capacity for handling concentrating ore.—C. E. Stevenson, superintendent of the Cuprite M. Co., reports that the tunnel is in 170 feet and in ore. The vein is 8 feet wide, with 2 feet of black manganese ore. The company will increase development work.

H. L. Martyr, superintendent of the Standard C. Co. mines, near Clifton, reports to the Clifton-Morenci Mining Bureau that the large amount of development work mapped out by President Ross is under way, and that promising new ground is being opened up. A 25 H. P. engine is being placed in position at the mines, which will take the place of the other two engines, increasing the capacity and also cheapening cost of hoisting ore from the mine. Ore is being shipped, which will be increased later in the season. G. G. Gill, president of the Shannon C. Co., operating the Shannon mine, near Clifton, says the mine is outputting a better class of ore than for some time past, and as a consequence the output from the smelter is also on the increase.

Manager Sweeting has taken charge of the Polaris group and development work

will be increased. More men are being put to work. The ore carries gold-copper values. It is near Clifton.

After a year's steady work from both ends, under Mine Superintendent M. H. McLean, the tunnel driven from the West Yankee and the Old Yankee mines, near Morenci, to connect both workings, was broken through last week. This tunnel will aid in handling the ore from the Old Yankee mine, which will now be worked to its full capacity. The ores will be run through the tunnel to the West Yankee hoist, and from there raised to the surface. In cutting the tunnel, which is 1700 feet long, several bodies of low-grade ore were struck, and the work has answered the double purpose of developing the ground passed through and that for which the tunnel was started. It is estimated that the cost is approximately \$15,000, which will be still further increased before the connection is in the condition the Detroit C. Co. puts all its workings for the safety of its men.

### Morenci County.

The Swiss-American M. Co. is preparing for increased development work on its property at Vivian the coming fall and winter. A new hoist has been set up and the shafts on the Ben Doran and Uncle Sam mines will be sunk farther. The Ben Doran shows a large body of milling ore.

Ore is being shipped from the C. O. D. mine, near Chloride, of the Fletcher M., M. & S. Co. of Needles, Cal., and it is said the stopes show bodies of high-grade ore. The C. O. D. mine is made up of a number of veins. The ore occurs in lenses in these veins and can be worked through one shaft. It is intended by the Fletcher to sink a new shaft to cut the vein near the 400-foot level and work out the old ground completely above that level, and at the same time new ground will be opened out ready for stoping.

### Pinal County.

Superintendent A. C. Sieboth of the Lake Superior & Arizona M. Co., at Superior, near Florence, says he has put in an air compressor. The progress of work at the mine has been retarded by lack of compressed air. Difficulty has been experienced in getting teams to haul machinery and supplies to Superior, owing to railroad construction and work at the Tonto damsite, which has created an unusual demand for teams. The Lake Superior & Arizona is sinking its shaft, having made 45 feet since resuming. There is considerable water coming in.

### Yavapai County.

The George A. Treadwell M. Co. will build a narrow gauge railroad to connect its mines with the main line of the Prescott & Eastern Railroad, thence to the company's smelter at Mayer. Ground has been broken for the new smelter. E. D. Treadwell is manager.

It is reported that Manager G. Bethune of the Yavapai Gold Co. will build a 5-stamp mill on his mine at Mayer.

The Gold & Consolidated M. & M. Co., says Superintendent Pickerell, is expecting to start its mill for the Longfellow group of mines this week. The mines are 12 miles south of Prescott and development work is going on and the bins are being filled with ore.

The Black Rock M. Co., near Martinez, is preparing to put in a mill, with F. Perkins of Salt Lake City, Utah, as superintendent. The mine has a large amount of development work done. The deepest shaft is down 210 feet and is in sulphide ore. There are 60 feet of quartz carrying gold values. The company has a gasoline engine, hoists, machinery, etc. Twenty-five men are at work, but development work is temporarily suspended to put up the mill.

The mill at the Crowned King mine at Crown King, especially constructed to handle the 50,000 tons of tailings accumulated there, started up last week.

Superintendent Pickerell of the Gold & Copper Con. M. & M. Co. says that at the company's Rockefeller group of mines, 12 miles south of Prescott, in Hassayampa district, he is continuing development work and is filling bins with ore and expects to start the mill this week. There are 2 miles of underground workings and the main shaft is down 815 feet.

## CALIFORNIA.

### Amador County.

At the Burlington mine, near Sutter Creek, L. Smith of Chicago, Ill., manager and owner, has men on development work and is putting up a hoist. A two-compartment shaft is being sunk. When the ore bodies are blocked out a mill will be built.

Work is reported progressing at the Fremont-Gover mine, near Amador City, with the non-union crew. Underground work is going ahead and the bins in the mill are being filled with ore.

A gravel strike has been made in the

Butte Basin mine, 3 miles from Jackson, in a tunnel which has been worked for years with little success. A 5-foot deposit was disclosed and gravel is being taken out that goes from 10 cents to \$1 per pan. The number of men working will be increased. W. E. Stewart is superintendent.

### Butte County.

The Gold Mountain mine near Inskip is being actively operated and the 10-stamp mill is running on ore taken from the strike made in the spring. The ledge is 4 feet wide, all of it carrying values. It is free milling. The Diamond Match Co. railroad runs within 8 miles of the property, and will afford means of access. C. E. Clough is manager.

### Calaveras County.

(Special Correspondence).—At the Royal Con. mines at Hodson, a Merton roasting furnace has been built under supervision of the inventor, and it is said to be in successful operation. The furnace is used to roast the sulphides concentrated by the 120-stamp mill, preparatory to chlorination. Chlorine gas for the process is generated by a reaction of SO<sub>2</sub> gas (sulphurous anhydride) on brine (NaCl solution). The gold is precipitated from the gold chloride solution, but is not allowed to settle in the precipitation tanks, but by agitation is kept suspended and the mixture is passed through sawdust filters. These filters collect the particles of precipitated gold, which is recovered by incinerating the sawdust when filled.

Hodson, Aug. 3.

Operations are to be started at the Hamby quartz mine, 2 miles from Mokelumne Hill. This mine is owned by Will & Pink of San Francisco and is under bond to J. King of Mokelumne Hill. There are three tunnels, run 800, 250 and 150 feet, respectively. A drift has also been run on the lead 283 feet and the ore extracted prospects well. A 20-stamp mill will be put in, as well as other machinery, and the work of grading for same has been started.

A 3-stamp mill is on the ground for the Woodward & Fuller quartz mine, near Mountain Ranch. Ore has been taken from the mine and is on the dump, to be milled.

Twenty-two men were put to work at the Sheep Ranch mine, at Sheepbranch, last week. The number will be increased.

The old Stickle hoist of the Utica G. M. Co., at Angels, was torn down last week and a new one will be built in its place.

The Voinich M. Co. is reported preparing to put up a 30-stamp mill on the Voinich mine, west of Angels.—The Prince mine at Altaville, near Angels, has been bonded to C. H. Bean of Los Angeles and J. F. Hamby of Calaveras and first payment made. Work will be resumed in the shaft.

### El Dorado County.

A. K. Grim of Berkeley, president El Dorado C. M. Co., operating at Georgetown, says the company is preparing to put in heavier machinery at the hoisting works and the sinking of the triple-compartment shaft will be resumed. The hoist has been removed from the old Eureka shaft to the works on the hill and work on the Eureka mine suspended for the present.

H. F. Barker and R. M. Crackles of the Rescue M. Co., at Rescue, are arranging for addition of machinery at the Rescue mine, recently bonded. Preparatory work is in progress and the property will be developed. The mine is a gold-bearing quartz proposition. R. M. Crackles of Rescue is president of the company.

The Star mine, near Latrobe, is being developed and is reported turning out \$400 a day regularly. The ore is said to consist of porphyry carrying fine gold. A mill has been built and twenty tons of ore are put through the mill a day. G. H. Jones, T. H. Edwards and W. S. Banks are owners.

### Kern County.

The Associated Oil Co. has a number of gas engines on the ground, near Bakersfield, and will put its wells on the beam. Most of the companies are changing from the pumping jack to the beam on account of the greater efficiency of the latter method of the pumping, says the Pacific Oil Reporter. With an engine at each well it is possible to work the pumps much faster and a corresponding increase in production is the result. Another advantage of the separate engine is that when it is necessary to pull up the pump for repairs the power is always at hand.

Of the companies operating in the Kern River field nine are paying monthly dividends amounting to \$74,500, or \$894,000 per year. The aggregate land owned by these nine companies is about 950 acres, about one-fifth of the proven territory of the field, and less than one-quarter of this 950 acres is developed. There are about 5000 acres of proven oil land in the Kern River field, and less than 1000 producing

wells. A well is said to drain the oil from about one acre of land. The largest factor in the Kern River field is the Associated Oil Co., and the Associated has not yet declared any dividends. In addition to the Associated and the nine companies first referred to is the Petroleum D. Co., which is owned by the Santa Fe Railroad. There are also a number of companies that pay quarterly and semi-annual dividends, and those are also left out of the account. With the profits of these companies added to the amounts already given, it is estimated that the net returns from the Kern River field in the present depressed condition of the oil industry approximates \$2,000,000 per year. These figures are for net profits, with cost of operating, deterioration and betterments taken out. They are made, too, on the basis of the prices which the companies have been getting for their oil—less than 20 cents.

### Mariposa County.

The Champion mine, near Mariposa, has resumed work after a few weeks' shut down. The shaft is down 200 feet. Superintendent Chandler of San Francisco says the ore carries free gold.—The Virginia mine, 5 miles south of Coulterville, is dropping its ten stamps on payable ore. D. O'Toole is owner and manager.

At the Princeton mine at Mount Bullion Manager C. C. Derby has started rebuilding the surface plant destroyed by fire on the 19th ult. The hoist, carpenter and machine shops were burned also and the timbers in the mine shaft to a depth of 150 feet. The 20-stamp mill was saved, also 2000 cords of wood piled near the buildings. Loss is placed at \$75,000, with no insurance. New machinery will be put in.

### Nevada County.

(Special Correspondence).—At the Mountaineer mine at Nevada City, 2½ miles of pipe are being laid to carry water for power purposes. The water enters a 24-inch pipe and is delivered through a 15-inch pipe, 800 feet difference in elevation. The drift has been run into the hill for 800 feet, than a shaft sunk 800 feet on the incline and a drift run back for 1200 feet. A three-compartment shaft will be sunk 675 feet to tap the face of the drift. When the shaft is completed ten more stamps will be added to the 10-stamp mill. The company is figuring on the utilization of the water power for either electricity or compressed air for haulage or other purposes. J. C. Campbell is superintendent.

Nevada City, August 3.

(Special Correspondence).—The Gray Eagle mine and mill at Maybert have been running since early spring when the pipe washouts were repaired. The vein is narrow but high grade, being free milling quartz. A 575-foot crosscut has been run and 450 feet drifting. The mill, tramway and compressor are run by water power, a Tuthill water motor running the compressor. H. Kaler is superintendent. Maybert, August 2.

(Special Correspondence).—In three years 6000 feet of drift have been run at the Union Blue gravel mine at North Bloomfield. A 40 H. P. steam locomotive, burning anthracite coal, handles the cars. These are made at the mine and are provided with wooden bumpers as they are pushed into the mine by the locomotive. Drawbars and chains are provided for pulling them out. The brakes can be set on all four wheels. A No. 4½ Baker rotary pressure blower, belted to a water wheel, furnishes air through a 11-inch riveted pipe. This, with the shaft 2000 feet from the mouth, gives good ventilation. The gravel is given a preliminary crushing in two jaw crushers, run by separate Pelton water wheels. Thence it passes to the 20-stamp mill. This is equipped with 1000-pound stamps and double discharge mortars. The large amount of water used in milling scours the plates, and so four troughs are provided at the lower end to catch the quicksilver and amalgam. Formerly the pulp from the plates was run over riffles, but shaking tables are being put in to effect a further saving. Eighty men are employed. A. D. Gassaway is superintendent.

The Shady Creek Dredging Co. is at work near Cherokee. The gravel is moved by a hydraulic giant, the big boulders separated by a grizzly or trap, and the water and gravel run into a pit and raised by a 6-inch centrifugal pump 50 feet—a sufficient height to allow washing on riffles. This handles 15 cubic yards per hour. The pumps have to be frequently reined. C. L. Miller is in charge.

North Bloomfield, August 2.

The Champion M. Co., near Nevada City, which has for some time been operating forty stamps, is making arrangements to start up the remaining thirty stamps in its mill.

N. P. Brown and F. White have bonded



two quartz mines in Willow valley, near Nevada City, one being the Austin mine and the other the Wedge. Both have been partially developed. The claims adjoin the Murchie mine, and the Independence ledge is said to run through them. It is expected that work will begin next week.

M. Stewart of Rough and Ready has bonded eighty acres of the Kohler ranch on the north slope of Kentucky Ridge and will start men on work of development. The land bonded is north of the Niagara mine and adjoining same, and is said to be on the trend of the ledge in the Norton Ranch mine. Iron gossans are there, an abundance of timber and two springs of water. Stewart will drive a tunnel to cut the gossan, having already struck a 12-inch ledge which he will follow.

A report by President J. D. Hague shows during six months ending June 30, 1904, the North Star M. Co. at Grass Valley produced \$305,000 at an operating cost of \$142,000 and \$53,000 expended for general development of the North Star mine (including the deeper workings of the Central shaft). Further outlays during same period for other developments, mainly at Gold Hill, amount to \$27,000. During the half year the expenditures, mainly for new mill construction and other equipment and including about \$4000 for property purchase, have amounted to \$61,000, whereof about \$37,000 will have been drawn from the surplus fund, which amounted to \$224,000 at the beginning of the year. The general condition of the company's property and business is reported satisfactory. The construction of the 40-stamp mill at the Central Shaft mill was long delayed by unfavorable weather during the winter and spring. It is now nearly ready for operation.

#### Placer County.

(Special Correspondence).—Since the new company has taken hold of the Three Stars mine, near Auburn, under the superintendence of B. F. Hartley, 2000 feet of electric railway have been run to the Almont shaft from the Three Stars 20-stamp mill for ore transportation. This shaft had been sunk 500 feet and was then abandoned. It is now being unwatered and retimbered, preparatory to extraction of ore, which will be hauled. The mill is crushing ore from the 700-foot vertical Three Stars shaft, and also ore from the dump.

Auburn, Aug. 2.

(Special Correspondence).—For six weeks from the first of May water was taken from the 460-foot Gold Blossom shaft at Ophir. Since unwatering thirty men have been at work. Drifts had already been run 1150 feet to the old shaft and the 100, 200 and 300-foot levels. Connection is now being made on the 400-foot level. They are also drifting east and have struck a body of ore. The present working is to verify reports, future progress depending on the outcome. A feature of the surface installation is the placing of the rock crusher half way between the shaft and the 20-stamp mill, which are connected by a tram. This removes the vibrations due to the crusher from both gallow-frame and mill. F. Homer is superintendent.

Ophir, Aug. 2.

#### Shasta County.

The Mammoth copper property, comprising 900 acres of land showing ore blocked out at the mine, near Kennet, in Backbone district, has been sold to F. G. King of Denver, Colo., and J. Filius of Boston, Mass., for \$140,000. They have had it bonded for three years and have expended \$60,000 on development work. Their plans provide for breaking ground for a 500-ton smelter within sixty days. It is thought a railroad will have to be built a distance of 2½ miles to the Southern Pacific main line at Kennet.

#### Sonoma County.

A strike of quicksilver ore has been made near Mark West Springs and it is said San Francisco men have bought Kettlewell, Goodwin and other ranches in that section and will begin tunneling.

#### Trinity County.

G. F. Lewman, owner of the Jo Ham placer mine, above Junction City, reports he has completed his season's work on the mine. In his clean-up was included 6½ ounces of platinum, some of which was in nuggets.

#### Tuolumne County.

In the Don Pedro mine, south of Chinese, a drift has been run 582 feet in ore from the 116-foot level. The steam hoisting plant will be in place next week and operations on a larger scale will be started, says Manager W. H. McClintock.

At the Longfellow mine, near Groveland, the mill is being set up. Superintendent Partington says he expects to start up by August 15th. He bought

the equipment of the Alameda mine, west of Jamestown, consisting of hoisting engine, with 4-foot drum; boiler, gallow-frame, skips, etc. Grading is being done for the hoist and lumber is on the ground for buildings. Drifting is being continued on the 400-foot and 500-foot levels in ore.

### COLORADO.

#### Clear Creek County.

The Fostoria G. M. Co. has arranged to drive the Silver Gem tunnel, near Idaho Springs, to intersect its group of claims at the head of Gilson gulch. The tunnel is in 900 feet, and within 350 feet will reach the Summit vein at a depth of 650 feet below the surface. In the meanwhile connection will be made with the pipe line of the Consolidated Gem M. Co. and air will be supplied from the latter company's Silver Age plant. The mouth of the Silver Gem tunnel is but 300 feet above the Silver Age-Franklin tunnel—Negotiations are pending between the Little Mattie Co. and the owners of the Star tunnel on Chicago creek, for the use of the tunnel to open up the Mattie-Newton vein. The Star tunnel will reach the vein by driving additional distance of 300 feet, and will cut it at a depth of 900 feet from the surface. Besides unwatering the vein to that depth it will be a desirable method of handling a large tonnage of ore to the Mattie mill, located across the creek. The dump of the Star tunnel is almost on a level with the Mattie mill, and by building a few hundred feet of tramway they could be connected. Manager Arkills of the Star tunnel says he will resume work in the tunnel. Several of the veins already cut have ore which can be profitably mined.

Manager Eaton of the Pelican-Dives Co., operating near Silver Plume, says arrangements have been completed for erection of a concentrating mill for treating material that has accumulated during the long period that this property has been operated. Tests have been made on material from the dumps and stopes of the property, as several hundred tons were sent to different mills and the result reported satisfactory. The mill will be located at the portal of the Burleigh tunnel and the motive power for its operation will be electricity. Tramways will be built from the Seven-Thirty and Pelican dumps and the Burleigh tunnel will be driven through to connect with the Seven-Thirty shaft and cut the other lodes owned by the company at that level. The mill will be of 400 or 500 tons daily capacity.

The Democrat Mountain M., M. & L. Co. has been incorporated to operate a group of claims on Democrat mountain, near Georgetown, and has started operations. The number of men will be increased as development proceeds. The group includes the Fred Rogers, Polar Star, Bonanza and other early-day producers. C. I. and K. R. Burt are interested, the company having the property under lease and bond.

#### Dolores County.

The Emma G. M. Co., on the Dunton side of the range from Rico, has completed a 750-foot drift on the vein in the second level and connected the second and fifth levels by a 300-foot raise, blocking out a body of ore 4 feet wide, 300 feet high and 750 feet in length. The main or fifth level is into the mountain 2900 feet and the vein holds out. The second level has reached a horizontal length on the vein of 2500 feet and is also in ore. In addition to doing development work, twenty stamps have been kept dropping in the Emma mill continually and several carloads of high grade ore smelting ore have been shipped to Durango.

The San Juan Ore Co., near Rico, has unwatered the Argentine mine and the extraction of ore has been started. The Pro Patria mill, which is being overhauled by the company, will be in running order this week. The cave in the Pro Patria tunnel is being caught up and ore will be taken out in the Laura workings of the United Rico M. Co. property by the San Juan Ore Co.

#### Fremont County.

F. W. Jones of Boston, Mass., president of the United States Mica M. & Co., says he is shipping mica from his mines at Micanite, in northern Fremont county. The product of the mines at Micanite is free from iron and is adapted for use in electrical industries. The company has expended \$400,000 on its plant. They have uncovered twenty-one veins and holdings cover 240 acres. The mica is quarried. With present installation of machinery, they manufacture into the finished product three tons per day; by Jan. 1st next they expect to double this capacity, says President Jones. The value of mica depends on its size. Sheets approximating a foot square are worth \$13 a pound; but the smaller pieces have their

value. There is no waste in the product. The by-product is ground into a fine powder and sold as "flitter" to wall paper manufacturers. Jones says no raw product is shipped out by his company. Micanite is 20 miles from Canon City by wagon road, but the company will build its own railroad connection with the Rio Grande at Canon City.

#### Gilpin County.

The Quartz hill properties of the Kansas-Burroughs Con. M. Co., near Central City, are employing 100 men on the leasing system. For June the shipments over the Gilpin County Tramway lines were 145 cars, or 1235 tons, maintaining a daily average of 40 tons. Most of this tonnage was delivered to the stamp mills and concentrator at Black Hawk, the balance going to the sampling works. English capital is interested, with R. Skyes as manager. It is reported that the Ridgewood mine (formerly the Rialto), on Lawrence street, will start up again.

#### Gunnison County.

W. S. Chenoweth of Davenport, Iowa, of the Little Tyecon M. Co., owning property in the silver belt 5 miles north of Pitkin, says it is proposed to resume operations. The workings consist of tunnels and shafts. Considerable stoping has been done from a tunnel which is in 400 feet. A shaft sunk 30 feet showed a body of ore 2 feet in width between dolomite hanging and blue lime foot wall that averaged 150 ounces in silver per ton and carries some galena. The property has not been in operation for eight years. Men will be put to work cleaning out the old workings and developments continued. Chenoweth says machinery will be put in.

#### Hinsdale County.

At the Contention mine, near Lake City, Superintendent Kazar is finishing the concentrating mill and increasing work on the Mayflower tunnel, so that mine connections will be made as soon as possible after the mill is ready for the ore. A body of milling ore that makes a solid breast in the Mayflower tunnel has been opened. There has been delay in receiving the machinery.

#### Jefferson County.

Pyritic smelting in Colorado will have another trial in Golden, commencing August 15, says the Times, when the plant built by the Clear Creek R. Co., owned by the Independent S. & R. Co., will resume operations. It will handle the material, to begin with, at the rate of 250 to 300 tons per day, and by November 1st it is expected to have the capacity enlarged to 500 tons per day. As the Colorado & Northwestern Railroad in Boulder, Gilpin and Grand counties, and the Colorado & Southern Railroad in Boulder, Gilpin and Clear Creek counties, have each extended low rates on certain classes of ores for the benefit of the Golden plant, a steady supply is expected. Ores of the higher grades are not solicited. For the present the Golden plant will be a modified pyritic smelter, making a specialty of low-grade siliceous and gold-copper ores. This excludes the lead-silver and lead-zinc material, which may be later provided for in a separate furnace. M. A. Bettman of New York City, N. Y., is president and manager and A. H. Carpenter is superintendent. After the plant gets fully under way the feasibility of extracting sulphuric and other acids from Gilpin and Clear Creek sulphuretted ores, before handling such ores at the smelters, may be taken up. The acid plant would in that case be located on the Colorado & Southern track, between the mouth of Clear Creek canyon and the smelter.

#### Lake County.

(Special Correspondence).—The White Cap M. Co., J. A. Shinn manager, has made arrangements with the Yak Tunnel Co. to operate the lower workings of the White Cap mine through the Yak tunnel. The upper levels of the White Cap are under lease on the block system. The ore bodies from the Moyer and Minnie Lee are said to be trending in the direction of the White Cap, and it is expected to cut a body of sulphide in the Imes dike. The same channel carried carbonates in the upper levels with large values in gold. The lower workings will be worked from a winze from the bottom of the Yak tunnel.

It is stated that a mill will be erected by the Yak Tunnel Co. at the tunnel entrance.

Leadville, July 31.

The boilers have been set up and foundations built for the machinery for the electric plant which will supply the Yak tunnel and workings. Electric haulage and lighting will be used.

#### San Juan County.

A company to operate in Sylvanite basin with claims adjoining the New York-Brooklyn property, near Silverton, has been organized & Grand Junction by

D. Parker, J. J. Lumsin, J. S. Robin and T. Chambers. The company is the Tomkins M. & M. Co. T. Manion, of the New York-Brooklyn group, has supervision of the present summer's work on the new company's property.

Work is progressing at the Ruby T. & M. Co. workings on the Ophir road, at foot of North Lookout mountain, near Silverton. From a lead opened by the crosscut a 20-ton carload shipment of lead carrying gold and silver values is being made weekly, and exclusive of the shipping product, there is said to be a good tonnage of mill dirt. Excavating for a 50-ton concentration plant at the foot of the tunnel is under way, and by October 15 it is expected to be running. The machinery will consist of Cornish rolls, etc. A short side track has been laid from the Red Mountain railroad. Thirty-five men are on the payroll.

The Venetian M. Co., operating at Gladstone, near Silverton, has thirty-four claims. Among improvements contemplated is a 100-ton mill.

#### San Miguel County.

The Bayfield group, in Waterfall gulch, near Ophir, owned by G. Anderson, C. Fredlund and H. Meyers, is making regular weekly shipments of high-grade silver-lead ore to Durango. C. Rittmaster has been given an option on the group. He is preparing to increase development. In addition to values in silver and lead the ore carries gold, and associated with the rich streak is from 2 to 4 feet of concentrating ore. At present the ore is coming from stopes above a tunnel which has been driven on the vein 560 feet. The group comprises nineteen lode claims, a placer and a millsite, and is favorably located for operation through tunnels. A stream crossing the placer and millsite furnishes water for concentrating purposes throughout the year, and on the former there is timber.

#### Summit County.

The Cashier M. & M. Co., operating in Brown's gulch, near Breckenridge, is considering placing additional stamps in the mill. It is said a new ore zone has been exposed in the mine. L. C. Stanton is president.—The larger boiler and air compressor at the Senator group on North Star mountain, near Breckenridge, have been connected up, and the machine drills are in operation in the tunnel.

#### Teller County.

Cripple Creek reports say the Lily shaft on Bull hill is to be used for hoisting the water in that section from the district and for that purpose the Vindicator Con. G. M. Co. has bought the property for \$30,000. The Lily contains 6½ acres of territory. While the ore shoot of the Lily is said to dip into the Vindicator, it is thought further development work may lead to discovery of others. It is the intention of the Vindicator company to use the shaft to drain territory when they resume work of sinking their main working shaft, which will be started by Sept. 1. The Lily shaft is down 1500 feet.

The output of the mines of the Cripple Creek district for month of July is reported showing increase. The United States R. & R. Co. treated 18,000 tons, value \$432,000. The smelters handled 10,000 tons, bringing value up to over \$600,000. The other mills and reduction works will increase this amount. Of the sections which contributed to this tonnage the Gold Sovereign leads, with 1500 tons of average value of \$30. The Last Dollar mine has shipped 1100 tons. This property, since installing the washing machine, is reported saving all values in the rock. Its milling grade returns 1½ ounce gold per ton, with a smelting grade of 4 ounces to the ton. The Doctor-Jack Pot estate during the month sent out 600 tons, with average value of 1½ ounce to the ton. The Rose Maud, since making its recent strike, has sent out 150 tons, but has a total tonnage for the month of 300 tons, with values of three ounces per ton. The Victor mine, on Bull cliffs, a new producer, sent out 150 tons, which returned two ounces per ton.—The management of the Independence, Ltd., has that mine reopened after a month's idleness. This mine will again enter the shipping list. The directors in London have ratified the leases recommended by the local officers. Notices have been sent out to twenty-three of these bidders notifying them that their proposals have been accepted.

### IDAHO.

#### Bannock County.

Pocatello reports say the Inman M. Co., through W. W. Stevens, has closed a deal whereby it bought eight claims on Rabbit creek, 7 miles from the group of the Inman Co., for \$10,000. It has a well developed vein of 40 feet with pay ore uncovered. Stevens states he intends to



start shipping next week from these claims.

#### Boise County.

Work was started last week in the English Co.'s shaft in Gambrinus district, near Idaho City. The shaft was sunk 50 feet before machinery was put on. Superintendent V. Thorne is prepared to continue work to depth of 600 feet.

#### Custer County.

The plant and properties of the Clayton M. & S. Co. at Clayton are reported under option to the Guggenheim Exploration Co. for \$1,500,000. E. W. Nash is president of the Clayton Co. and L. Greene manager. The Clayton mines are equipped with a smelter, which is not, however, in commission. It is said bullion containing lead, silver and gold is stored at the camp, awaiting a less expensive outlet than the wagon road provides. It is thought an outlet by rail will be provided.

The mill on the Lucky Boy at Custer resumed operations last week.

#### Kootenai County.

A large amount of development work is being done in Trussell creek district, says I. J. Brant of Sandpoint. The district is located 1 mile north of Pend d'Oreille lake and 7 miles from Sandpoint. He is developing four claims, largely by open cuts in tracing the courses of the veins, and in doing that work has taken out ready for shipment six carloads of ore which carries \$25 per ton in gold. The ore also carries 4% to 6% lead. Considerable work is being done on a group of claims owned by Johnson & Co. of Spokane, Wash. The vein is 4 feet between walls. Brant says they are looking forward to completion of the Panhandle smelter at Sandpoint, as they will then be able to market ores at nominal transportation charges.

#### Shoshone County.

Mines are being opened by the True Fissure M. Co. on Gold Hill. They are owned by W. J. McConnell of Moscow and they are doing extensive development work. They are also making ready for a mill which they propose erecting this summer. Three nearly vertical falls, from 80 to 125 feet, in a creek directly under their claims, give them a natural mill-site. Added to this, the claims can be worked from a tunnel running directly into the mill. It is 25 miles in an air line to the nearest point on the Coeur d'Alene branch of the Northern Pacific. It is 65 miles from Missoula, Mont. A 25-mile wagon road from Gold Hill to Lo Lo Hot Springs, Mont., will connect Gold Hill with Missoula.

### KANSAS.

#### Cherokee County.

At Baxter Springs the plant of the Ford & Troupe mine is grinding out ore. Another drill hole is being put down on the Angel land near the lead strike. The Sunny Side mine is hauling ore for shipment. J. T. McRuer, of Parkville, Mo., is putting in a boiler and pump for his mine on the Ford & Troupe lease, and will continue sinking until the body of ore shown by the drill is reached.

### MISSOURI.

#### Jasper County.

The Carthage Lead & Zinc Co., which is sinking on the Palmer land at Kendricktown, has put in a steam pump, also a steam hoist. They are down 100 feet and are said to be within 20 feet of ore. Men have been put to work in the Monitor mine, west of Carthage, which has been idle for three weeks on account of wet weather. They have started drifting. A night crew will also be added to continue sinking, it being intended to carry the shaft down to the lower run of mineral while still developing the upper drifts.

The Independence mine and lease, consisting of 160 acres, near McKinley switch, north of Joplin, has been sold for \$40,000 to T. Rhodes of Chicago, Ill., and T. J. Schmitt. They will prospect the land extensively. There is one mine on the lease—the Independence—producing ore.

The Independence M. Co. of Joplin has been incorporated. C. B. Wolcott, W. P. Betts, H. A. Wolcott, H. L. Baird, W. E. Evans, M. K. Salsbury, J. A. Wilson, R. A. & J. Balph, C. B. Judd, G. M. Jones and J. M. Young have incorporated the Pittsburg-Missouri Zinc & Lead Co. in Carthage.

The Pearson-Sayers M. Co., on the Picher land, is sinking on a drill hole prospect, having six holes down, showing 70 feet of ore. The shaft is down 120 feet and lead was struck at 110 feet. Zinc ore of payable quality is being obtained with the lead.

There seems to be a scarcity of shovel hands in the mines around Cartersville. Two mines—the Brass Ring and the Majestic—have shut down on account of lack of hands. T. Coyne's mill has started

operations. It is equipped with machinery run entirely by electricity. The Opal Wonder mine has been leased to H. Tibbons et al. Repairs are being made and work will begin next week.

The Stepp & Kaiser plant is operating on the first lease on 175 acres of the J. C. Guin land, near Cartersville. They have built a mill and office. There are five new mills on this ground and all are working in ore. Stepp & Kaiser average 7½ tons of jack per day, and report lead enough carried in addition to pay the labor.

Notwithstanding the mines have generally all been restarted and the output increased, the sales last week were only 340 tons of zinc ore more than the previous week, says the Joplin News-Herald. The highest price reported paid was \$40 per ton and the assay basis was \$35 to \$37 per ton of 60% zinc. The companies paying the highest assay price are the heaviest buyers. So long as the shipment continues as large as last week, and the mines that are now closed down from water, directly or indirectly, remain out of the outputting class, the reserve stock will increase slowly. Nearly all producing plants are in operation and the output will be increased. Lead remains firm at \$54 per ton, \$1 higher than last year. Mine operators expect the market prices will remain around the \$40 mark. The shipments of spelter for export are said to be increasing. Besides the 1000 tons said to have been recently sold to Japan, 600 tons have been sold to an English firm to relieve a shortage there.

#### Lawrence County.

Aurora reports say the I. X. L. Co. is arranging to sink another shaft on its lease, work to begin this week. The shaft will be put down to open a body of lead that has been drilled into in the bottom of one of the drifts and considered too far from the shaft to make it profitable to develop without sinking a new shaft. The shaft will be put down to a depth of 200 feet.

At Aurora work is progressing in shafts on the United Zinc Co.'s ground, and several feet have been added to the depth of the new shaft, and this fall two new mines will be in operation in that quarter of the camp. The Myrtle J. and No. 4½ mines on the Boston-Aurora land, which have been shut down, may be started up this week. The development at the No. 1 mine on the Boston-Aurora ground is reported showing up satisfactorily. Hudson, Griffith & Co. report making a weekly output of 25 tons of silicate at their mine on the Black land.

### MONTANA.

#### Broadwater County.

E. J. Morison of Townsend says the outlook is favorable for beginning work on the placer deposits on Indian creek by Sept. 1. The deposit is in the bed of Indian creek, 2½ miles from Townsend. He says it runs on an average of \$1 a cubic yard from the grass roots to bedrock, with an average depth of 12 feet. It is intended to put on three shifts of seven men each. Electric power will be used to run the machinery. The power will be furnished by the Missouri River Power Co.

#### Fergus County.

The Kendall G. M. Co. reports making \$25,000 profit per month on \$6.50 ore. The property, controlled by Finch & Campbell, is at Kendall under management of H. H. Lang. The mine is developed by open cuts and by a 500-foot incline shaft, with levels at regular intervals. The vein strikes northeast-southwest along a lime footwall. A dike of porphyry cuts the vein at right angles and the richest ore is on contact of the lime, shale and sandstone with the porphyry. At the 200-foot level the vein has an average width of 125 feet, with a dip of 65°, says the Spokesman-Review. The ore is a quartz porphyry with principal values in gold, there being a trace of silver. It is suited to cyaniding, 300 tons per twenty-four hours being treated by that method. The ore is crushed to ¼-inch size before placing it in the leaching vats, each of the latter being 22 feet square and 8.5 feet deep, built of steel, twelve in number, holding 170 tons each of dry ore. Seven days are required for leaching; three pounds of cyanide per ton of water is used as strong solution, this being followed with a weak solution in which one pound of cyanide per ton of water is used, and finally by a wash of fresh water. In precipitation by zinc shavings the consumption of zinc amounts to 0.33 pound per ton of ore treated. The ore, as fed to the mill, averages \$6.50 per ton, the extraction being 90%. Superintendent Lang states the cost, including mining, milling and development, averages below \$2 per ton of ore treated. Everything is run by electric power and seventy-five men are employed. The Barnes-King M. Co. mine is on the same ore zone as the Kendall. The Barnes-

King, however, is wholly within the lime, the vein being 30 feet wide, with a dip of 35°. It is opened by surface cuts and a 270-foot shaft. The collar of the shaft is 200 feet below the apex of the vein. From the 100-foot station an 800-foot drift has been driven; a 600-foot level has been run from the 200-foot station. A 200-foot winze has been sunk in ore from the 200-foot level. The ore comprises altered lime with some sandstone. The values are in gold, with a slight trace of silver, said to average \$9 per ton. The gold is extracted by cyanide. Thus far, the ore is well oxidized. It is found necessary to mix the sandstone and lime ores in the vats to overcome the free slacking of the latter. Superintendent H. I. Shaw says they use 0.3 pound of cyanide per ton of ore, and that the consumption of zinc in precipitating amounts to 0.25 pound per ton of ore treated. E. W. King is manager. The mill is handling 160 tons of ore daily. The Golden Discovery group and others are being developed on the same belt.

#### Missoula County.

The Denver & Rock Island Dev. Co., composed of Pennsylvania mining men, has been incorporated to develop the Rock Island group of claims, formerly held by the Duquesne M. Co. The claims were sold at sheriff's sale in Missoula and bid in by A. Lutz of Pittsburgh, Pa. The mines are north of De Borgia and are said to be in the same silver-lead belt as the Shoshone Co., Idaho, Coeur d'Alene mines, but on the opposite side of the summit of the Bitter Root range. The property is a concentrating proposition and there is also ore that could be shipped. The ore contains silver and lead values.

#### Silver Bow County.

The known area of the copper deposits of Butte district is being widened by explorations from the working mines, says C. J. Fitzgerald. The Speculator Co., owned by the Largey estate, has struck a new body of high-grade copper ore in a crosscut run 1000 feet from the 1200-foot level of the Speculator mine, the ore being in the Jessie ground, one of the original claims of the Speculator group. This strike occurred in territory outside of what were heretofore considered the boundary lines of the copper deposits on Anaconda hill. A good body of copper ore has also been opened by development work carried on by H. L. Frank in the Gem mine, which is also near the boundary of the copper zone. The fact that copper ore is constantly being uncovered by exploration in the old silver producing mines warrants the expectation, says Fitzgerald, that the copper deposits extend under the silver belt of Walkerville. The Anaconda mine, now a copper producer, was originally located and worked as a gold and silver mine.

### NEVADA.

#### Lincoln County.

H. J. Norris of Boston, Mass., interested in the Seven Devils gold-copper claims, 15 miles north of Muddy Springs, near Moapa, says a company will be organized to open up the properties, build a smelter and do development work.

By fall twenty stamps will be dropping in the Quartette mill at Searchlight. Preparations are being made for ten additional stamps. A number of men were laid off last week, as the many improvements, together with a great deal of development work, are completed. It is claimed that but five men are required to keep the 10-stamp mill supplied with ore. The electric pump is at work in the shaft, the Cornish pump will not be used until sinking is resumed, says Superintendent Harrington.

#### Lyon County.

It is reported the Southern Pacific Railroad has decided to build a cutoff 27 miles in length from a point 8 miles north of Wabuska to Hazen, 7 miles east of Reno, thus saving the long haul up the grade to Mound House, and considerably shortening the route to Salt Lake City, Utah, which would benefit the shippers of ores from Tonopah district. The only point now to be decided is whether the road from Hazen to Wabuska shall be narrow gauge or standard. In the former case the Western Ore Purchasing Co. will build a sampling plant at Hazen, but if the standard gauge is continued to the Wabuska end the sampler would be installed there. This latter plan would be preferable, as it would enable the smelters to handle the tonnage of low-grade copper ore blocked out at Yerington, which, however, cannot stand the cost of reshipment.

The Central G. M. Co. has been incorporated by Connecticut men to operate near Silver City. The company has bought the Lillian & Hope property, adjoining the Golden Eagle and Brodek, and is developing it through the Zadig-Keating drain tunnel, which will cut the old

workings of the Lillian & Hope 300 feet below the surface, where there is said to be a vein of pay ore. A crosscut is being run from the tunnel. A blower operated by a gasoline engine has been set up in the main tunnel, which furnishes ample supply of good air for development work. C. H. Glines is superintendent.

#### Storey County.

An examination of the Union shaft at Virginia City, made through the drain tunnel, shows that the shaft at that point is not damaged. The pump shaft is now clear of debris, but the main shaft is not yet entirely cleared. The work of retimbering the shaft has been started.

#### White Pine County.

Work has been resumed at the Pilot Knob copper properties at Ely.

### NEW MEXICO.

#### Grant County.

The output of the Chatham smelter at Silver City will be increased, as recent development work on the company's mines in the Burros mountains are said to be showing additional ore bodies. Since the smelter has proved successful, many of the smaller miners have decided to resume work on their claims. The main portion of ore handled by the smelter at present is the output of the company's mines, especially the Virginia. The ore from the latter is high-grade copper, carrying gold and silver. A body of ore has been uncovered at a depth of 150 feet. The smelter employs 150 men.

#### Lincoln County.

The Montezuma M. Co., J. M. Blocker of Bridgeport, Tex., superintendent and director, is preparing for active operations on the company's property near Nogal.

#### Luna County.

R. C. Ely of Deming, with New York and Pennsylvania men, has organized the Luna Lead Co., with the following officers: S. R. Bush of Easton, Pa., president, and J. T. Duryea of New York secretary and manager. The company owns properties in Luna and other counties and will build a smelter at Deming for treatment of its ores.

#### San Miguel County.

The Blake M., M. & I. Co. at Las Vegas is preparing to equip a 50-ton reduction plant with leaching and settling tanks. Steam power will be used.

#### Socorro County.

The Carthage coal fields at Carthage are reported sold to P. Stackhouse of El Paso, Tex., of the Colorado F. & I. Co. Their development heretofore has been hindered by lack of transportation facilities. It is understood the new owners intend to build a railroad to the fields either from the Santa Fe or as an extension of the Santa Fe Central.

### OREGON.

#### Baker County.

The 10-stamp mill, started in operation on December 15th last, has not missed a day's operation since, and last week they started the sawmill cutting timbers for the buildings in which will be put the deep-sinking plant and air compressor, says F. D. Smith, manager of the Snow Creek mine, near Greenhorn. The machinery will comprise a hoist of 1000 feet sinking capacity and a 4-drill air compressor. The shaft will be sunk at a point 550 feet from the portal of the present working tunnel, a raise of 120 feet having been completed to the surface. The shaft will be extended 200 feet, and then crosscutting to the vein will be started; in the meantime the mill will continue to treat the ore from the present drifts. The concentrates and shipping ore will be sent to Sumpter. The placer mines, for which the company has obtained a patent, are being put in shape for operations the coming season.

T. Lee of Cincinnati, Ohio, of the Alpine Con. G. M. Co., owning the Alpine mine at Cable Cove, near Sumpter, says he has ordered a resumption of operations in the mine and the finishing of construction of a 20-stamp mill, the machinery for which is on the ground.

Arrangements are being made for resumption of operations on the company's mines near Sumpter, says S. M. Moulton, treasurer of the Turnagain Arm Co. The mines include the California in Cable Cove, the Cracker-Oregon and Cracker-jack properties. Work will resume at the California, says Moulton. Tests have been made of California ore during the past winter, and they are prepared to continue milling operations. Roads are opened to traffic to the Cove. The county has been doing improvement work and the mining companies also, and between the two they are eliminating the traces of last winter's snow and this spring's floods.



As the California got caught short of chemicals and other supplies for the leaching plant last winter, work was suspended until the same could be provided. Work will be increased at the Cracker-Oregon, the management contemplating development on three levels of the mine.

E. F. Zinns of Houghton, Mich., has a bond on the Climax group near Bourne. Zinns has till October 1 in which to start development work and make first payment. The Climax group is owned by G. W. Grayson of San Francisco, Cal. There are four full claims in the group, which adjoin the Columbia mine, and is near the Golconda and North Pole and Taber Fraction. In the Columbia No. 2, the Climax group picks up the broken ledge which was dropped in the Columbia on the 300-foot level. The Climax has been developed by several thousand feet of tunneling, crosscuts and raises. Ore is blocked out. The ore assays \$6 in gold and is mostly free milling. The Climax carries water and timber rights. Zinns expects to put on men to extend the lower and upper tunnels, and it is thought they will also sink.

W. L. Vinson and W. J. Patterson of Baker City have a bond on the Watson placer mines and water power on John Day river. This embraces 600 acres. Arrangements have been made to equip the mine with hydraulic machinery, for which there is said to be an abundance of water available.

#### Yamhill County.

The Red Jacket M. Co. of North Yamhill reports a portion of the underground workings of the mine have been lost through a cave-in. The property is on Trout creek. The cave occurred below the 200-foot level, and more than 100 feet of the main shaft is said to have gone in. The shaft penetrated soft ground at that point, and the timbering was not sufficient to withstand the great weight to which it was subjected. The extent of the damage is not known. Work has been begun to remove the debris from the tunnel. The company had just put in a steam plant, with pumps and new machinery, and was planning to clear the mine of the small amount of water remaining in the workings. It is considered possible that a new shaft will have to be sunk. It is thought ore shipping will be delayed several months. A large vein of ore had been cut on the 350-foot level. A heavy flow of water struck at the time the vein was tapped is considered responsible for the damage.

### SOUTH DAKOTA.

#### Lawrence County.

The first shipment of ore from the Black Hills to the South Dakota gold reduction plant at the World's Fair at St. Louis was sent out last week by the Golden Reward from its mine in the Bald Mountain country, west of Lead. The initial run of the stamp mill at the Fair grounds will be made on this ore. Shipments from other mines in the Black Hills will follow, and the mill will be kept in continuous operation until the close of the Exposition.

The Commonwealth M. Co. has been incorporated by W. F. Dutton, P. N. Stankovitch, V. W. McKay, S. E. Crans, J. J. Morrow, L. B. Bailor, E. J. Barklow and J. Smith, with principal place of business at Lead. The company owns thirty-five acres of mining ground adjoining the Globe M. Co., west of Lead. It is intended to sink a shaft and crosscut the formation in both directions. W. F. Dutton, of Lead, is president, and P. N. Stankovitch is manager.

W. L. McLaughlin, manager of the Horseshoe M. Co., says the Horseshoe mine and mill, near Deadwood, are again in full operation. Production for June and July fell below average, due to heavy rains and consequent flooding of the Ben Hur workings. The Ben Hur has been unwatered, the mill is dropping seventy stamps and regular shipments are being made to the smelter. The Snowstorm shaft has been unwatered and ore is being taken out from the Ben Hur mine through this shaft. An arrangement has been made between the company and the Snowstorm owners whereby the former gets the use of the shaft. Ore will be raised by a skip, from the shaft to the Burlington railroad tracks above.

J. Bylow, of the Hidden Spanish M. Co., says the company owns 200 acres of mineral land 5 miles south of Lead, adjoining the ground of the Wauconda company. It is developed by a shaft 140 feet deep, equipped with a steel whim. Developments show payable ore. Preparations are being made for resuming operations and to increase development.

The framework for the mill of the Gilt Edge-Maid M. Co. in Bear Butte district, near Galena, is up, and lumber and other building materials have been delivered for completing the structure. It is ex-

pected to be ready for service by Sept. 1st. Right of way has been secured by the Belt Electric L. & P. Co. from Pluma to the site of the mill, and the poles are being set. The plant will have an initial capacity of 130 tons of ore a day, and provision has been made for doubling its capacity without addition to the building. One Chili mill will be put in. G. A. Duncan is manager.

Mining operations are reported increasing around Custer Peak, near Roubaix. The Custer Peak M. Co., owning 400 acres southeast of the peak, has completed installation of a plant, including a 75 H. P. boiler, single-drum hoist, 8 drill air compressor and pumps. An assaying laboratory will be built. The main shaft is down 75 feet and will be continued several hundred feet. J. H. O'Brien is superintendent. The Amazon, which has been closed due to litigation, is again in operation, by F. A. and C. Sherman of Pactola. It is equipped with a stamp mill. Adjoining the Amazon, the Sherman Bros. have opened and are developing a body of free milling gold ore.—It is said C. Donaldson et al. of Minneapolis, Minn., have a group of copper prospects in the same district and are developing with a shaft.—It is reported a deal is pending for sale of the St. John group, north of Box Elder creek, 2½ miles southwest of Roubaix. It is equipped with a hoist and 2-stamp mill.

#### Pennington County.

The North Fork M. Co. has resumed operations near Keystone, and President H. B. Leonard is in charge.—New discoveries of quartz and placer gold are reported from Spring Creek, near Rockerville. The owners are S. Rush and D. Phinney.

G. M. Thresher of Berton Harbor, Mich., of the Black Hills C. M. Co., says at the company's property on Copper Reef mountain, 5 miles from Rochford, work will be resumed next week. The property is developed by an incline shaft, which has attained a depth of 800 feet, and much lateral work has been done. Drifting was done in an easterly direction from the shaft the past spring, but owing to water struck work was suspended until pumps could be put in. It is expected the east drift from the incline will cut the main ledge. The company owns 510 acres of land taking in Copper Reef mountain. The property is equipped with a plant of machinery. J. B. Taylor is superintendent.

### UTAH.

In the ore and bullion market the settlements for month of July aggregated \$1,644,103, which, during same period last year, amounted to \$1,829,250, says the Salt Lake Tribune—this, too, with increasing production by the mines. Manager Whitley of the American S. & R. Co., explaining the shrinkage in the settlements notwithstanding the increased production of ores, says a short output of ores in Colorado during hostilities in that State had made it necessary for his company to forward a larger volume of ore to its smelters there. The Utah settlements are accordingly deprived of this credit, and hence the apparent shrinkage in the output of Utah. July, at the copper smelters, closed on an output of copper bullion, containing gold and silver, amounting to 3,207,896 pounds and of a value of \$750,000, the output from all sources, including that produced at the furnaces of the American S. & R. Co., showing a total of 4,223,896 pounds. Nor were copper producers permitted during the month to show their strength. On the contrary, not one at Bingham but is capable of doubling its present output. However, the gains over the same month in 1903 have been pronounced. August promises an increased production at each of the plants.

#### Beaver County.

By Sept. 1st it is expected Contractor J. Dederich and his men will finish the concrete work at Newhouse, near Frisco, where the concentrating mill for the Cactus mine will be erected. By that time the railroad from Frisco will be completed and much of the material for the various buildings will be on the ground. Altogether Dederich is working 100 men in putting in the concrete foundations and in grading the Newhouse Co.'s railroad, over which the ores of the mine will pass from the tunnel entrance to the mill. The line will be 2 miles long. In the meantime machine drills are busy in the tunnel which is to connect with the 600-foot level of the mine. The distance has been reduced to 1300 feet, and with men working from both sides good progress is being made. S. Newhouse of Salt Lake City says he expects to have the adit finished in November.

#### Box Elder County.

The output of the Century mine for the

first half of July was \$8000, notwithstanding the mill has not been kept running up to normal on account of the necessity of making repairs, says Assistant Manager V. R. Madsen. He shipped a gold bar of \$3000 value, a carload of concentrates from which \$2000 were realized, and 1000 pounds of high-grade concentrates valued at about \$3 a pound.

#### Carbon County.

Two-thirds of the miners working at the Pariette gilsonite mines have been laid off indefinitely, the management giving as the reason that there is at this time no market for the product, says the Price Advocate. The mine has been producing for the past thirty days twenty-five tons a day and this ore is stacked up at the mine ready for shipment. The shaft at the Pariette is down 525 feet, where the ore in the drifts is 4 feet wide, but the average of the vein is 20 inches. The second class stuff is on top of the vein and the first grade at the bottom. Lately a small flow of gas was opened and this makes bad air in the property. The gas vein has been plugged. D. Raustrom, superintendent, says the ore now stacked at the mine will be taken to Price and shipped to Chicago, Ill.

#### Juab County.

A Tintic report says C. H. Blanchard is preparing to open up the King William ground, adjoining the Grand Central, near Eureka.

Eureka reports say shipments from Tintic district for the week ending July 30 amounted to 107 carloads, the producers being: Bullion-Beck 5, Gemini 12, Centennial-Eureka 42, Joe Bowers 1, Granite 1, Eureka Hill 2, Eagle & Blue Bell 1, Uncle Sam Cons. 3, Yankee Cons. 5, Mammoth 20, Grand Central 11, Lower Mammoth 1, Ajax 2, Victor Cons. 1. The Uncle Sam mill shipped three cars of concentrates and the Eureka Hill mill four carloads.—For the month ending June 30 the shipments from Tintic district were as follows: Ajax 9, Mammoth 72, Grand Central 71, Victor Cons. 4, Lower Mammoth 4, Carisa 9, Bullion-Beck 22, Gemini 66, Laclede 1, Centennial-Eureka 220, Eagle & Blue Bell 8, Yankee Cons. 27, Tetro 3, Uncle Sam Cons. 10, Sunbeam 4, South Swansea 1, Joe Bowers 1, Granite 1, Eureka Hill 2; total, 535 cars. Concentrates—Uncle Sam mill 24, Eureka Hill mill 4, May Day mill 1; total, 29 cars.

The movement of copper, gold and silver-bearing bullion and high-grade concentrates from the mill with first-class ore from the mines has been resumed by the management of the Eureka Hill Co.'s plant at Eureka, Tintic district. The bullion goes to an Eastern refinery, the concentrates and ores to the furnaces of the United States M. Co. Since the company's mill went into commission bullion and concentrates have each been piling up until, says Manager Fox, there are 600 tons of the former, with a considerable volume of concentrates. But a portion of the battery of stamps with which the mill is equipped is dropping at present. For several years the Eureka Hill mill was hung up while ore shipments were desultory. During that period, however, a large volume of milling ore was blocked out.

Preparations to continue development of the Lucy L. Co. properties at Clifton, west of Fish Springs, in the Deep creek country, are being made, says F. L. Wilson, manager. Copper ore with gold values has been opened up.

#### Millard County.

The management of the Copperhead M. Co., whose properties near Oasis are being developed, shipped a trial lot of ore last week, which was sold on controls showing \$17 gold, 12.5 ounces silver and 4.3% copper. The ore bodies are being opened up under direction of Superintendent J. Clive.

#### Piute County.

The Signal Peak M. Co., operating in Gold Mountain district near Marysville, has a group of twelve claims at head of left fork of Fish creek, 2 miles south of the Annie Laurie mine. D. D. Hanks of Eureka is president and J. H. Nelson director and manager. The surface showing at the Signal Peak is that of three veins, trending north, 125 feet and 300 feet apart on top. The apparent dip of the three is expected to bring them together. The east ledge is 12 feet wide, the middle 6 feet and the west 10 feet. The main working tunnel, driving east to tap the ore bodies, has reached the length of 325 feet. According to surveys a total length of 770 feet will carry it to the ledge. At that point the stopping depth attained will be 500 feet, says Manager J. H. Nelson. It is estimated that an average of \$9 per foot, or about \$7000, will complete the tunnel to its destination. A thousand feet of air pipe, a fan and water wheel are on the ground for use in the tunnel. Timber and water are abundant.

—An air plant has been put in at the Annie Laurie Extension mine and the tunnel is progressing toward the ledge. Manager S. Black has men drilling to the lead of the Richfield M. & M. Co. group on Deer creek, near the Butler-Beck.

#### Salt Lake County.

The Deems group in Bingham has been organized as the Deems M. Co. The officers are: C. D. Rooklidge, president; J. P. Spaulding, A. Hanauer, Jr., J. E. Kauffman and J. P. Megeath.

W. A. Sherman has an option on the Julia S group of mining claims at Bingham for \$60,000. The property has been productive of high-grade ore and Sherman will increase work.

The Heaton jiggling plant in Bingham canyon, near Bingham, has, with its water right, been sold to E. A. Wall, and will be used in the reduction of Kempton ores.

#### Summit County.

An attempt was made last week to destroy the hoisting works of the St. Louis-Ontario M. Co. at Park City by dynamite. The work was done while Superintendent Lapelt and his men were at dinner. Investigation proved that giant powder had been placed under the buildings and that it had been touched off by a long fuse. The force of the explosion threw the corrugated iron sides of the building out, tore off part of the roof and destroyed the hoisting bucket and a heavy mine car which stood near the collar of the shaft.

The work of putting up the hoisting plant to replace the one destroyed at Ontario shaft No. 3, near Park City, is progressing satisfactorily. The gallowa-frame is in place and the machinery is being set up.

#### Tooele County.

The Katharine, a former producer of Stockton, will resume operations this month.

G. St. Clair, manager of the Chloride Point mine on Lion hill above Ophir, says he is shipping ore averaging 300 ounces silver with \$2 gold per ton, with silver sulphides. At a vertical depth of 400 feet from the surface the main ore body is being opened up. It is from 2 to 6 feet between well-defined walls, dipping at an angle of 35°. The second-class ore is being piled up. To reduce this, says St. Clair, he will use pan amalgamation, which will replace the cyanide process with which the present plant was equipped several years ago. Alterations at the present mill will be made and the substitute process installed as soon as the volume of milling ore justify it.—At the Northern Light, same locality, G. Weston has uncovered another shoot of ore at the grass roots, and is extracting rock while developing it along the strike. At the Clark mines and mill in Ophir canyon operations are again in full blast, with fifty tons of concentrates produced daily, while at the Ophir Queen streaks of high-grade ore are occurring in the second class, for the treatment of which later a mill is under consideration.

The management is preparing to reduce the large tonnage of arsenical ore that has been blocked out in the properties of the Sacramento G. M. Co. at Mercur. The ore body underlies the oxidized zone, on which latter the company has been drawing for several years, and, while it is refractory and will require roasting, it is expected it will be made to afford a margin. Of the supply of mercuric ores Treasurer McConaughy says the output of quicksilver has been active, the ores have maintained a good average and the stoep from which they have come is comparatively a small one.

### WASHINGTON.

#### Okanogan County.

T. James of Spokane, interested in Slate Creek mining district, in the Cascade mountains, near Twisp, says the Mammoth is running a 10-stamp mill and the North American Co. of Minneapolis, Minn., has a 10-stamp mill on the road. The Mill Creek mine intends to get a mill. The Eureka M. Co. has to remodel its 10-stamp mill and to resume underground work. The Mammoth and the North American are each working thirty-five men.

J. C. Hass of Spokane and W. F. Smith of Greenwood, B. C., have a bond on the Copper Queen, the No. 9, Golden Curry, Neutral and Aztec claims on Copper mountain. They are ½ mile east of Bolster. Work will start this week. The showings on these claims are deposits of iron-copper ore.

Nespelem reports say the Multnomah M. & M. Co. is driving its tunnel ahead and is in 590 feet, the breast of the tunnel showing mineral. They have cut two ledges that assay in gold, silver and copper. The company owns twelve quartz claims and several placer claims on the Columbia river which are patented. It



also owns the water right of the Nespelem river, which will give them power.—Four claims of the Croll group have been bonded to Lind & Oleson, and they are sinking on the Pittsburg and are down 60 feet in silver ore. They are working four men. The Doubleheader and Little Chief will start up this week.—The Pacific Coast M. & M. Co. has stopped work temporarily while putting in machinery. They are down on the Seattle claim 150 feet and have crosscut 90 feet. The ledge is 85 feet wide on that level. The company has worked sixteen men all winter.—Cook & Yates of Republic will start up work on the Last Chance mine, a high-grade silver proposition.

#### Stevens County.

Northport reports say the Last Chance M. Co. tramways are completed and horses and mules are being used to haul ore from the foot of the first tramway, at the bottom of the hill below the mine, to the top of the one on the hill above the smelter, a distance of about 6 miles. The ore will then be shipped by rail to some lead smelter. It is said that a body of silver-lead ore is blocked out and that at least one carload of ore a day will be shipped. It is also said a small smelter may be built either on the flat below the mine or in Northport.

## FOREIGN.

### AFRICA.

#### Rhodesia.

The Ayrshire G. Co., near Bulawayo, reports for month of June 6950 tons of ore crushed, 2150 ounces of gold recovered; value, £8550. Mill worked twenty-two days, sixty stamps running. Average value of tailings assay, 3 dwts. The full battery of sixty stamps ran from the 13th; thirty stamps ran the full month, equivalent to twenty-two days' run for sixty stamps.—The Globe & Phoenix G. M. Co. for June reports forty stamps ran twenty-seven days, crushing 5640 tons of ore; duty per stamp per day, 5.03 tons; yield, 2538 ounces bullion. Tailings: average assay value per ton, 2.36 dwts. (fine gold). Cyanide: tons treated, 3550; yield, 491 ounces bullion. Total 3029 ounces.

The Rezende Co. during month of June had twenty stamps running twenty-eight days, crushing 2850 dry tons; recovered from mill, 940 fine ounces; recovered from tailings by cyanide, 216 ounces; total, 1156 ounces fine gold. In addition, 14 tons concentrates were produced, containing 84 ounces fine gold.

### AUSTRALIA.

#### New South Wales.

The annual report of the Department of Mines of New South Wales has been issued, showing aggregate value of metals and minerals produced in the State to the end of the year 1903 to be £158,339,798. Production for the year 1903 was £6,059,486, being a net increase of £421,341 over that of 1902. All the principal minerals show satisfactory increases in value. The most important increase was in the production of copper, and amounted to £122,263. Decreases were in the output of gem opal and oil shale.—Under the heading of gold the product to the end of 1903 is placed at 14,071,700 ounces, valued at £51,822,617. The production of gold from ores, etc., mined in the State during 1903 was 254,260 fine ounces. The principal producing field during the year was the Cobar, which turned out 79,860 ounces of gold. A statement of the yield obtained by dredgers during the past four years shows an increase from 8882 ounces in 1900 to 27,238 ounces in 1903, the increase over the previous year being 1764 ounces. The chief center of gold dredging operations is in the Araluen division. There were fourteen plants at work there at the close of the year, and they contributed 53% of the value of the yield obtained by that branch of the industry. Satisfactory yields were also furnished by the dredgers operating in the Stuart, Tom, Tingha, Adelong and Sofala divisions.—The quantity of coal produced in 1903 was 6,354,846 tons, valued at £2,319,660, as compared with 5,942,011 tons, valued at £2,206,598, for the previous year. The Northern district was the largest producer, giving 4,410,565 tons, while the Southern district contributed 1,476,005 tons and the Western district 468,276 tons. The total production of "keresene" shale for 1903 was 34,776 tons, valued at £28,617.—The estimated net value of silver, silver-lead, concentrates, ores, etc., for 1903 was £1,501,403, and with lead and zinc added the total value was £1,626,576.—From ores raised in the State during the year the value of the copper produced was £431,186, as compared with £308,923 for the previous year. The increase in value of production was in the main contributed by the mines at Cobar and Burraga. The quantity of tin ore obtained

by the dredgers during the year amounted to 244 tons, valued at £20,100. At the close of the year there were six plants, equipped primarily for saving tin, at work, while three dredgers were saving tin as well as gold. Several additional plants were on the point of starting operations, and others were in the course of construction. The output of tin ore during 1904 is, therefore, expected to be largely augmented from this source. The number of plants in commission at the end of 1903 was forty-one, valued at £253,480. Four plants were idle during the whole year, and three others were dismantled owing to operations being proved unremunerative.—The estimated quantity of diamonds won during the year was 12,239 carats, valued at £9987, an increase of 244 carats, but a decrease of £1339 in value, as compared with the output of 1902. The bulk of the yield is still drawn from the deposits in the Tingha division, but the output from the principal mines on the Boggy Camp field evidenced a falling off.—The estimated value of the production of gem opal in the White Cliffs division was £100,000, as compared with £140,000 for the previous year. The known opal-bearing area had been worked and reworked, and the decrease in the production was due to the partial depletion of the deposits already opened.

For month of June, the gold output of New South Wales is reported at 28,508 ounces valued at £95,205, as against 34,622 ounces, value £129,859, in June, 1903. Yield for first six months of 1904 was 169,047 ounces, against 119,718 ounces for same period of 1903.

#### South Australia.

The Northern Territories M. & S. Co. reports, via Adelaide, for month of June as follows: At the smelting works, the water jacket smelter worked twenty-eight and one-half days, averaging sixty-two tons daily, and 1770 tons were treated, the average assay value before treatment being: Copper 4%, gold 4 dwts. 9 grs., silver 11 ounces per ton, production being 236 tons of matte, containing, copper 70 tons, gold 387 ounces, silver 19,500 ounces, valued at £7576. The tonnage treated consists of 1180 tons of ore and 590 tons of slag, the value of the ore being £6 5s per ton.—At the Mount Ellison mine, the main shaft was sunk 20 feet; timber fixed to 100 feet; now putting in 12-inch pump. Raised during month 300 tons carbonate ore, estimated value 7% copper.—At the Iron Blow mine the main shaft was sunk 23 feet, total 133 feet, on 100-foot level; south drive extended 22 feet, total 91 feet, assay value copper, gold, and silver, £6 5s per ton. Raised 1500 tons of ore.—Tramways: Mount Ellison section: Earthworks completed for 8 miles 6 furlongs; the rails are laid for 8 miles 6 furlongs; ballasting completed for 7 miles 6 furlongs. The large proportion of slags used at present is said to be necessary on account of there being a considerable percentage of finely divided carbonate ores. A briquetting machine will be put in and is expected to be working at the mines by Oct. 1st. The finely divided ore will be made into briquettes, and slags will not then be required for smelting. When the fine ore is supplied to the water-jacket smelter as briquettes, the tonnage of ore smelted will be increased by nearly 50%.

#### Queensland.

Brisbane reports show the Queensland gold output for month of June as follows:

	Tons Crushed.	Yield in Ounces.
Charters Towers.	21,300	21,300
Croydon.	6,000	3,600
Geelong.	17,500	9,800
Mount Morgan.	21,300	10,000
Ravenswood.	2,600	2,900
Other Fields.	4,500	2,400
Alluvial.		1,200
Total yield.		50,700

The total yield for the first six months of the year was 310,200 ounces.

The New Chillagoe R. & M. Co. at Chillagoe reports for period ending June 30 the smelting plant treated: For Chillagoe Co., 1228 tons copper ore; Mungana Co., 713 tons copper ore and 655 tons lead ore; purchased ore, 93 tons copper ore and 403 tons lead ore; Mount Garnet, 671 tons copper ore and 154 tons lead ore; total, 2705 tons copper ore and 1212 tons lead ore; producing 115 tons copper matte and 261 tons lead bullion, containing 86 tons copper, 261 tons lead and 47,452 ounces silver in the following proportions: Chillagoe Co., 43 tons copper and 3878 ounces silver; Mungana Co., 2 tons copper, 154 tons lead and 26,806 ounces silver; purchased ore, 7 tons copper, 91 tons lead and 6386 ounces silver; Mount Garnet, 19 tons copper, 16 tons lead and 7274 ounces silver; total, 71 tons copper, 261 tons lead and 44,344 ounces silver. Balance of product apportioned to matte retreated; copper and lead furnaces ran twenty-two and twenty-five days respectively. June railway receipts were £4105, with working expenses.

## BRITISH COLUMBIA.

The statistics of the approximate mineral production of British Columbia for the first six months of the present year, compiled by the Minister of Mines, includes the figures given below. The production of the last six months of this year will exceed the first six months, on account of the amalgamation of large concerns in the Boundary district and the installation of several concentrating plants in Rossland. The total production from January 1 to June 30, 1904, was: Gold, 123,339 ounces; silver, 2,037,061 ounces; copper, 17,513,886 pounds; lead, 16,500,000 pounds. The total production during the whole year of 1903 was: Gold, 232,831 ounces; silver, 2,996,201 ounces; copper, 34,359,921 pounds; lead, 18,089,283 pounds.

#### Boundary District.

J. P. Graves, manager of the Granby C. M. & S. P. Co., says the company has decided to spend about \$75,000 in equipping the No. 2 and the No. 3 tunnels at the Granby mines at Phoenix, which are reached by the Great Northern tracks. He will put an ore crusher, with capacity of 1000 tons every ten hours, at each tunnel, which will treble present crusher capacity at the mines. The ability of the mine to produce ore is now greater than the capacity of the smelter to reduce it. While it has been settled to increase the size of the smelter by doubling the number of furnaces, Manager Graves says it is hardly likely that they will make that improvement this year.

The Granby M. S. & P. Co. mines at Phoenix have shipped over 300,000 tons of ore so far this year, an average of about 8500 tons per week. Total for Boundary district for the year to July 15 was \$31,673 tons. The Granby smelter treated a total of 322,621 tons.

#### East Kootenay District.

After a shutdown of eleven weeks the coke ovens at Morrissey have recommenced burning. Sixty ovens are in operation. Six weeks ago the mines started after a close down which lasted five weeks, but the coal has been shipped out for steaming purposes. It is expected that by Sept. 1st the entire 240 will be fired, and the output of 500 tons a day will be reached. The coke weight is between 60% and 70% of the weight of coal put in the ovens, hence the mins will have to turn out 700 tons of coal to supply the ovens, which is double the quantity they now ship out. About eighty men will be required to handle the ovens.

The Gold River M. & P. Co. intends to put in hydraulic pipe, sluices and monitors and a sawmill with 20,000 feet capacity a day on its mine on Bull river, near Fort Steele.

#### Nelson District.

Near Ymir, the \$60,000 option on the Bayonne group of mineral claims will be taken up by H. B. Winchell, G. T. Magee, A. Janczewsky, C. F. Booth et al., of Butte, Mont., who will put in machinery for development.

#### Rossland District.

Machine drills have been put in at the Jumbo mine at Rossland. The compressor plant is running and air is used in the forge blowers. The development in the intermediate level is to be driven ahead with the machine drills. The mine is shipping fifty tons of ore daily.

A year ago concentration was a thing of the future in Rossland so far as concrete facts were concerned, says the Rossland Miner, but in the intervening twelve-month equipment for handling the milling ores of the camp has reached the following status: Le Roi No. 2—Fifty-ton plant in continuous operation and officially reported to be earning profits; cost, \$40,000. Velvet mine—Fifty-ton plant in partial operation; balance to be running by this week; estimated cost, \$15,000. War Eagle—Center Star mines—Two-hundred-ton plant partly running; entire works to be operating by August 1; estimated total cost, \$250,000. White Bear Con.—Seventy-ton plant partly built and progressing; may be in operation before September 1; estimated cost, \$30,000. Le Roi—Twenty-ton experimental works running continuously; construction of large works probable sequel to completion of milling details.

J. H. Mackenzie and F. W. Bradley, consulting engineers for the Le Roi mine, have recommended to the directors of the Le Roi M. Co. the erection of a 250-ton concentrator at the mine at Rossland.

#### Slocan District.

At the Monitor mine, at Three Forks, Manager M. Gintzburger will put in an air compressor and ore crusher. The concentrator will be built at Rosebery and run in conjunction with the zinc enriching plant under way there.

A company has been formed to take over the Molly Gibson mine, on Kokanee creek, 5 miles from Mollie Gibson landing,

to be known as the Aspen M. Co. The company is composed of Sherbrooke, Quebec, and Nelson, B. C., men. S. Jencks, of Sherbrooke, is manager. Nothing has been done at the mine since the slide of two years ago.

#### Vancouver Island.

G. H. Robinson of Salt Lake City, Utah, manager of the Britannia C. Co., operating on Howe sound, near Vancouver, says arrangements are being made for a tramway  $3\frac{1}{2}$  miles long and for a mill over the tables of which 600 tons of copper-bearing sulphides will pass daily. The breaking of ground for the plant will start this week.

## CANADA.

#### Alberta.

H. C. Galer, recently of Grand Forks, B. C., vice-president and manager of the International Coal & Coke Co., at Coleman, says although coal mining operations were started less than nine months ago the underground workings already exceed 1 mile in length, and a daily output of 250 tons is maintained in development. An extensive plant is being installed.

#### Quebec.

The Department of Lands, Mines and Fisheries' report of mining operations in Province of Quebec for year 1903 contains the following summary:

Kind of minerals.	Quantities Shipped or Used.	Gross Value.
(Tons of 2,000 lbs.)		
Titanic iron ore.	112	\$300
Bog iron ore.	12,035	34,985
Chromic iron.	3,020	45,300
Copper ore.	26,481	109,875
Asbestos.	26,481	916,970
Mica (thumb trimmed).	145	74,119
Ocher calcined.	1,748	20,440
Gold (ounces).	5,510	1,600
Slates (squares).	5,510	22,040
Cement (barrels).	40,000	66,000
Granite.		140,000
Lime (bushels).	1,000,000	140,000

Other non-metallic products bring the total values to \$2,772,782.

The total number of workmen employed was 4662 and their wages amounted to \$1,308,925.

## INDIA.

The Indian mines' gold output for the first six months of 1904, as compared with 1903, is reported as follows:

	1904.	1903.
	Ozs.	Ozs.
January.	51,588	48,080
February.	50,151	46,288
March.	51,034	48,327
April.	50,509	48,271
May.	51,142	48,628
June.	51,606	48,980
July.		50,571
August.		50,286
September.		51,452
October.		52,724
November.		52,016
December.		54,457
Totals.	306,630	600,060

The report of the principal producers of the Kolar field for June was: Champion Reef—Mill, tons, 15,120; ounces, 15,208; tailings (cyanide), tons, 20,176; ounces, 2770; total ounces, 17,978.—Mysore—Mill, tons, 1550; ounces, 15,219; tailings (cyanide), tons, 11,882; ounces, 1570; total ounces, 17,035.—Ooregum—Mill, tons, 10,894; ounces, 5209; tailings (cyanide), tons, 10,305; ounces, 1008; total ounces, 6217.—Nundydoo—Mill, tons, 6550; ounces, 5095; tailings (cyanide), tons, 5018; ounces, 551; total ounces, 5646.—Balaghat—Mill, tons, 2950; ounces, 2336; tailings, tons, 238; ounces, 225; total ounces, 2561.—Mysore West and Mysore—Wynad—Mill, tons, 1759; total ounces, 1022.

## MEXICO.

#### Chihuahua.

It is stated the Cia. Metalurgica de Torreon, owner of the smelter at Torreon, has plans prepared by Manager J. W. Pender for a concentrating plant for its San Diego mine at Santa Barbara and the mill will be built this year. Development work is blocking out ore.

La Doris gold mine, 85 miles northwest of Parral and 50 miles southwest of Batopilas, owned by J. F. Bode et al., of Parral, is being developed under superintendence of D. E. Owen. About eighty men are employed, and the mine is equipped with a 100-ton Huntington mill. The vein is 35 feet wide and is said to run \$10 per ton in free milling gold. Manager Bode proposes to put in improvements for increase of the output.

P. H. Heffron, who with J. W. Piper is working the Dos de Abril mine, near the Dolores mine at Dolores, west of Minaca, says the ores of the mine carry gold and silver and are in a limestone formation. They are sinking an inclined shaft which is down 70 feet, and they expect to strike the vein at 100 feet. They have a small mill. Heffron says the Heffron company is preparing a site for its mill, which it expects to have in operation by October 1. About 300 men are at work at the mine.

J. W. Pender of Parral, who controls the Socorro mine near Sahuayacan, in the western part of the State, and in the Jesus Maria district, expects to start



work on the property this week. J. A. Dick is in charge of the mine.

J. F. Johnson, B. Peterson et al., constituting the Descubridora M. & Dev. Co., are shipping 1000 tons of ore per month from the Descubridora mine, near the Adela mine at Santa Barbara. The ore carries silver and gold.—El Rayo M. & Dev. Co., composed of the same men, is developing El Rayo mine adjoining, and ore is being taken out, but none is being shipped as yet. H. L. Brown is manager. A mill will be built.

F. Howard and E. M. Parish are starting increased work on the Monte Cristo mine in Parral camp. They are to start a shaft and put on an electric hoist. They have done considerable work on the San Nicolas mine of the Monte Cristo group. The properties are on the veins that accompany a dyke, 2000 feet north of the Palmillo mine.

#### Coahuila.

The production of the coal mines in State of Coahuila is increasing, the output being approximately 1,000,000 tons of coal and 100,000 tons of coke a year, says the Mexican Investor. The Mexican Coal & Coke Co., working Las Esperanzas property, is producing 400,000 metric tons of coal and 75,000 tons of coke per annum. The shipping point is Barroteran on the Mexican International Railway. The company is building its own railway to the International, which will be 30 miles distant from an additional coal property bought in Muzquiz district. The Coahuila Coal Co. is working its properties at Hondo, 16 miles from Sabinas on the International Railway, and at Mezquite, 1/2 mile from Sabinas. It is producing 250,000 tons of coal and 20,000 tons of coke per annum. The company has begun to open a new part of its holdings known as the "upper coal field." The Fuente Coal Co., working its lands at Fuente on the Mexican International Railway, is producing 160,000 tons of coal per year. It has increased its holdings. The Monterrey Iron & Steel Co. is working its coal lands at San Felipe, 12 miles from Sabinas on the International Railway, and producing 150,000 tons of coal per annum. It has made arrangements for building 30 miles of track from Mezquite to Menor, the center of an additional tract of coal which it has bought.

A 34-foot bed of coal is reported found on the San Blas hacienda and another vein on the adjoining hacienda at Sanceda. They are near Monclova and development is under the Coahuila C. & O. Dev. Co.

The Fuente Coal Co. at Fuente, the Mexican C. & C. Co. at Esperanzas, the Coahuila Coal Co. at Hondo and the Mexican Iron & Steel Co. at Felipe are all increasing their holdings and operations will be extended. Further equipment will be required.

#### Guerrero.

(Special Correspondence).—In La Union district work will be started on the iron claims at La Mira, near the mouth of the Rio Balsas. Considerable ore is blocked out.—Nearly 2000 mining pertenencias of iron deposits have been denounced in the district recently.

La Union, July 20.

It is expected that a 60 or 100-stamp mill will be built at the Mina Grande property, near San Nicolas del Oro, says Superintendent W. W. Miller. The Mina Grande is owned by the Balsas Valley M. Co., which is operating it, having bought it for \$100,000 gold. Of this amount half has been paid. About 150 men have been steadily doing development work.

#### Jalisco.

M. G. Perez, of Guadalajara, who holds title to the Estrella del Sur y Anexas mines in southern Jalisco, says arrangements are being made to form a company in Chicago, Ill., to work them. Machinery will be put in. These mines were worked by the Spaniards and were producers of native silver. Two of the mines are flooded, and will be unwatered. There is a good wagon road from the mines to Zapotiltic, a station on the Zapotlan branch of the Mexican Central railroad.

Superintendent Fitzgerald of the Lupita mine, west of Ameca, says five stamps will be added to the mill.

The iron mines, mills and foundry at Ferreria de Tula have been leased to R. H. Beach of New York and G. Townsend of Indianapolis, Ind., who will increase the capacity to fifty tons daily and also build a steel plant. J. E. Jones of Pittsburgh, Pa., is manager.

A 50-ton concentrating plant has been placed in operation at the Soquito Prietas mines, south of Ayutla, says the Jalisco Times. These mines are owned by an American company and W. H. Lees is manager. The ore is low-grade copper.

A concentrating plant will be built by the Bautista M. Co., operating three old Spanish silver mines, near Ayutla. The company is of Boston, Mass., men and the

mines are managed by B. McLellan.

The Fortuna M. Co. has started its mill at the Candelaria mines, near Etzatlan. The mill and mines are under Manager R. Eames.—The mill of the Pozos M. Co. will be started about August 1, under management of S. S. Gates. The Pozos mine is owned by C. Kratz and C. E. Carroll.—J. J. Mann, of Philadelphia, Pa., has bought a half interest in the San Pablo group of mines, two hours' ride south of Etzatlan. There are five mines in the group, and they are old Spanish properties. Mann & Mathews are operating them with forty men. They have opened up 1500 feet of tunnels and stopes. The properties are between the Altamira group and the Santo Domingo mine.—The Camichi M. Co. has put in a larger hoist.—The Amparo M. Co. is shipping forty cars of ore per month, which is said to net \$1500 a car.

#### Lower California.

The Mendoza C. M. Co. is shipping high-grade ore from its mines at La Paz, direct to San Francisco, Cal. In June 125 tons were shipped, besides the free gold extracted on the plates, and the shipments for July aggregated 300 tons.

#### Michoacan.

(Special Correspondence).—In Arrio district, the Carrizal G. M. Co., owning 700 acres of mining ground at Agua Fria, has 125 men at work. The 5-stamp mill is crushing twelve to fifteen tons of ore daily averaging about \$16. The ore is a soft, blocky quartz and is easily milled. The ledge outcrops between layers of porphyry and slate lying on the granite. Over 500 feet of work have been done on the main incline—the Fortuna and the Bella Vista. Recently, while crosscutting, the Fortuna No. 6 old workings were cut into. Among the improvements contemplated by the company are a cyanide plant and the addition of a grinding mill, which is en route to the mines from Patzcuaro, on the Mexican National Railway. A tramway is to be built from the mine to the mill, a distance of 800 meters, reducing the transportation costs from about \$1 to an estimated 4 cents per ton. S. Butler is president of the company, E. B. Sanderson manager and W. J. Kelly chemist.

J. Luna has denounced ten pertenencias of mining ground south of Los Posos. The claim is a free-milling gold proposition.—Over 5,000,000 francs have been expended on the Inguaran copper mines, mostly in mine exploitation. A smelting plant is being built near the Rio Balsas. The mines are owned by a French company, in which the Rothschilds of Paris hold controlling interest.

In Apatsingan district work has been suspended on the San Juan and Virgen mines near Aguillita. They are copper-silver claims.—Work is progressing on the Alacranes mine and shipping ore is being produced. It is a silver claim and is owned by Aguillita parties.

#### Sonora.

La Brisca G. M. Co. has been organized to exploit placer ground adjoining the Greene Gold Co.'s property, 50 miles from Magdalena, by P. J. Debaney, J. A. Campbell, T. Evans, J. M. Walsh, P. R. Lucas, F. A. Mosher and G. W. Arnett, all of Cananea.

It is reported the Yaqui C. Co. is to put in at its mines at Campo Santo Nino a 100 H. P. hydraulic plant to operate the projected 2000-ton smelter, drills, etc. The source of power is the Yaqui river. W. E. Pomeroy is superintendent.

At Sahuaripa the Cienegueta C. Co., G. Beebe of Chicago, Ill., president, is preparing to put in two copper furnaces of 100 tons daily capacity for smelting its ore.

Two leagues below Sibachicori is the smelter of the San Juan mines—a water jacket, with a daily capacity of seven tons. The San Juan mines include 6 denunciations and 100 pertenencias, owned by J. Sattory, manager, and C. Laux, F. H. Seymour of Torres, A. G. Pace and C. M. Hughes of La Colorado. A ledge 16 feet in width runs the length of the properties and in places open cuts and other antigua workings show extensive development has been done. The properties are under bond to E. S. Rutherford of Nogales, Ariz., who is planning to increase operations. The present owners have sunk a shaft 130 feet deep on the ledge, developing a 4-foot body of ore carrying copper, gold and silver.

#### Zacatecas.

E. Gmelin has an option on the America mines, adjoining the Mala Noche mines, near Zacatecas, and says he is arranging to commence operations. It is expected that by Sept. 1 he will start work opening up the mines and installation of machinery.

J. F. McNabb, of the English company organized to take over the gold mines at Mesquit del Oro, says M. Cockerell,

manager, is starting operation of the Mesquit properties. The work of remodelling the 50-stamp mill at the mines is progressing, and the plant will be put in condition to treat 100 tons of ore daily.

At La Noria and San Bartolo, 12 miles from Sombrerete, B. C. Wheeler, who has a lease and bond, is preparing to build a cyanide plant.

#### NICARAGUA.

D. P. Gillis, formerly of Libby, Mont., now general foreman for La Leonessa M. Co. of Massachusetts, says the company has a property in Metagalpa department, near Metagalpa, which had been abandoned since 1881. A stamp mill has been put up, together with a cyanide plant, and mining will start this month. The mill will start with thirty stamps, though the company intends to make it a 160-stamp mill. The mine is working 350 men. The ore bodies are large and so situated that mining as a rule is carried on by quarrying. At La Leonessa they have a lead varying from 6 to 10 feet wide, with values running \$20 in gold per ton. The whole ledge, 60 feet wide, will average \$7 per ton, says Gillis.

#### TASMANIA.

The report of the Mount Lyell M. & R. Co., Ltd., operating copper mines at Mount Lyell, for the period ending March 31, 1904, shows the following table:

Copper sales.....	\$346,369
Railroad earnings.....	19,183
Total.....	\$365,552
Expenses.....	
Mining charges.....	\$ 47,867
Removing overburden.....	13,966
Smelting and converting.....	117,452
Freight and charges on copper.....	20,636
Railway expenses.....	13,577
General expenses.....	18,261
Mine prospecting.....	13,843
Total.....	\$251,602

The present company is a consolidation of the former Mount Lyell M. & R. Co., Ltd., and the North Mount Lyell C. Co., Ltd., and was incorporated in August, 1903, hence the report covers about eight months. The ore from the North Mount Lyell is smelted at the company's reduction works at Queenstown, and all supplies for the mines are transported by the Mount Lyell Railway, owned by the company. During the period 186,214 tons of ore were produced from the Mount Lyell mine and 54,846 tons from the North Mount Lyell, together with ten tons of copper precipitates from the mine water; also, from the Royal and South Tharsis mines 5182 tons of fluxing ore. The North Mount Lyell ore is now supplying silica, so that it is becoming unnecessary to operate the Royal and South Tharsis mines for flux. The North Mount Lyell main shaft has been sunk below the 200-foot level. During the eight months 5005 tons of blister copper resulted from the smelting operations, containing 4944 tons of copper, 510,906 ounces of silver and 13,139 ounces of gold. The smelting and operating costs have been decreased—due primarily, says the report, "to the elimination of the use of barren siliceous fluxes, owing to the complementary fluxing nature of the ores from the two principal mines." Coke is obtained from the company's coke works at Port Kembla, N. S. W.

#### Personal.

W. P. DUNHAM of Los Angeles, Cal., is in Denver, Colo.

E. H. MEAD is at Mountain City, Nev., from Salt Lake City, Utah.

J. JOSEPH has returned to Tonopah, Nev., from San Francisco, Cal.

J. E. JONES, a mine owner of Tonopah, Nev., is in San Francisco, Cal.

T. KEOGH returned to Salt Lake City, Utah, last week, from the East.

W. A. TICE of Tonopah, Nev., is in San Francisco, Cal., on mining business.

H. A. BUTLER, interested in mines at Nome, Alaska, is in San Francisco, Cal.

D. RAUSTRON is superintendent of the Parlette gilsonite mines, near Price, Utah.

W. F. BRAY of Placerville, Cal., is in San Francisco, Cal., on mining business.

W. F. SNYDER of the Western Exp. Co. is in New York, from Salt Lake City, Utah.

W. A. BRADLEY is manager of the Gold Hunter M. & S. Co. at Wallace, Idaho.

H. CATROW, manager of the Ohio C. Co.'s mill and mines at Bingham, Utah, is in the East.

L. J. GAGE of Chicago, Ill., is in Colo-

rado looking after mining interests, near Ward, Colo.

W. MAGUIRE, a mine manager of Dutch Flat, Placer county, Cal., is in San Francisco, Cal.

G. W. MYERS has returned to San Francisco, Cal., from a trip to southern California mines.

A. F. ARMSTRONG of the Newhouse M. Co., is in southern California from Salt Lake City, Utah.

M. E. DITTMAR, interested in northern California mines, is in San Francisco, Cal., from Redding, Cal.

A. H. CARPENTER is superintendent of the smelter of the Independent S. & R. Co. at Golden, Colo.

FRANK MANNING is en route to Mia Bong, Korea, to accept a position with the Oriental Con. M. Co.

R. C. CALHOUN, a mine manager of Topolobampo, Sinaloa, Mexico, has gone north on mining business.

H. J. KINKEAD of Virginia City, Nev., has gone to Mexico to put up a milling plant at Pachuca, Mexico.

H. JOSEPH of Salt Lake City, Utah, is at Caribou, Idaho, making an examination of mining properties.

E. W. MASSEY, interested in Sonora, Mex., mines, is in San Francisco, Cal., from Zubiate, Sonora, Mex.

J. J. MCSORLEY, a mine owner of Calaveras county, Cal., is in San Francisco, Cal., from San Andreas, Cal.

G. M. CLARK, superintendent of the River Hill M. & M. Co., near Placerville, Cal., is in San Francisco, Cal.

J. MCCHRYSTAL, superintendent of the Gemini mine of Eureka, Tintic district, Utah, is visiting in California.

W. F. DETERT, superintendent of the Zella mine at Jackson, Cal., has returned there from San Francisco, Cal.

J. F. BODE, a mine owner of Parral, Chihuahua, Mex., has gone to St. Louis, Mo., and other Eastern points.

G. W. ROOT, manager of the New York-Grass Valley Con. M. Co. at Grass Valley, is in San Francisco, Cal.

SAMUEL C. WIEL of San Francisco, Cal., has gone to Tonopah, Nev., to engage in the practice of mining law.

PRESIDENT J. E. BAMBERGER of the Daly-West M. Co. returned to Salt Lake City, Utah, last week from the East.

J. W. PENDER, manager of several mines near Parral, Chihuahua, Mex., has returned there from an Eastern trip.

P. H. HEFFRON, part owner of the Dos de Abril mine, near Dolores, west of Minaca, Chihuahua, Mex., is in the East.

H. H. YARD, representing the Western Pacific R. R., has returned to San Francisco, Cal., from Salt Lake City, Utah.

J. H. LENOIR has resigned as superintendent of the Senorita mine at Victorino, Chihuahua, Mex., and is in Chihuahua.

MANAGER ARKILLS of the Star tunnel at Idaho Springs, Colo., has returned to Idaho Springs from Lake Geneva, Wis.

PRESIDENT S. BAMBERGER is at the Bamberger gold mines and mill at De Lamar, Nev., from Salt Lake City, Utah.

F. BRADSHAW, manager of the Santo Domingo M. Co., at Batopilas, Chihuahua, Mex., has returned from an Eastern trip.

B. HOLDEN, managing director of the United States M. Co., has returned to Salt Lake City, Utah, from an Eastern trip.

R. J. COLEMAN of western Sinaloa, Mex., was in Denver, Colo., last week en route to New York, N. Y., and Boston, Mass.

J. E. JONES of Pittsburg, Pa., has been appointed manager of the iron mines, mills and reduction works at Ferreria de Tula, Jalisco, Mexico.

P. A. H. FRANKLIN, a Utah mine owner, returned last week to Salt Lake City, Utah, from examining mines in Colorado.

J. W. BURTON of the Pioche, Nevada, Con. M. Co., is at the company's mines at Pioche, Nevada, from Salt Lake City, Utah.

M. COCKERELL, recently at Guanaquato, Mexico, is manager of the gold mines at Mesquit del Oro, Zacatecas, Mexico.

M. A. BETTMAN of New York City, N. Y., is president and manager of the Independent S. & R. Co., operating the smelter at Golden, Colo.

SUPERINTENDENT VEITCH, of the



Arizona C. Co., who has been at Santa Barbara, Cal., for several weeks, has returned to the mines at Clifton, Ariz.

S. L. PEARCE, president of the La Luz G. M. Co., at Maguarichic, Chihuahua, Mex., is at the company's mines from Louisville, Ky.

F. L. RANSOME of the United States Geological Survey, is at Wardner, Idaho, to make a survey of the Cœur d'Alene mining district.

C. D. GETTIS, recently from Colorado, is superintendent of the Blue Ledge copper mines in Siskiyou county, Cal., south of Jacksonville, Or.

C. C. CLINE returned to Oroville, Cal., last week, after a year's absence in the Gold Coast, Africa, where he built a number of gold dredging boats.

J. W. MCCLURE of Des Moines, Iowa, president of the Queen of the Hills G. M. Co., has returned from the company's mines in the Black Hills, South Dakota.

H. I. WILLEY has returned to New York City, N. Y., from the mines of the Yaqui C. Co., near Campo Santo Nino, Sonora, Mexico, of which he is consulting engineer.

H. N. GALER, having resigned as assistant manager of the Granby Con. M. & S. Co. at Grand Forks, B. C., has gone to Coleman, Alberta, as vice-president and manager of the International Coal & Coke Co.

WM. H. ARMSTRONG, formerly manager of the New York business for the Chicago Pneumatic Tool Co., is now associated with the Ingersoll-Sergeant Drill Co. of 26 Cortlandt street, New York, and will look after the interests of the Pneumatic tool department.

PROFESSOR A. VANDER NAILLEN, who has for over thirty years conducted a school of practical mining engineering in San Francisco, Cal., has been appointed by the Belgium world's fair directors a commissioner to represent California at Liege, Belgium, from April to November, 1905.

## Obituary.

J. LANKAN, a pioneer miner of Montana, died at Anaconda, Mont., July 23rd. Deceased was 73 years of age and went to Montana in the early '60s.

H. C. ASH, a Black Hills, South Dakota, mining man, died July 25th at Lyons, Colo., at the age of 45 years. Deceased went to the Yukon region in the early days of the Klondike excitement and was successful in mining there.

W. H. PETTIT, an Idaho mine owner and manager, died in Boise on the 19th ult., in his eighty-first year. Deceased was interested in the Valley View mine, near Idaho City, Idaho, and in other properties there in the early days. He went to Idaho about 1876, as manager of the Monarch mine at Atlanta.

G. B. MCAULEY of Spokane, Wash., identified with British Columbia mines, died at Callamisk, Scotland, on the 20th ult. Deceased was born in Scotland. He went to Spokane, Wash., from Silver City, N. M., and joined the rush to the Cœur d'Alenes during the first excitement over the discovery of the Bunker Hill and Sullivan mines, and was associated with V. B. DeLashmutt in the Stewindler, California, Granite and Sierra Nevada mines. Later he went to British Columbia and became interested in the Cariboo mine, near Camp McKinney. He was also interested in mines at Rossland.

## Trade Treatises.

"The Perfection Dust Collector" is the subject of discussion in a handsome trade treatise for the makers and vendors, the Prinz & Rau Manufacturing Co., Milwaukee, Wis.

"Jeffrey 'Century' Rubber Belt Conveyors" is the subject of the latest trade treatise from the Jeffrey Mfg. Co., Columbus, Ohio, and gives illustrated information in detail regarding this important branch of transmission machinery. The booklet will be sent on request.

Catalogue No. 42, from the F. M. Davis Iron Works Co., Denver, Colo., is devoted entirely to the filter press treatment of gold ore slimes, and the leaching of copper ores. These important subjects are discussed in technical detail, making the pamphlet of more than ordinary value. It will be sent to any address on request.

## Commercial Paragraphs.

THE Rapid-Economy Stamp mill Co. of San Francisco, Cal., is erecting one of its 3-stamp mills on the Longfellow mine, in Tuolumne county, Cal., which will be in operation in about ten days. They will also have one of their 3-stamp mills dropping at the F. & W. mine, near Angels, Cal., soon.

THE John T. Baker Chemical Co. has recently been incorporated for the purpose of manufacturing chemicals for assay and laboratory work. The company is now erecting a plant at Phillipsburg, N. J., which will probably be ready for occupancy by October 1. The officers are: John T. Baker, president, and Charles D. Davis, secretary and treasurer. The main business offices of the John T. Baker Chemical Co. will be located at Easton, Pa.

THE O'Rourke Engineering & Construction Co., which firm has the contract for building the Pennsylvania Railroad tunnel under the Hudson river, has placed the order with the Ingersoll-Sergeant Drill Co. for two central compressed air power plants to be located at New York City and Weehawken, N. J. This order includes eight 36-inch stroke Corliss air compressors, each of 3690 cubic feet capacity. With the O'Rourke plant installed, the total number of Ingersoll-Sergeant compressors supplying air for subaqueous tunnels in New York will be as follows: Six class "A" straight line compressors, twelve Corliss duplex compressors, three class "H" duplex compressors, two class "G" duplex compressors.

THE Excelsior Wooden Pipe Co., 6-8 California St., San Francisco, Cal., has a contract for furnishing and erecting wooden stave pipe for the municipal water supply of Lynchburg, Va. The pipe is to be about 20 miles in length, with an inside diameter of 30 inches. Heretofore wooden pipe construction has been largely confined to the Middle and Western States. The Excelsior Wooden Pipe Co. say this is the largest contract for this particular style of construction ever awarded near the eastern seaboard. The fact that a large cast-iron pipe foundry in Lynchburg made efforts to secure this contract without success shows that the value of wooden stave pipe is becoming thoroughly recognized in the East as well as in the West, and since the staves will be shipped from the west coast and furnished by Redwood Manufacturers Co., who act as agents for the above contractor, shows that the western lumbermen can compete in the eastern markets. The Excelsior Wooden Pipe Co. is also about to install a line of 60-inch diameter pipe for Cornell University at Ithaca, New York.

## Dividends.

Bunker Hill & Sullivan M. & C. Co., dividend No. 82, \$75,000; payable August 4. Total paid since January 1, 1904, \$438,000; total to date, \$1,971,000.

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING JULY 26, 1904.

765,657.—PNEUMATIC FEEDER—T. J. Amault, Everett, Wash.  
766,095.—MAIL BOX—J. A. Barclay, Ballena, Cal.  
765,914.—EYEGLASS SUPPORT—W. S. Boyd, 3rd, Los Angeles, Cal.  
765,813.—CAR FENDER—E. E. Caton, San Jose, Cal.  
765,888.—RAIL JOINT BRIDGE—C. W. Coburn, S. F.  
765,817.—SUPPORTING DEVICE—A. M. Cox, Los Angeles, Cal.  
765,023.—BOTTLE—D. W. Divine, Highlands, Cal.  
766,026.—APPAREL HANGER—Curtis Easton, S. F.  
766,034.—FLOW COLTER—J. B. Hamilton, Requa, Cal.  
765,777.—ROTARY MOTOR—J. F. Hathaway, S. F.  
765,894.—HAIR DRIER—S. Hudson, Los Angeles, Cal.  
765,049.—VIOLIN—J. D. Loppentien, Orange, Cal.  
765,784.—NAPKIN HOLDER—D. G. McClay, Santa Ana, Cal.  
765,851.—LAUNDRY TONGS—S. R. Nettleton, Kirkland, Wash.  
765,905.—LEGGING—M. Rose, S. F.  
765,797.—RAILWAY—A. J. Smithson, Portland, Or.  
765,800.—FAUCET CUTTER—F. Stansfield, Los Angeles, Cal.  
765,072.—GAME TABLE—N. B. Stone, Outlook, Wash.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

LEGGINGS—No. 765,905, July 26, 1904. Maxim Rose, San Francisco, Cal. This invention relates to improvements in leggings for the protection of the lower parts of the legs and trousers, and it consists of a flexible wholly or partially waterproof material adapted to wrap around the leg and having a stiffener at one edge and a bar near the other edge, with an upturned hook at the lower end of said bar adapted to engage the lower edge of the

fold of the trousers. A hook and elastic cord connect the edge of the leggings with the bar to hold the leggings in place.

PORTABLE RAIL JOINT BRIDGE.—No. 765,882, July 26, 1904. C. W. Coburn, San Francisco, Cal. This invention consists of a plate of metal adapted to rest upon the outer flanges of contiguous abutting rails and crossing the open space between said ends, the upper surface of said plate being substantially on a plane with the tops of the rails, and an elastic steel plate secured thereto and adapted to spring over the tops of the rails to retain the bridge plate in position and form a continuous surface for the passage of car wheels.

## Latest Market Reports.

SAN FRANCISCO, August 5, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 27d (standard ounce, 925 fine); New York, bar silver, 58½c, refined (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 45½c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.75; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £56 15s 0d spot per ton.

LEAD.—New York, \$4.25; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 13s 9d long ton.

SPELTER.—New York, \$4.85; St. Louis, \$4.75; London, £22 2s 6d long ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$27.00@27.20; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, \$30, 32½c. London, £123 spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 17s 6d San Francisco, local, \$41.50@43.00 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.00@42.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 3½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, \$3.50, 50c; dust, \$3.10, 10c; sulphate, \$3.10, .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.60 @12.85; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c per lb.

### CHICAGO CURRENT QUOTATIONS.

Bessemer	.....	\$14 75@15 00
Foundry Northern 1	.....	13 75@14 00
Northern 2	.....	13 25@13 50
Northern 3	.....	12 75@13 00
Southern 1	.....	13 40@13 65
Southern 2	.....	12 90@13 15
Southern 3	.....	12 40@12 65
Forge	.....	11 65@11 90
Charcoal	.....	14 50@15 00
Billets, Bessemer	.....	23 00@24 00
Bars, iron	.....	1 35@1 40
Bars, steel	.....	1 51@1 51
Rails, standard	.....	28 00@30 00
Rails, light	.....	23 00@25 00
Plates, boiler	.....	1 91@2 01
Tank	.....	1 76@1 81
Sheets, 27 store	.....	2 26@2 31
Angles	.....	1 76@
Beams	.....	1 76@
Tees	.....	1 81@
Zees	.....	1 81@
Channels	.....	1 76@
No. 1 railroad wrought	.....	10 75@11 25
No. 1 cast, net ton	.....	9 50@10 00
Iron rails	.....	14 50@15 00
Car wheels	.....	10 50@11 00
Cast borings	.....	3 50@3 75
Turnings	.....	6 50@7 00

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No.

1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.00; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brynbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$11.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$11.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 22@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, \$2.00@2.25; California refined, 1¼@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

OILS.—Lined, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Ecocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MOLYBDENUM.—Best, \$2.00 per lb.

CHROMIUM.—90% and over, per lb., 80c.

PHOSPHORUS.—American, per lb., 70c.

SILVER.—Chloride, per oz., 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride, per lb., 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—per lb., \$2.75.

SODIUM.—Metal, per lb., 50c.

BISMUTH.—Subnitrate, per lb., \$2.10.

URANIUM.—Oxide, per lb., \$3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## To Users of Gold Dredging Machinery.

The Risdon Iron & Locomotive Works of San Francisco, California, has instituted in the Circuit Court of the United States, for the Northern District of California, equity suit number 13,605, against the Western Engineering & Construction Company and the Central Gold Dredging Company, as joint infringers of certain patented Gold Dredging Machinery which is owned and controlled by The Risdon Iron & Locomotive Works.

The patented apparatus claimed to have been infringed is what is commonly known as the "Postlethwaite Rotary Separator Gold Dredge," which is the machine in general use on the Feather river and on the property adjacent Oroville, California.

Owing to the great success which has followed the use of this machine, the present suit will be watched with great interest by those interested in this class of gold mining.



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## The Mines of Clifton District, Graham County, Arizona.

Among the most extensive mining and reduction plants of southeastern Arizona are those of the Arizona Copper Co., and of the Shannon Copper Co., near Clifton, in Graham county. The mines of the Arizona Copper Co. are located at Clifton, Metcalf, Coronado and Garfield, the works, with the exception of the concentrator at Longfellow, being at Clifton, an illustration of which appears herewith. Over 1500 tons of ore are treated daily by this company, the motive power being gas engines, the total equipment exceeding 2500 H. P. The company makes its own coke used in smelting the ores and concentrates, the gas resulting from the coke making being employed in running the engines. The most recent installation at these mines is an electric haulage plant. The Shannon Copper Co. has its mines at Metcalf and its works (see accompanying illustration) near Clifton. The ores and concentrates from this property are smelted in the company's furnaces at Clifton, being hauled over a narrow gauge railway. The Arizona Copper Co. and the Shannon Copper Co. have a side-line working agreement by which all extralateral rights are waived, by means of which all contentions and disputes are obviated, which, owing to the irregularity of these deposits, would undoubtedly otherwise be numerous. The underlying rocks of the district are granite, over which lies a series of sedimentary beds, chiefly limestones and quartzites, intruded by porphyry, which latter has an intimate association with the ore. These rocks are much disturbed by faulting and movement. The deposition of the ores has followed the extensive faulting and fracturing of the rocks. Faults showing a displacement of more than 1000 feet are of common occurrence. The ore deposits were evidently all formed since the intrusion of the porphyry. As an interesting result of contact metamorphism, the lower Carboniferous limestone, ordinarily in this district a pure calcium carbonate, has been transformed for a distance of several hundred feet into a mass of almost solid garnet rock. The shales are less metamorphosed, but usually contain more epidote near the porphyry. Magnetite, pyrite, chalcopryite, and zincblende accompany the contact metamorphic minerals, and appear to be the result of this form of metamorphism. In many places the ores have accumulated along certain horizons in the sedimentary rocks, which evidently were in some way more susceptible to the infiltration of mineral



The Shannon Copper Co.'s Concentrator and Shops, near Clifton, Ariz.

solutions and the deposition of ores from them. The ore bodies are usually very irregular in form and size, but are generally roughly tabular in shape, owing to the deposition of mineral along the bedding planes of the rocks. The deposits have been much altered by their oxidation and the removal of certain constituents which have in some instances been redeposited elsewhere. The sulphide ore chalcopryite has been converted into carbonates and oxides. Copper glance occurs very sparingly in the oxidized zone and other sulphides of copper are almost entirely absent. The zinc sulphide has been leached out as zinc sulphate, and this mineral is often found incrusting the walls of the tunnels. The oxide and carbonate copper ores have been extensively mined in this district, and these ores are now produced in much less amount than the chalcocite ores, which are at present the mainstay of the mines. This ore is generally conceded to be the result of secondary enrichment. Owing to oxidation by surface waters, copper (probably as sulphate) has been leached from the original ores and redeposited in the porphyry in the Shannon mine, where it is now found as chalcocite. A similar occurrence is observed in the Metcalf mine. Unlike some of the other copper districts of southeast Arizona, in this district are found fissure veins cutting granite, sedimentaries and porphyries alike. These

fissures form a distinct type of ore deposits in this district. As a rule the limonite outcrops show little or no copper, but veins in the porphyry usually carry copper oxides and carbonates at the surface. The main vein of the district is known as the Humboldt, on Copper mountain at Morenci. The croppings of this vein are almost destitute of copper, but at 200 feet from the surface payable ore is found, consisting of chalcocite (copper glance) and pyrite. The ore deposits of this class, impregnations of country rock, are not sharply defined, but fade away gradually by disappearance of the mineral. The principal ores of the district at present being worked are the chalcocite impregnations in country rock, and these require concentration. The Coronado mine occupies a fault fissure between granite and quartzite and is the anomaly of the district. The Copper King is found in a series of fissures at contact of granite and porphyry. The district thus has represented bedded deposits, fissure veins, contact veins and secondary impregnations.

THE decision of a judge of the Supreme Court of the State of New York that the eight-hour law is unconstitutional is likely to have a far-reaching effect and may extend to the West where several States have adopted and endeavored to enforce the eight-hour law.



Plant of the Arizona Copper Co. at Clifton, Ariz.



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## Common Sense Required.

One of the most serious mistakes made in mine operation is the effort to make a large property out of a small one. There are often found veins of large size in which occur a narrow paystreak—large enough, perhaps, to pay to keep five or ten stamps employed, but which will not supply sufficient ore for a larger mill. This fact is sometimes disregarded and a large mill is built on this really small mine and a failure is the usual result. In some instances the fault lies in the demands of the directors and stockholders, and at other times it may be charged to the management. A large low-grade ore body with rich streaks or spots in it is all right if the low-grade ore contains enough value to afford a profit, without the aid of the rich spots and streaks, but when the rich portions only pay it is bad business to mine the great mass of ore and mill the entire vein to obtain the values from the spots, if it can possibly be avoided. Occasionally this cannot safely be done, particularly where the rich spots are concentrated in small spaces, like gold pockets, which occur in some mines. In such cases it is found advisable at times to mill all the vein material, that none of the gold shall be inadvertently thrown into the filling or over the dump. There are instances, however, where the values occur in certain strata or in good-sized bunches, and these actually constitute all the pay rock in the mine, but in the desire to make a large showing a big mill is built, a great many more men are employed than necessary, and the property is operated on an extensive and extravagant scale. The result is never satisfactory unless the good ore is sufficiently rich to pay all the expenses of extravagant management. This condition is found in copper, silver, lead and zinc mines, as well as in those producing gold. A number of instances can be mentioned where this policy was pursued until the concerns were wrecked financially, to be subsequently reopened by others, who successfully worked the mines on a scale commensurate with their magnitude, and in a practical, common sense manner.

## Why Good Mines Are Closed.

It is not an unusual thing to see a mine with extensive development, large equipment, and a good record, lying idle. Not infrequently the property is offered on the market, the owner extolling its past history and grand possibilities, and still seemingly unwilling to work it himself. There are a great many different kinds of people engaged in mining—more, perhaps, than there are different kinds of mines—and these are legion. The fact that the owner of a mine speaks enthusiastically of his idle mine is not prima facie evidence that the property is without merit. Mines have periods in their history as varied as those in the life of an individual. As an instance may be mentioned a noted mine discovered by a prospector, who still owns it. In its early history this mine produced high-grade shipping ore. Extensive development was made and a large tonnage of ore exposed. The character of the ore changed in depth, and though shipping ore can still be sorted from the vein, it is no longer a producer in large quantities of the rich ore of its palmy days. The ore now exposed in the well developed mine aggregates many thousands of tons, and it is payable ore, too, but not for the owner of the property, who, though an expert miner, has no knowledge of metallurgy. As a result, the mine is being worked in a small though careful way, paying all the expenses of development and something over, and the tonnage of ore in sight daily grows larger. The metallurgical problem is not without solution in a manner oft proven to be successful elsewhere; but the owner of this property is not conversant with this fact, and continues his development work while "looking for something to turn up." Another instance may be cited where a large mine, which has produced a great amount of gold, to-day lies idle waiting for a buyer. It has a mill, the mine is open, but the owner apparently does not feel disposed to operate it. At first sight this looks strange, but a careful study of the situation reveals a reasonable excuse for this inactivity. In the prosperous period of its history the production of rich ore was accomplished as rapidly as possible, but development did not keep pace with this extraction of known ore bodies. The character of the ore changed also, sulphides to a great extent replacing the free oxidized ore. Moreover, the values decreased as the workings ran out of the pay shoots, until comparatively low-grade ore is found in almost every face. With the change in the value and character of the ore, the mill machinery and methods were not changed materially, and as a result as values went down the percentage loss in tailings went up. The property now needs capital for dead work and a mill suited to the changed condition of the ores. These things the owner is either unwilling or unable to supply and the mine is idle. These are merely two instances which typically illustrate the need of a full understanding of the problems of mining and metallurgy. Development must be carried forward contemporaneously with the extraction of the reserves or the life of the mine is limited to the removal of all the ore in sight. This may be a matter of several years or only a few months—the principle remains the same. So with the metallurgical branch. A change in the value or character of ore usually demands a more or less radical change in treatment. When a rich mine is being successfully operated, the management is too often disposed to neglect extensions of development—crosscutting, re-timbering and shaft sinking to explore lower levels—and sooner or later a good mine is closed. An instance comes to mind where a rich mine was operated to a depth really beyond the capacity of the hoisting and pumping machinery, which were maintained by frequent repairs. Finally the pump broke down completely and the owners refused a new plant because the lowest level looked less promising than those above. Had a new equipment been supplied at the proper time this mine, now idle, would probably still be in operation. In another instance a rich gold mine was operated without very necessary shaft repairs. The hanging-wall timbers slowly crowded downward until the skip was in imminent danger when the wall plates were trimmed with axes until the skip would pass safely. A few weeks later this was repeated,

and again, until it became evident that it would be unsafe to cut the shaft timbers further, so the skip was replaced by one of smaller size. The timbers, however, continued to close in and eventually the pump gave out and the mine was abandoned and remained idle for years. It was reopened by others and has since produced a large amount of gold and is still an active and profitable property. The several instances above cited are but a few of the numerous similar cases where good mines are closed through lack of foresight on the part of the owners or manager. Happily, a broader view of the situation is being taken of these matters to-day, and in the future it is likely that mine managers will be more inclined to profit by the unfortunate experience of others and not allow themselves to be caught in a similar predicament.

THE recently published reports of the high wages paid at the newly discovered beach mines at and near Sand Point, on the Alaska coast, are attracting many men to that latest gold field in the far north. The venture is sure to prove disappointing to the greater number who go, as those already there and living in Alaska have long since taken up all of the available claims, and the high rate of wages at first offered will quickly be reduced as the demand is supplied. Alaska is a great mineral country and its resources are only beginning to be known. Of those who go there properly equipped with means, great possibilities await them, but those who go with the view of securing work at abnormally high wages for unskilled labor are doomed to disappointment—at least, this has been the experience of the past in that country, and that the present instance will prove an exception there is no reason to anticipate.

THAT unpatented mining claims are property, in the strictest sense of the word, is a fact recognized by all mining lawyers and those informed on matters of this character; still there are those who think it wrong to tax property to which the claimants have not secured absolute title. To all intents and purposes the title of a claim owner to an unpatented claim is as good as though it were patented, so long as the requirements of the law are complied with. It is not an easy matter to dispossess a claim owner, even for cause, as so long as he shows his good faith by a strict compliance with the Federal, State and local laws his title to his claim is sufficient. The Supreme Court of California has recently rendered a decision emphasizing the fact that unpatented mineral claims are property, and as such are taxable.

THE copper mining industry shows no sign of advancing price for the metal. The production is large, though apparently normal. All the most important copper mines of the United States are in operation, and both British Columbia and Mexico are producing a large additional amount, but the consumption of copper seems to keep up with the heavy production. While higher prices have been looked for, the present price and condition are not unsatisfactory. The constant increase in electrical development calls for more and more copper, and this demand can only be met seemingly by the opening of new mines.

AN instance of short-sightedness in the management of a mine is seen in a Tuolumne county, Cal., mine, which has recently been bought and paid for from the proceeds of operating the mine, but where it has now been found necessary to hang up the mill because of shortage of ore. The necessary dead work must now be done which should have been accomplished during the productive period. It is a wise policy to keep the work of prospecting and development well in advance of extraction of ore bodies, and thus, as far as possible, avoid the unpleasantness and additional expense of a shutdown.

THE movement of large numbers of men from one district to another in Alaska is a feature of this season's operations in the far North. Recent advices from Dawson state that several thousand men and women have taken advantage of the open summer months to remove from Dawson and vicinity to the newer district of Tanana, and that the exodus has left the mines and industries about Dawson crippled for want of laborers and wages have gone up accordingly.



## CONCENTRATES.

If the distance over which it is desired to transmit power exceeds 60 feet, it would probably be more satisfactory to put in rope transmission than to attempt to employ belts.

**MOLYBDENITE** may be concentrated from its gangue minerals by the oil process, by magnetic separators and by the ordinary methods of concentration, though the last is stated to be the least satisfactory. The crushing should be done with rolls.

**PRESSURE BLOWERS** are seldom used for mine ventilation in metal mines, the fan type of ventilator being considered efficient, and less in first cost. There are places, however, where the fan is of no service and "direct blowers" are necessary.

When air compressors are arranged in pairs, it is a good idea to place valves on each of the pipe lines leading from each cylinder and between the cylinders and the point of union of the two pipes. This arrangement makes it possible to run one side of the machine in the event of the other becoming disabled.

It is unsatisfactory to undertake to secure high speed by belting direct from a very large to a very small pulley. It is advisable to interpose at least one intermediate pulley, as the belts will operate to better advantage in this way—reducing from a large to a medium-sized pulley and from the latter to the smallest pulley.

As a means of thawing frozen ground to be excavated it has been suggested that a series of boxes, similar to sluice boxes, be placed over the ground, end to end, cover the cracks with gunny sacks and close the ends, covering the sacks with earth, then turn steam in from a boiler. Ground may be thawed cheaply in this manner.

The best mill for soft sulphide ores and other minerals that slime readily, and which it is desired to concentrate, is one which will granulate the ore into fine particles with the minimum amount of attrition. The ore should not be crushed finer than necessary to free it from its matrix. Further crushing or grinding results in slimes.

Where an air pipe is buried to a depth of 3 feet underground, and where the snow falls to a depth of 3 feet in winter, it is unlikely that there will be much movement in the line due to changes of temperature; but, as a factor for safety, it is advisable to put in slip joints at points where there may be radical changes in the direction of the line, whether these changes be in a vertical or a horizontal direction, as it is at those points that the greatest movement, if any results, takes place.

In a large vein or ore deposit lying at a low angle, and where this fact makes it necessary to shovel a large amount of the ore, the levels should be run closer together, and the operation of the mine may be facilitated somewhat by putting in raises which stand steeply from level to level instead of following the foot wall. Where it is considered necessary to run levels a long distance apart—100 feet or more—it has been found that shaking troughs are a convenient method of passing ore from slopes to levels below.

The cost of earth work depends entirely upon the situation, the character of material to be removed and its condition, upon wages, and to no small extent upon the magnitude of the job, whether or not it may be best done by hand, or whether it will justify the use of horses and scrapers, or possibly steam shovels. As to materials which may be considered as earth, there are loam, sand, fine gravel, coarse gravel, shale, and materials containing a greater or less amount of clay. Whether the material to be moved is wet or dry or frozen is often of importance in handling materials. The cheapest method of handling earth is by hydraulic if the means be at hand, but this is not often the case.

The term cuproso cyanide may be more fully understood upon considering that the term potassium ferrocyanide is applied to the salt  $K_4FeCy_6$ , instead of calling it potassium ferrous cyanide, because it is looked upon as a compound of the positive radical or ion potassium, with the negative radical or ion ferrocyanogen ( $FeCy_6$ ), rather than as a compound of potassium cyanide with ferrous cyanide, in which case the formula might be written  $4KCy, FeCy_2$ . Similarly we have cobaltcyanides, ferricyanides, etc., and the words cuprocyanide, aurocyanide, auricyanide and argentocyanide are sometimes used for the salts formed when  $CuCy$ ,  $AuCy$ ,  $AuCy_3$  and  $AgCy$  combine with alkaline cyanides.

MOST of the litigation due to conflicts over extralateral right is the outcome of the carelessness of prospectors in locating their claims. The mining law on this subject is clear, but is often disregarded by locators either through ignorance of the law, for which there seems to be little excuse, or they intentionally neglect to mark boundaries before they can feel sure of the strike, dip and trend of ore shoots in their claims, thinking to benefit by such knowledge and to locate to greater ad-

vantage. Not infrequently this is done to the disadvantage of others, following which lawsuits are almost inevitable. In other cases the extraction of ore is a clear case of trespass, but this is seldom admitted by the trespasser, and the usual litigation is a consequence.

TOO HIGH a blast pressure in blast furnace work will have a tendency to drive the fire toward the top of the charge, and if the size of the furnace will admit it a reduced blast will be an aid to the matte charges in bringing the zone of fusion down. Copper furnaces require less blast than those working iron, and lead stacks require still less than copper. Peters says, "8 H. P. will drive a positive blower suitable for a 36-inch copper furnace, while a 48-inch stack will require from 12 to 14 H. P." On blowers it is advisable to make the pipe leading from the blower to the furnace of larger diameter than the outlet of the blower by at least 20%, and if the length of pipe be greater than 50 feet it should be from 30% to 50% larger. This precaution materially diminishes the friction of the air moving in the pipe and aids in the efficiency of the blast.

THERE is considerable difference of opinion among millmen as to the length of time a cleanup barrel should be run in a mill, and this divergent opinion probably represents the varied experience of different localities. One class of men say that 4 to 6 hours is long enough. Others insist that 36 to 40 hours is necessary. The first claim that long-continued running will flour the quick-silver. A third class take an intermediate position and say the barrel should be revolved 12 to 24 hours. It is probable that in this matter as in almost every other phase of gold milling each mill foreman will run his barrel the length of time that experience in a particular mill seems to justify. If the pulp be too thick, it will undoubtedly flour the mercury. Ordinarily from 6 to 24 hours will be found to be the outside limits of time a barrel should be run for satisfactory results.

IN the matter of right of way over the surface for mining purposes the right of a State to legislate on this subject is limited to the powers conferred by its constitution. The following States have enacted legislation prescribing methods of obtaining easements and rights of way for mining purposes and providing for condemnation proceedings: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, South Dakota, Utah, Washington and Wyoming. In California the State Legislature has provided (Section 1238) that the right of eminent domain may be exercised as a public use for by-roads leading from public highways to mines. Accordingly subsequent locators of mining claims who surround an original locator on all sides cannot deny the latter the right of way for a road from his mine to the public highways of the neighborhood.

NITROGLYCERINE explodes from concussion and sometimes without apparent cause. The safest way to explode nitroglycerine, nitrocelatone and nitro powders, is by means of the exploders or caps made for this purpose, XXXX being recommended. The higher the percentage of nitroglycerine in the explosive, the more readily will it explode. If the powder has failed to explode, it is because the powder is too old or the caps are too low-grade XX or XXX, or possibly the powder may have been too cold. The experimentation with chemicals which are likely to cause explosion upon coming in contact with each other is a dangerous practice which novices should not attempt. Nitro powders are made of various grades, from 5% to 70%. When a stronger explosive than the latter is needed, nitroglycerine is usually employed. It is best to employ some one familiar with these materials to do the blasting or exploding, as all are dangerous in the hands of the inexperienced.

"DARTON'S TEST" for gold by the iodide method is a delicate one and is hardly adapted for use in the field. In prospecting the miner searches for outcrops of ore, and usually the gold in an ore from croppings may be seen by washing in a pan or hornspoon after fine crushing. Occasionally an ore is found in which the gold is too fine to be seen or it washes out by the movement of the water. Rocks which look like ores, but which fail to yield colors on panning, should be carefully marked and saved for assay. Fine gold may be dissolved in a weak solution (0.02%) of potassium cyanide, and the gold precipitated on a block of charcoal as a brownish-yellow film of infinitesimal thickness, but to be visible the ore must be rich in gold. Fresenius says, page 260, edition 1902: "Stannous chloride, containing an admixture of stannic chloride (which may be easily prepared by mixing a solution of stannous chloride with a little chlorine water), produces even in extremely dilute solutions of gold, a purple-red precipitate, or at least coloration, which sometimes inclines to violet or to brownish red. This precipitate, which has received the name of purple of cassius, is decomposed by hydrochloric acid, with the separation of gold."

BLISTER COPPER is a high-grade crude copper from which has been removed nearly all the impurities which may be removed by oxidation, slagging and volatilization. When it has been properly manipulated it contains from 97% to 99% copper. The proportion of sulphur is very small. Black copper is the crude copper resulting from running blast furnaces on oxide copper ores, or on roasted sulphide materials (matte). It is

always alloyed with one or more other metals. It usually contains lead and iron and sometimes sulphur. The bars on cooling assume a blackish color, hence the name. By "copper bottoms" is meant usually a product of indefinite composition, generally the result of smelting in reverberatory furnaces rich copper-bearing materials with insufficient sulphur present to form matte. This method of treating ore is based on the fact that metallic copper has a greater affinity for certain substances than copper matte has, and by this method these substances are caused to combine with a small amount of copper present, while the larger part of the copper forms a matte free from these substances. The substances may be arsenic, antimony, tin or lead, which are undesirable, or they may be gold or silver, which are much desired.

JAMES in his work, "Cyanide Practice," says, page 135: "Bromo-cyanide may be added in crystals. This form has proved inconvenient and expensive to transport owing to the liability to decomposition, or it may be made on the spot by the addition of dilute bromine water to a solution of cyanide, the latter being in excess. By cyanide is meant potassium or sodium cyanide. It is not advisable to add all of the bromo-cyanide at once, but in portions, say every two hours, as in the presence of cyanide solution decomposition is rapid, being completed in three to six hours. It is stated that in practice the crystals give lower cyanogen consumption than the home-made solution, but this statement does not appear to be verified. To test for bromo-cyanide, add potassium iodide and hydrochloric acid in excess; the liberated iodine is then titrated with  $\frac{N}{10}$  sodium hyposulphite in

the ordinary manner. In forming bromo-cyanide by the addition of bromine water to potassium cyanide solutions, it must be noted that the reaction  $KCy + 2Br = BrCy + KBr$  takes place slowly with dilute solutions and is not completed for some time. With stronger solutions, however—those over 1%—the reaction is immediate and even violent, heat is produced and decomposition products form."

NATURAL DEPOSITS of sulphur are sometimes found stratified with beds of clay or rock, but they often occur as what are known as "living beds," in which the sulphur is continuously being formed as the result of active chemical decomposition. In such a living sulphur bed the sulphur is produced by the direct action of sulphurous gases, especially hydrogen sulphide ( $H_2S$ ) and sulphur dioxide ( $SO_2$ ), which in the presence of moisture ( $H_2O$ ) react and form water ( $H_2O$ ) and sulphur ( $S$ ). These gases emanate in regions of active or expiring volcanoes, and form the so-called solfataras, in which the sulphur has been condensed from the vapors formed and has collected in cracks in the lava tufts or in the kaolin or clay formed by the corroding action of the acid vapors on the lavas. From a commercial standpoint, especially for the manufacture of sulphuric acid, the mineral from the solfataras deposits is not regarded favorably on account of its liability to contain arsenic in the form of the minerals orpiment ( $As_2S_3$ ) and realgar ( $AsS$ ). Sulphur of this character has been imported from the island of Volcano, one of the Lipari group, off the coast of Italy. A similar association of arsenic minerals has been reported in the sulphur deposits in Yellowstone Park. Traces of selenium and tellurium, which are also objectionable in the manufacture of sulphuric acid, occur in the volcanic sulphur deposits in Japan. The only solfataras deposits of commercial importance at the present time are in southern Utah and in the island of Hokkaido, Japan. Solfataras also occur in numerous places in California, notably in Sonoma and Lassen counties, but nothing is being done with them.

CRUSHING ROLLS may be run at too high a speed to accomplish the best results. Ore falling from the hopper feed between the rolls drops from 12 to 24 inches, having a final velocity of 480 to 680 feet per minute, according to height of drop. If the periphery speed of the rolls too greatly exceeds the velocity of the piece of ore at the time it first reaches the angle of "nip," it will slip. The character of the ore must be studied and the speed of the rolls adjusted to that peripheral velocity which is found to produce the most satisfactory result. When rolls are run at a speed which causes the rock to slip on the line of contact the rolls will be found generally to wear away more rapidly than where they are run at a slower speed. Some soft "metallic" ores, such as those containing galena, graphite, etc., will cause the rolls to become glazed if run too fast, but crush readily when run at proper speed. With some hard material it is found that the rolls will not "nip" the ore or matte under a stated angle, for pieces of given size. This necessitates the setting of the rolls at a greater or less distance apart. Where rolls are run at very high speed it is sometimes found that the pieces of ore falling between the rolls rebound, and are met by other falling pieces, only to rebound again. The result is the rolls become choked. In such cases the speed of the rolls must be reduced until the material passes through readily. In crushing very hard, dense rock in rolls it is desirable to have the ore crushed to comparatively small size by rock breakers before it is fed to the rolls. Tough minerals require a less angle of nip than those which are brittle and soft. Granular ores will stand a wide angle of nip. In wet crushing the fines adhering to the rolls may cause the ore to crush more rapidly than when dry.



## Geology in Mining.

Written for the MINING AND SCIENTIFIC PRESS.

The gold mines of Angels Camp, Calaveras county, Cal., have been operated almost constantly for nearly fifty years. Originally a rich placer camp, the quartz veins later received the attention which their extent and richness deserved; but in the earlier history of quartz mining there the results were not always all that could be wished by the mine owners, though often the surface outcrops were found to contain valuable accumulations of gold—pockets which paid handsomely—and it was largely to these that the rich placers owed their origin. In time, as development progressed, one of the numerous veins was determined to be more persistent and of greater value than the others, and this eventually became the scene of extensive mining and milling operations. The evolution of a definite knowledge of mining geology in the Angels district has been a slow process, due largely to a close adherence to the miner's text, "Stick to the ore." Briefly stated, the gold-bearing veins of the district are largely quartz, with more or less calcite, and an admixture of magnesian material—the partly silicified schistose rock in which the veins occur. The formation is chiefly amphibolite schist, with a few intrusive dikes of diorite and other basic rocks. The width of country throughout which these gold-bearing veins occur is about 4 miles, reaching from the foot of Bear mountain, west of Angels, to a mile east of the town. The principal ore-bearing fissure thus far developed is along a zone of fracture extending in a generally northerly and southerly direction and conforming nearly to the strike of the enclosing schists. This zone of shearing, crushing and mineralization near the surface dips at a high angle—70° to 80° to the eastward—which conforms nearly to the dip of the schists. On this zone are located the Sultana, Bovee, Angels, Lightner, Utica-Stickle and some other mines, all of which have extensive development, and some of which have been largely profitable. In the vicinity of this fissured zone are several other fissures, on which valuable mines have been developed; but geological conditions of greatest interest are those affecting the principal fissure as above indicated. The mines named have been worked successfully from the surface to shallow depth, as in the Sultana, down to a depth exceeding 1000 feet, as in the Stickle, this depth becoming increasingly greater from the north end, as in the Fritz and Bovee (Sultana), toward the south, each mine to the southward finding the rich ore to extend to a greater depth than its adjoining neighbor on the north. Thus in the Sultana the good ore was discovered on the surface, but did not extend below 100 to 150 feet in depth. At the north end of the Angels mine it quit at 200 to 300 feet, and in the south end it extended to over 400 feet. In the Lightner it went still deeper, and this depth was found to be correspondingly greater in the Utica, until it reached and exceeded 1000 feet in the Stickle mine. The ore was usually found to terminate upon a talc "foot wall," and it was supposed until recently that the ore bodies had no farther downward extension.

West of this mineralized zone, which has produced in the aggregate many millions of dollars in gold, is found a heavy white quartz cropping, which strikes proceeding northward in a more easterly direction than the Stickle-Sultana vein, and dips at about 45° to 50° easterly, instead of at 70° to 80°, as in the latter. This white and usually barren vein intersects the main pay zone obliquely, the line of intersection being farther and farther from the datum plane at the surface as it goes southward. It is down to this plane of intersection that the ore bodies above referred to have been worked. The intersecting later vein of "bull quartz" occurs as a series of lenses of varying size. The plane in which these lenses lie is that of a fault fissure in which there has been great movement, the character of which is not fully known to the writer further than that there has been a reverse fault, the hanging wall side having been thrust upward relatively to the foot wall of the intersecting vein.

How important the discovery of this fact is in the possibilities presented for the perpetuation during an indefinite period of the mining industry in Angels is well understood by those who realize that the ore bodies now largely depleted lying above the fault plane may be found to continue to great depth below it.

Underneath the "bull" quartz vein the long-continued movement of the rocks has crushed the upturned edges of the greenstone schist, sheared and altered them until it has become a mass of talc schist, varying from a few feet to upwards of 100 feet in thickness. This zone of talc, which conforms to the dip of the fault plane and not to that of the amphibolite schist in which the veins occur, forms what has been considered for years as the "foot wall" of the ore bodies, although these ore bodies did not possess this talc wall from the surface, but were always found at a greater or less depth, according to the position of the mine, and always acting as a barrier to the downward extension of the pay zone.

Some months since the vertical north shaft of the Angels mine was continued downward through the talc zone, entering a region of normal amphibolite

schist. As no ore was found in the shaft, crosscuts were run, and in the east crosscut a zone of gold-bearing rock, similar to that above the fault, was encountered. This has been explored and was found to consist of several lenses of pay rock, not unlike that worked in former years above. Subsequently, the Sultana company, on the north side of the Angels mine, found the downward extension of the vein in a similar manner by sinking vertically through the talc and crosscutting to the eastward.

In the Lightner mine, which joins the Angels mine on the south, the same procedure has resulted in the discovery of three essentially parallel veins beneath the fault. Prospecting is proceeding in the Utica-Stickle mines; but the discovery of the vein has not yet been announced, though doubtless it will be found there also. It is probable that the course of the pay zone above and below the fault plane will be found diverging to the southward, which would necessitate longer crosscuts as the work of development proceeds southward along a given line. The development of this important geological condition at this late day on the "Mother Lode" of California indicates the necessity of a more careful study of geological conditions generally. It is never safe to rely on an assumption, but to prove theories by development. There are doubtless other structural problems of importance along the gold belt which remain as yet unsolved. At Sutter Creek and near Jackson, in Amador county, are geological conditions not fully understood as yet and of which a knowledge can only be gained by more or less extensive development in the section involved. Near Plymouth, also, in Amador county, in the Pioneer mine, is found complex disturbances involving the unexpected disappearance of a rich body of ore, which problem has never been satisfactorily explained. Numerous others might be mentioned, and in some instances no doubt the existing conditions are assumed not to be of unusual character, as was formerly the case at Angels, until the discovery of the real condition results from systematic or hit-or-miss exploration. W. H. S.

## Gold Placers of Fairbanks District, Alaska.

Among the placer fields of Alaska that attracted attention during 1903 were those of Fairbanks district. In Bulletin 225, entitled "Contributions to Economic Geology, 1903," recently published by the United States Geological Survey, L. M. Prindle has a brief description of this district, which is an abstract of a more complete report in preparation.

The area described lies between Chena and Tolovana rivers and is drained by their tributaries. It is 140 miles southwest of Circle, 200 miles in a straight line west of Eagle, and perhaps 200 miles above the mouth of Tanana river. This region forms a part of what is known as the Fairbanks district, where present interest is directed mainly to the valleys of a few small streams, which head close to one another just within the hill country about 12 miles north of Tanana river. Gold was discovered on one of these tributaries of the Tanana in July, 1902, on Pedro creek. In the report of the Peters & Brooks expedition of 1898 prospectors were advised to look for gold in the streams entering the Tanana from the north and heading opposite the gold-producing creeks of the Forty Mile and Birch Creek regions. The streams in which gold has been found in the Fairbanks district all head far back in the Yukon-Tanana divide and flow westward or southward.

The creeks of present economic importance are Pedro creek, called Gold stream below the point where Gilmore enters it, and Twin creek, a tributary of Pedro; Cleary creek, with its tributaries—Chatham and Wolf—and Fairbanks creek. They are but a few miles apart and are separated by broad divides that rise 1000 feet or more above them, and flow in divergent courses—Pedro towards the southwest and west, Cleary towards the northwest, Fairbanks towards the east.

These are the only creeks in the Fairbanks district which up to the present time have afforded paying deposits. The conditions of the occurrence of gold on all of them are essentially the same. No foreign wash has been observed, and it would seem that the gold is derived from the rocks in which the creeks have cut their channels. The pay is generally found at considerable depth and, except at a few localities, in frozen ground. The creeks are small, carrying hardly sufficient water for extensive operations, and their grade is low. Timber for mining purposes on most of these creeks must be freighted for several miles from the lower valleys. Trails along the ridges are mostly good, but where they traverse the swampy areas along the creeks they are generally bad.

Although no large values have yet been discovered, the gold seems to be well distributed along the creeks where it has been found. In some localities gold is known to occur in sufficient quantity to pay for working even under the present unfavorable conditions. Notwithstanding the inaccessibility of the district, which can be reached only by trail, the high prices of supplies, and the lack of money necessary for the development of claims, this district produced from \$30,000 to \$35,000 during the short summer of 1903.

## Mining and Ore Treatment in Western Australia.\*

NUMBER V.—CONCLUDED.

Written by DONALD CLARK.

The gold dissolves readily at first, and then solution takes place more and more slowly, until the commercial limit is reached. The state of the roast is the essential factor governing the success or failure of the process. It is found that if alkaline sulphides are present not only does the solvent action of the cyanide cease, but that a partial precipitation of gold takes place. For instance, at one of the prominent mines, the following results were obtained:

The solutions flowing into the settlers contained 40 grains of gold per ton. The solution was then made up to the desired strength with cyanide. One hour after adding KCy solutions assayed 50 grains per ton; 4½ hours, 42; 8½ hours, 40; 12½ hours, 37; 16½ hours, 25; 28½ hours, 25. Had the solution gone on in the regular way, the value would have been about 170 grains per ton. This sample was found when tested with the lead carbonate method to give a sulphide reaction. The method adopted for the quantitative determination of sulphur is based upon the qualitative test already described. About 5 grams of ore are boiled with about 50 c.c. of 5% NaOH for about five minutes. This is filtered, washed, and the filtrate diluted to 200 c.c. with cold water. It is then made faintly acid with acetic acid and titrated with decinormal iodine solution. The reaction  $H_2S + I_2 = 2HI + S$  is quantitative, and the end reaction with starch as an indicator is sharp. This method will indicate not only sulphur, but any other compound which can be raised to a higher state of oxidation by iodine. Further, it assumes the decomposition of all sulphides by the caustic alkalis. By this method of indicating sulphur, only 0.03% was shown to be present in the case of the ore, which refused to yield its gold to the KCy solution. Assuming that the sulphur is present in the state of soluble sulphide, and that the following equation is a quantitative one— $K_2S + KCy + H_2O = KCyS + 2KOH$ —then each atom of S destroys a molecule of KCy, or double its weight, so that 0.1% of S means 2.24 pounds of S and a destruction of 4½ pounds of cyanide per ton. The addition of soluble lead salts to the solution, in order to precipitate the sulphur of the soluble sulphides as sulphide of lead, does not appear to be carried out at any of the mines. A test which has to be carried out regularly is the determination of the alkalinity of the solutions from the ore. Now, as water is not used for moistening the sand, but dilute KCy solution, the problem is to determine that of the liquid, independent of the KCy present. This is done by running in  $AgNO_3$  solution, using KI as an indicator, and taking it to opalescence. This fixes the KCy; a few drops of alcoholic phenolphthalein solution is added, and the alkalinity indicated. This is titrated with decinormal HCl. The protective action of an alkaline on KCy is now very well known, and care is always taken to see that there is always free alkali present. If the solution from an ore is neutral a small amount of lime is added.

What the effect of moistening finely divided hot ore with KCy solutions is, cannot be definitely stated, but it would seem from some instructive experiments carried out by S. Radcliff, the metallurgist to the Chance mine, Cassilis (V.), that a great deal of cyanide is destroyed.

Mr. Radcliff was struck with the amount of KCy decomposed on running a solution through dry sand, and found the finer the sand the higher was the consumption. In order to find the relationship between the size of the particles and the consumption of KCy he powdered some clean glass and sieved it through various sized sieves. He determined the amount of cyanide in his original sample, the amount retained on the glass and the amount oxidized to cyanate. Twenty-five c.c. was used in each case; this was washed with 25 c.c. distilled water.

The method of treatment at the Great Boulder of sending back the water washes from the filter presses, in which there is a minimum amount of cyanide, is one to be recommended.

The treatment of the pulp after its gold has been dissolved in the agitators is an adaptation from modern chemical practice. First of all are the monteju, of which there are four, into which the slimes from the agitators pass. Each monteju has a capacity of 500 cubic feet, and is simply a steel pressure tank, fitted with a pipe through which air may be delivered, and another pipe reaching nearly to the bottom and leading to the filter presses above. By admitting air under pressure the pulp is forced up to the other tube as water is forced out of a wash bottle. The pulp is forced into a filter press, taking but a few minutes to fill it; as soon as the press has been filled, water is turned on to wash the cakes, and finally a current of air to dry them.

A filter press is a mechanical contrivance for separating finely divided solids from liquids; in its simplest form, it might consist of three square or rectangular frames, like the frames of a schoolboy's slate, tightly clamped together, the press being

\*Abstract Australian Mining Standard.



solely for the purpose of drawing the frames together, and not, as might be imagined, of forcing solutions through. The middle frame is open—that is, a frame without a slate in it; on one side of this open frame is another, which contains a corrugated plate instead of a slate; over each side of the corrugated plate lies a sheet of punched iron, or a screen; on the other side of the open frame lies another frame similar in construction to the first. A sheet of filtering cloth is doubled over the open frame. If water and slime are forced through a lateral opening into the open frame, then the liquid will escape through the filter cloth, then through the screen, and find its way between the corrugated plate and screen. By providing a lateral tap on this frame, water may be drawn off, and the open frame filled with a cake of slime. By closing the lateral opening through which the slime entered, and forcing water through a lateral opening between the corrugated plate and the screen, the liquid will pass through the screen, then through the filter cloth, then through the slab of slime in the open frame, through the filter cloth on the other side, then through the screen, and find its way down the corrugated plate, when it may be drawn off. Similarly air may be forced through to displace water or solutions. Instead of three frames, a great many are clamped up together. All of these have projecting lugs on their corners. Through these lugs holes are bored, which form a continuous pipe when the frames are in position. Lateral openings are made into each frame from one or other of these pipes, in accordance with its purpose. Each frame must be planed up accurately to minimize the danger of leakage; also, strips of tarred blanket are laid along the faces, so as to serve as packing. The filter cloths which lie over the open frames are

great diversity as to the number employed for a given quantity of slime, yet at all mines they appear to work well. Practically one size is adopted, and for increased capacity the number is added to. The spitzkasten is, as the name implies, a pointed box, the dimensions being 6 feet square and 6 feet 9 inches deep, the slope starting 1 foot from the top. The inverted pyramid is really 6x6x6 feet. These are constructed of  $\frac{1}{2}$ -inch mild steel, riveted on to angle iron, 2x2x $\frac{1}{2}$ -inch at the edges;  $\frac{3}{4}$ -inch rivets, spaced 1 $\frac{1}{2}$ -inch centers at the sloping edges, and 3-inch centers on the upper edges, are used. The plates forming the sides, if more than one, are riveted with  $\frac{3}{4}$ -inch rivets, 1 $\frac{1}{2}$ -inch pitch, the lower plate to overlap, so that no slime will collect on the ledge. The bottom of each box terminates in a cast iron cap, fastened on with  $\frac{1}{2}$ -inch cup head bolts, and packed water tight. A 2 $\frac{1}{2}$ -inch gas tap opening is provided; a pipe with valve attached screws into this, and so allows of regulation of downward flow. The boxes are arranged in series, connected into a square or rectangle. Each series has one or two smaller conical boxes preceding it. These are about 2 feet and 2 feet 6 inches in diameter, and 2 feet 8 $\frac{1}{2}$  inches and 3 feet 2 $\frac{1}{2}$  inches deep respectively. A cast iron cap, with screw for a 2-inch gas pipe, is provided below. The distances between the centers of the boxes are 2 feet 8 inches, 4 feet 8 inches, and 6 feet respectively. The slimy water flows from the sand separators, from the bottom of which any sand or heavy particles of amalgam are led back to the pans. The lighter material from one spitzkasten to another is settled and drawn off from the bottom of each at about a 1 to 1 consistency, while the clearer and clearer water overflows from each until it finally passes into a launder almost clear. How strange it

arrayed against experts to prove the theories of their respective principals?

The citation of mining in Texas as compared to that of New Mexico is not a happy one, for there is no government land in Texas, and the prospector has not the same rights of location.

It is a novel theory to me that mining litigation fosters and induces prospecting and mining.

It strikes me that laws which effect a reduction of litigation evidence a minimum of injustice, which of itself is an attraction to rich and poor.

San Francisco, Aug. 9.

M. P. Boss.

TO THE EDITOR:—The apex or extralateral right is certainly legal. It is also an equitable right. No prospector ever goes hunting for land by the acre. He wants a vein and cares little for the land. If he finds a vein, the law gives him that vein as far as he cares to follow it.

The apex litigation is not caused by the law, but by the attempt of the dishonest sidelineer to get something that doesn't belong to him. There would be little or no trouble if B would let A's vein alone and find one for himself.

Tonopah, Nev.

MINER.

## THE PROSPECTOR.

Where timber is not available for staking mining claims, the prospector may build a substantial monument of rocks. Make every monument of good size, and do not fail to place any that are required to make the outlines of the claim perfectly plain to any one who may be interested in tracing them. Each monument should be in plain sight of the next one on the line, and, if trees or brush intervene, they should be removed. If a change in the slope of a hillside causes the monuments to be hidden from each other, intermediate monuments should be placed, so that the lines may be readily followed. The greater the value of the mine proves to be upon development, the more important is it that the location be properly made. Faulty locations are the source of much subsequent litigation, and in some instances have caused the owner to lose his claim. It is the best practice for business reasons to comply as fully as possible with the requirements of the laws—Federal, State and local.

The appearance of the oxides and carbonates of metals in surface outcrops, known to miners and prospectors as "blossom," is merely an indication of the minerals lying below, and not usually an index of either their amount or grade. Thus an iron gossan, nearly or entirely destitute of copper ores, may cover a large and valuable deposit of sulphide copper ore.

Gold is sometimes found in payable amount in large white outcrops of white quartz, but not frequently. A mineral stained (iron oxides) quartz is more attractive, but this should not detract from an investigation of the barren-looking and often glassy quartz, for this rock is sometimes rich. Intrusive dikes are often found to contain precious metals, and should be investigated as well as quartz veins. Quartzites not infrequently are gold bearing.

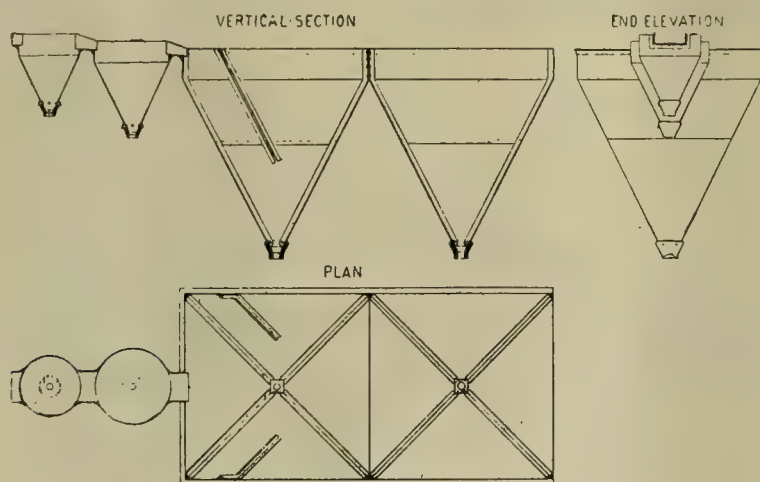
The white mineral samples from Livermore, Cal., are both magnesite, one being the soft and the other the hard variety. The two black, heavy minerals are manganese oxide (psilomelane) the bluish black one and chromic iron the spotted one. The spots and veinlets in the last mentioned are serpentine. This class of ore can be concentrated to a high-grade chromic iron.

The whitish-green rock from Bisbee, Ariz., is silica—a fine-grained quartz rock, probably the result of alteration of limestone, as this is a common occurrence in that district. Similar phenomena occur in Shasta county, Cal., and elsewhere.

The ore from Grizzly Flat, Cal., is mostly pyrrhotite—a subsulphide of iron slightly magnetic. With it occur pyrite and marcasite and a small amount of chalcopyrite. The iridescent tarnish is due to the presence of copper. The lace-like structure of the pyrite is not of uncommon occurrence on the east lode of California.

There are four commercial ores of iron, viz., the red oxide (hematite),  $\text{Fe}_2\text{O}_3$ ; the brown oxide (limonite),  $2\text{Fe}_2\text{O}_3 + 3\text{H}_2\text{O}$ ; magnetite (the magnetic oxide),  $\text{Fe}_3\text{O}_4$ ; and siderite (the carbonate),  $\text{FeCO}_3$ . Often these ores are found almost pure, but usually they are mixed with silica, alumina and other earthy minerals.

ANY MAN who ever worked in the mines of Montana, or any of his male descendants, is eligible in a competition examination to be held from Sept. 19th to Sept. 24th at the State School of Mines, Butte, Mont., for a scholarship in the School of Mines at Columbia University, New York, which carries with it an income of \$1000 per year. The scholarship has been established by a daughter of Marcus Daly. Inquiries concerning the matter should be addressed to Prof. W. G. King, School of Mines, Butte, Mont.



Spitzkasten at Great Boulder Mine, Western Australia.

stitched together in two or three places, where they project, so as to prevent them giving when the pressure is applied. The whole of the frames, which are vertical, are carried on horizontal bearers by means of projecting arms; they are brought together by means of powerful screws, or by hydraulic pressure.

When a press is empty, slimes are forced in, either by pumps or by the compressed air of the monteju. The mud flows along the slime passage pipe and rushes into the open frames; air is displaced and the solution starts to run through. Taps are turned off and the liquid finds its way through the filter cloths, thence through the filter frames; in from fifteen to twenty minutes a press is full of hard caked slime. The cakes are next washed. Connection with the pressure tank is cut off, wash water is forced into a frame on one side of the cake, this passes through the cake and escapes on the other side, the pressure applied being about eighty pounds per square inch, the time taken for washing being about twenty minutes. Air is then passed through in the same direction as the water. This serves to displace nearly 50% of the water that would otherwise remain in the cake. Even after air washing they contain from 15% to 20% of moisture. The press is then opened by unscrewing or releasing the hydraulic pressure. The frames are slid along the bearers; the slabs of semi-solid slime are knocked out; these fall into trucks below, the filter cloths scraped wherever necessary, the frames brought together and tightened up again, the press then being ready for another charge; the time taken for emptying and closing being about twenty minutes, or an hour in all. As an actual example, a solution containing 0.17% KCy before agitation, contained 0.09% after treatment, and 0.05% after washing the cakes. The slimes assayed 5 dwt. before treatment and 1 dwt. after treatment; the consumption of cyanide being 47%, the displacement of KCy solution by water 44%. The actual cost of labor in filter pressing is not high. Two men, paid at the rate of 11s. 9d. per shift, deal with ten presses of four tons capacity each in that time.

One of the most interesting innovations on the field is the spitzkasten used for thickening slimes and clarifying solutions. The old rules with regard to their dimensions are ignored, and though there is

is that the terrible bugbear of the old-time amalgamators and concentrators should be looked upon as a blessing by the modern metallurgists. Avoid making slimes was the old, and slime everything the newest, doctrine. But since slime production and treatment is much more expensive than the older methods, the latter is much to be preferred when there is no advantage in fine grinding.

## The Extralateral Right.

TO THE EDITOR:—It was with considerable surprise that I read your editorial under the title of "The Extralateral Right Law," and saw there a practical reiteration of a statement made by your correspondent in Africa—Mr. Van Wagenen—to wit: "I would say that it is only necessary to live in a mining region where vertical boundaries prevail and observe the deadening influence on the community."

Now, as I have lived many years in Mexico, and held mining interests in five of her States, I have had some experience in vertical boundary lines, but have never seen that "deadening influence."

On the other hand, it seems to me that the American prospector is as much in evidence in Mexico as he is in his native land.

I was so situated in that republic that I was often called upon by Americans for advice as to the best part of Mexico in which to prospect. My invariable reply was that I knew of no section that had not been and that was not being run over by foreign prospectors.

Time and again I have heard that feature of the Mexican law extolled by Americans, but I cannot recall of once hearing there an expression against it, and it is my firm conviction that if a vote could be taken of every American miner and prospector in Mexico upon the point in question 99% would be for vertical boundaries. When a title is once obtained it is unassailable and immovable, and no one, however poor, need fear of being forced out by a powerful neighbor.

In contradistinction, who that has long been familiar with mining in the United States cannot recall at least one instance wherein a title was involved by the scientific tracing of stringers and experts were



## The Ore Deposits of Bisbee, Arizona.\*

NUMBER V.

Written by F. L. RANSOME.

**FORM AND GEOLOGICAL ENVIRONMENT OF THE ORE BODIES.**—The Bisbee copper ores as exploited in the Copper Queen, Calumet & Arizona and Lowell mines occur for the most part very irregularly as large masses in the Escabrosa and Naco limestones. The horizontal dimensions of these ore bodies are usually much greater than the vertical. They are rudely tabular or lenticular in form, and lie generally parallel to the bedding planes of the inclosing limestones. Definite walls are exceptional. As a rule, the oxidized ore passes gradually and irregularly on its peripheries into so-called "ledge matter," consisting chiefly of soft limonitic clays, which in turn grade into more or less altered limestone. The unoxidized sulphide ores may exhibit a peripheral transition either to oxidized ores or to metamorphosed limestone impregnated with pyrite.

Under these circumstances the actual shape of an ore body is variable, being dependent upon the price of copper and the economic conditions of working. It is possible, however, to gain a fairly definite idea of the size and form of typical ore bodies by considering some of the older stopes, which, while not exhausted, have yet run through the ore at so many points as to establish its general contour.

The accompanying figures show plans and sections of three such typical stopes in the Copper Queen mine. On any single horizontal plane the dimensions of the ore masses rarely exceed 150 by 200 feet, but series of connected stopes indicate that in general plan these figures may be considerably exceeded. Thus the stopes northeast of the Holbrook shaft indicate the existence of a practically continuous body of ore and "ledge matter" about 800 feet in length and 600 feet in width. On the other hand, the actual maximum thickness of the ore bodies hitherto extensively worked rarely exceeds 125 feet.

**RELATION OF ORE BODIES TO THE BEDDING OF THE LIMESTONES.**—The statement that these very irregular tabular or lenticular masses of ore lie parallel with the bedding planes of the inclosing limestones is the simplest expression of a general relation and requires some qualification when the ore bodies are studied in detail. It is then found that the original structure of the limestone in the vicinity of the ore is very much obscured by metamorphism, if it is not entirely obliterated by the extensive formation of ferruginous clays resulting from the oxidation and decomposition of the ores and country rock. Furthermore, the ore sometimes cuts across the bedding of the limestones for considerable distances, as will be later shown.

Owing to the extensive alteration of the limestones in the vicinity of the ore bodies, observations on dip and strike of the beds can be made in but a small part of the extensive underground workings of the Copper Queen mine. Such observations as were recorded indicate a general southeasterly dip of less than 20°. But there is much diversity, and the beds were evidently subjected to considerable local disturbance prior to the deposition of the ore. At the old Queen incline, which follows the bedding, the dip is about 40° and is toward the south. This steep and unusual local dip apparently accounts for the exceptional attitude of the original Queen ore body, a roughly cylindrical mass 60 feet in diameter and 400 feet in length, which, according to the section shown in Fig. 3, had its axis more nearly vertical than horizontal. As this body presented some points of difference from those now open to study, the description of it by Mr. Douglas may be quoted. He writes in Transactions of the American Institute of Mining Engineers:

"The outcrop of copper which was first attacked, and which was, in fact, the only extensive surface indication, was on the northern exposure of a limestone hill. In this place stripping revealed a solid body of oxidized copper, iron, and manganese ore over 60 by 60 feet in area, and so rich in copper that the furnace, fed from the surface ores, yielded for a few months 23% of metal. \* \* \* This large outcrop was inclosed in an almost circular unaltered limestone frame. Associated with the ore was an abundance of calcite. The percentage of silica was so small that quartz had to be added to the furnace charge. This body, retaining its general dimensions and well-defined limestone walls, dipped at an angle of about 30° southeasterly into the hill. Between the 100 and 200-foot levels the ore changed into a clay, with well-marked bedding, too lean in copper carbonate to be profitably worked, but below this zone of clay the copper, as carbonates and oxides, increased to 12%, and was associated in a measure with limonite, embedded in ferruginous clay. This ore body extended to a depth of 400 feet on the incline from the surface, and there terminated abruptly in hard limestone."

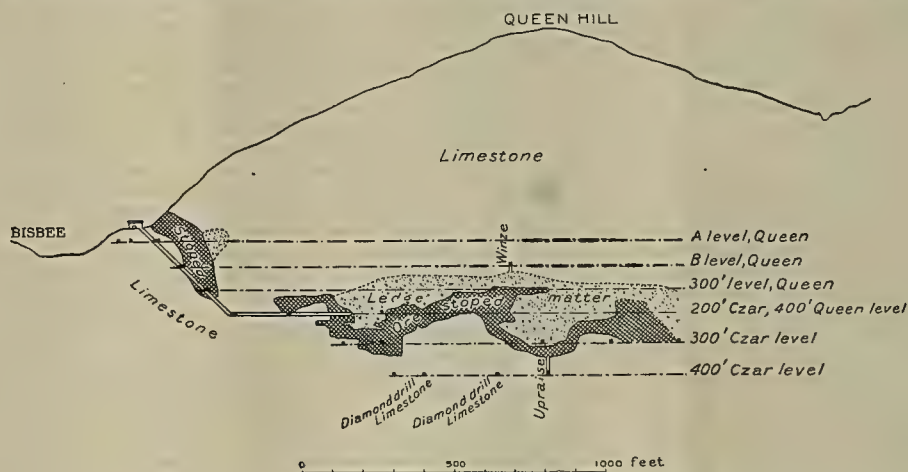
This single ore body yielded about 80,000 tons of ore and 20,000,000 pounds of copper.

Between the Queen incline and the Holbrook shaft,

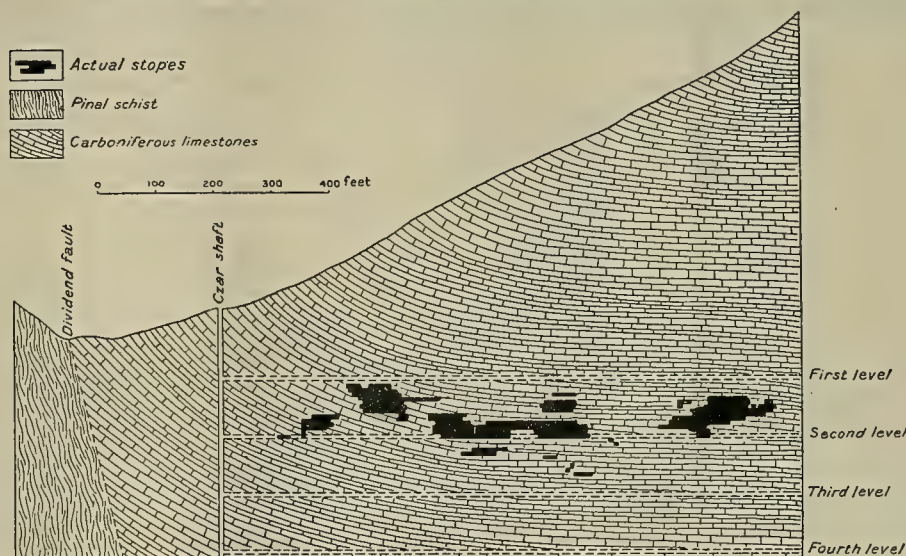
and southwest of the Czar shaft, the usual gentle southeasterly dip seems on the whole to prevail, although opportunities for satisfactory observation are rare. The very important ore bodies occurring in this part of the Copper Queen mine have been found on the whole to be nearly horizontal. As a rule, very few traces of original bedding are discoverable in the much altered, mineralized and decom-

posed material occurring within 500 feet of the probable position of the Dividend fault.

to follow what seem to be bedding planes in the mineralized limestone. In the Calumet & Arizona mine the limestones maintain their general southeasterly dip, but are more steeply inclined than in the adjoining Copper Queen workings, the average dip being about 35°. Stopping had not gone far enough in this mine at the time of visit to demonstrate the approximate shape



Section of the Copper Queen Mine Through the Open Cut and the Southwest Stope.



Cross Section of Copper Queen Mine, Bisbee, Arizona.

Diagrammatic northeast-southwest section through the Czar shaft of the Copper Queen mine, showing the general structural relation of the ore bodies. The black shows actual stopes. The structure of the limestones is generalized and no attempt is made to distinguish mineralized limestone or the altered clayey material known as "ledge matter" from the normal unaltered beds.



Plans and Sections of Stopes in the Copper Queen Mine, Showing Approximate Forms of Typical Ore Bodies.

posed material occurring within 500 feet of the probable position of the Dividend fault.

In the Spray workings the general dip of the limestones appears to be toward the southeast at an angle of about 15°. The ore bodies correspond roughly to this gentle inclination. This fact was particularly noticeable in the case of a relatively small body of chalcopryite ore being stoped in the seventh level at the time of visit. On the eighth level, also, it was noticed that bands of pyrite show a marked tendency

of the large ore bodies. There is little doubt, however, but that they are of the same general character as those worked from the Spray shaft, although more noticeably inclined in conformity to the increased dip of the inclosing beds. There is observable in the deeper levels of this mine the same pronounced influence of the bedding planes in directing pyritic impregnation as was noted in the Spray.

The development of the Lowell mine is as yet insufficient to throw much light on the shape and extent

\* Abstract Professional Paper No. 21, U. S. G. S.

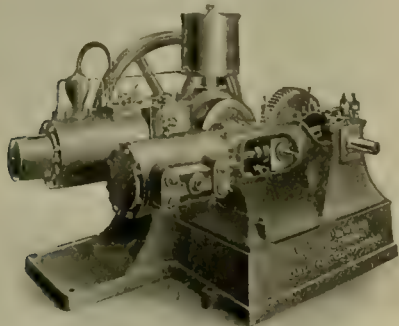


of the ore bodies. They are evidently of irregular form, but lie with their two greater dimensions parallel to the bedding planes of the limestone, which here have an easterly dip of from 35° to 45°. These ore bodies are undoubtedly of the same general type as those found in the Copper Queen and Calumet & Arizona mines.

(TO BE CONTINUED.)

### Engine Air Compressor.

Herewith is illustrated a 10 H. P. "M & W" engine air compressor now in operation at the new building at Forty-second street and Park avenue, opposite



Geared Air Compressor.

the Grand Central Depot, New York City, now in course of construction. The air compressor is an 8x8, giving 70 cubic feet of free air per minute against 80 pounds pressure. It was installed by the contractors, Ritchie, Brown & Donnelly, to furnish air for their pneumatic tools, and furnished by August Mietz, 128-138 Mott street, New York City.

### The Cockerill Gas Engine.

The Cockerill gas engine illustrated herewith is of the four-cycle type, in which only one impulse caused by the combustion of the gaseous mixture takes place during one stroke of the complete cycle or in two revolutions. The engine acts as a pump as well as a motor. The gas mixture is drawn in during the first or forward stroke, and compressed during the second or return stroke, exploded in the third, forward, stroke and exhausted in the fourth, return, stroke,

former, this method resulting in constant compression.

By this latter method the mixing valve remains lifted up during the entire suction stroke. The gas valve opens at a certain point during the suction stroke, and remains open until nearly the end of the stroke. The point of opening is variable, and is determined by the governor at all times; the quantity of gas admitted is intended to be in exact proportion to the load of the engine, the compression to remain constant.

The engines are provided with magneto-electric igniters of the most improved system. The starting of the engine is effected by compressed air. The Wellman-Seaver-Morgan Co., of Cleveland, Ohio, say: "We guarantee a heat consumption of 10,000 British thermal units per brake horse power per hour, and a thermal efficiency of 25% at the rated capacity of the engine."

### Tin Deposits of the York Region, Alaska.\*

Written by A. J. COLLIER.

Tin is known to be irregularly distributed in the York region over an area of about 450 square miles, embracing the western end of the peninsula. Its occurrence in alluvial deposits has been verified by the United States Geological Survey at three localities, and the existence of tin-bearing lodes has been observed at two points. The extreme points known are 25 miles apart. In addition to these, prospectors report the occurrence of tin at a great many other places, either in lode or placer form, and though it has not been possible to verify these reports, there is reason to believe that they indicate a more extensive distribution of tin ores. Many of the reported discoveries lie beyond the limits of the York region and indicate that the tin districts extend 100 miles or more to the northeast.

The tin ore is almost all cassiterite (tin oxide), though some stannite (sulphide of tin, copper and iron) has been found. In the bedrock two essentially different types of deposits are represented. The ore occurs in veins cutting phyllites or metamorphic slates, and is disseminated through more or less altered granitic dikes. The lode deposits of the latter type give promise of commercial importance. Lode deposits of the former type have not been discovered in place, but the occurrence of tin-bearing quartz veins

and which have been examined in some detail are Lost river, Cape mountain, Buck creek, Buhner creek and Anikovich river.

**LOST RIVER.**—Lost river enters Bering sea about 15 miles southeast of York, 25 miles west of Teller, a town on Port Clarence, and 10 miles northwest of Point Spencer, at the entrance to Point Clarence. The river has a length of about ten miles and drains the central part of the York mountains. The mountains constitute a nearly circular area of rugged land forms, about 15 miles in diameter. The summits rise to a general level of about 2500 feet, and, as noted, reach a culmination of 2900 feet in Brooks mountain, near the north side of the area, which is the highest point in the northern part of Seward peninsula.

On the seaward side the Cape York bench is bounded by steep bluffs, which at places front directly on Bering sea and at other points rise from a lower and younger bench nearly at sea level. This lower and newer plane, from the mouth of Lost river eastward to Port Clarence, has a width of  $\frac{1}{2}$  mile to 3 or 4 miles. It is in part a rock bench and in part a gravel-built coastal plane. Immediately north of Port Clarence the lower coastal plane is fringed by a wide lagoon, cut off from Port Clarence by a sand spit.

The York mountains are generally devoid of the tundra vegetation which covers so much of the Seward peninsula; and along Lost river, from the coast to the tin deposits, can be found an exceptionally good roadbed for this part of Alaska. For one traveling on foot it is as firm as an ordinary macadamized road, and owing to the ease with which the trip up the river is made, the distances are likely to be underestimated by persons who have traveled in other parts of Seward peninsula. Lost river forks about  $\frac{1}{2}$  miles from the coast, one branch continuing in a nearly due north direction, while the other drains a country to the west that has not been examined by geologists.

About 4 miles from the coast the north fork of Lost river divides. The eastern branch is Cassiterite creek; the western, which is somewhat larger, rises about 3 miles to the north, in the slopes of Brooks mountain.

The Lost river tin deposits are located on the east side of the north fork of Lost river. The ore has been found on Cassiterite creek and on another eastern tributary, known as Tin creek, which enters Lost river about a mile below the mouth of Cassiterite creek. The latter stream has a length of about 3 miles; its head is within 1 mile of Cassiterite creek, and after flowing parallel with Cassiterite creek for about 1 mile it turns westward and enters Lost river from a deep canyon cut in the limestone of the York mountains. At its mouth, Cassiterite creek is about



Cockerill Blast Furnace Gas Blowing Engine.

this action taking place on each side of the piston, as the cylinders are built double acting. The Cockerill engine is constructed with one, two or four cylinders—either single, tandem, twin or twin tandem; so that the two-cylinder engine has the same power delivery as a single cylinder steam engine, and the four cylinder engine as a duplex steam engine. The valve gear is actuated by a second motion shaft, driven by gearing from the crank shaft and running at half the speed of the same. It is located parallel to the axis of the engine, and carries the cams or eccentrics which operate the valves. The inlet valves are situated on the top and the outlet valves on the bottom of the cylinder, designed to secure ease of accessibility.

The regulation is effected by a governor which controls the admission of the mixture of gas and air either by automatically cutting off or by throttling a constant mixture, either of which produces variable compression; or, by varying the relative volumes of air and of mixture, the latter always following the

in slates is inferred from the distribution of the placer tin and from pebbles of slate containing small tin-bearing quartz veins, which have been observed in the gravels. It should be noted that no granite has been found in the slate area, and there is no positive evidence that the tin there has any genetic relation to granite intrusives.

From a comparison of the evidence at hand with the facts known with regard to the older tin-bearing districts, it seems to be at least possible that the tin lodes of both types are connected with intrusive granite bodies, some of which have been exposed by erosion, while others are still deeply buried. These granites, which probably were intruded at about the same time, mark a zone of plutonic activity extending from the Diomed islands northeastward, parallel with the Arctic coast, for 100 miles or more. The localities from which tin ore has actually been obtained by United States Geological Survey parties

100 feet above the sea. In the latter part of July, 1903, Lost river carried approximately 1000 miners' inches of water.

The York mountains, in which the Lost river basin lies, are composed almost wholly of gray limestone of Silurian age. Along Lost river the limestone shows little general metamorphism, and as a rule dips at low angles. From the coast to Tin creek the strata generally dip to the north, and unless there are faults, which were not detected, a thickness of over 5000 feet of limestone must be exposed. Near the mouth of Lost river a section of these limestones lying nearly horizontal is exposed in a mountain, called by prospectors Saddleback, which has an elevation of more than 2000 feet above sea level. Dikes of rhyolite cut this limestone at several places along Lost river, and a number of these were readily traced across the limestone by a growth of moss and other vegetation which formed over them, the limestone itself being utterly devoid of vegetation.

(TO BE CONTINUED.)

\*Abstract Bulletin 239, U. S. Geol. Sur.



### Knotty Problems.

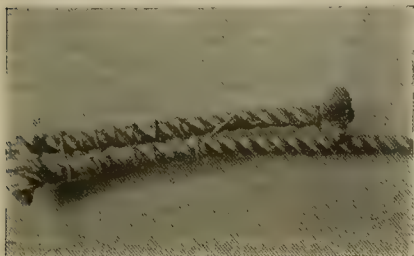
Every one whose duties require him to handle ropes is interested in the various methods of making quickly knots for the varied purposes for which ropes are used. The accompanying engravings illustrate better than can be described the methods of making

part. If it is used for hoisting, it should be of no larger diameter than the original size of the rope.

Splices can be made very quickly, and where a strong, quick splice is desired, it can be done by unwinding the ends of the rope and by simply braiding the ends together. You have a very simple and strong splice, but it is thicker than the original diameter of the rope.

very strong splice, and, if the ends are properly tucked in, it will be no larger than the original diameter of the rope, and can be used over pulleys or where it is necessary that the splice be no larger than the original diameter of the rope.

Two ropes can be joined by a square or reef knot. It will hold tight and not jam unless with a small size rope.



One way to join two ropes.



Ends unwound and laid together.



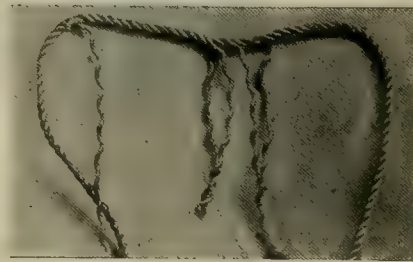
A very simple strong splice.



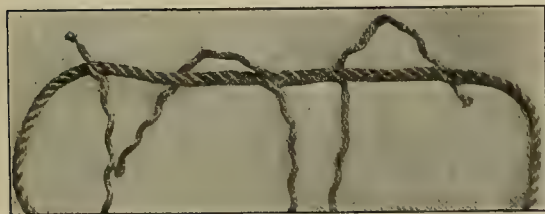
Rope laid together ready to weave in the strands.



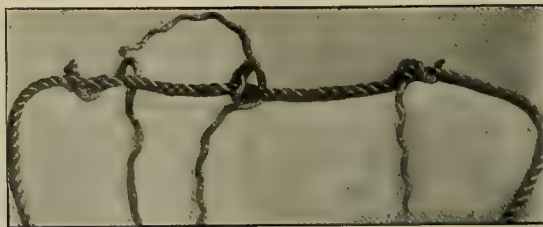
One strand wound into place.



Unwind strand to the right and follow with another strand.



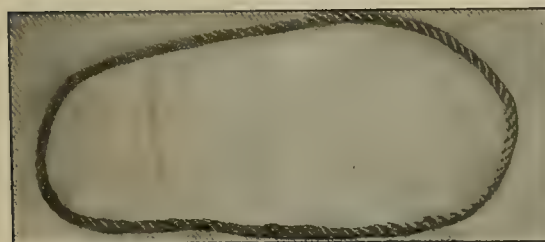
Strands laid in ready to fasten.



Two ways of fastening the ends.



Square or reef knot.



Both ends spliced together, forming a sling.



Plain bend.



Double bend.



Bowline.



Bowline.



Running bowline.



Bowline in the bight.

splices, hitches and numerous kinds of knots. The illustrations are from an interesting little pamphlet issued by the Edward Christian Co. of Massillon, Ohio, on prospecting for coal, oil and other minerals by means of drilling. From this little work is taken also the description of the various knots, etc.

Any one can tie a knot, but to tie a knot that will not jam and can be easily and quickly untied is the secret of all knot tying. A great amount of rope and cordage is destroyed by not being properly tied.

In joining two ropes together it is necessary to have the rope as strong at the splice as any other

A very strong and serviceable splice can be made by unwinding one strand for several feet and laying the rope together, winding one strand into the rope as the other is unwound.

After it is in place, unwind the two remaining strands following the one which is wound in the opposite direction from the one first laid in.

Thus you have two strands laid in opposite directions and ready to tuck. This can be done by crossing one end over the other and tucking the end under the strand or by drawing the ends in a knot and tucking them under the strands as before; thus we have a

Another safe way to join two ropes is a plain bend or a double bend; this knot can be untied very easily and is stronger than any part of the rope.

A bowline is very useful where it is desirable to have a loop at the end of the rope that will not slip.

Another form of bowline which is sometimes used is made by taking the end of the rope through the opposite way.

The only safe slip knot is the running bowline, which will tighten and not bind the rope.

A safe knot is the bowline in the bight. It is a double bowline and makes a very strong hitch in the



middle of a rope. A good way to fasten a rope to a becket in a pulley or around a beam is two hitches, which can be strengthened by taking a round turn also. There is a difference of opinion in regard to tying these hitches, but either is very strong.

A good way to fasten a rope to a becket or hook, or where it is not necessary to remove it, is by a half splice, which makes a neat and strong way to securely

they are made.

A clove hitch will be found serviceable for holding the top of a post or beam in a perpendicular position. It will bear the strain on either side of the knot without slipping; thus a long rope can be used for two guy lines.

An effective hitch for hoisting or lowering timber in a mine is the timber hitch. This is simple, yet ef-

much rounded. A cat's paw is famous for its great strength. It is simply an endless rope, and is stronger than any other part of the rope. In the cut of the cat's paw the outer loop should be given one more half turn to the right.

Another strong timber hitch, which is very serviceable but rarely used, is the halliard bend. This knot will not slip under the most severe strain, making it



Two hitches.



Two hitches.



To start a half splice.



Half splice properly started.



Half splice, to fasten a rope to becket or timber.



Clove hitch.



Timber hitch.



Timber hitch combined with half hitch.



Blackwall hitch.



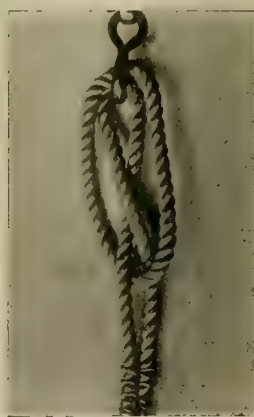
Hitch for strained hook.



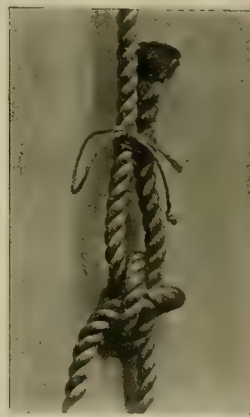
Cat's paw. This knot is not properly made. Note the rope on the right side of the cut.



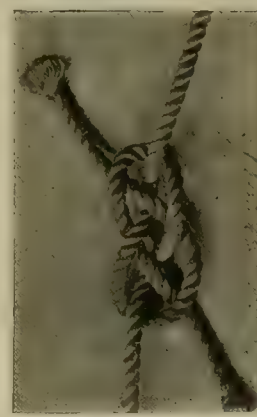
Halliard bend.



Clove hitch for sand pipe or boiler.



Rolling hitch.



Garrick bend.



Sheep shank.



Granny.

fasten the rope. By unwinding the rope for several turns and starting two strands through, bringing them out between different strands on the opposite side, you have the splice started, which is easy to complete, and, by trimming the ends, they can be tucked under the strands, making it tapered to the end.

There are a great many hitches that are useful and effective when used for the purpose for which

they are made. A backwall hitch is made by a twist of rope, which secures one object to another, and can be also safely made with a chain.

Another effective hitch can be made, which is more complex but useful, for a hook that is strained or is

reliable at all times.

A good way to fasten the end of a wire or manila rope to a hook, or at the top of a bailer, is to make a clove hitch and tie the loose end to the line. This also can be made stronger and more effective by putting in a half splice. It will wear a long time and will not draw tight.

A rolling hitch is very useful to fasten one rope to another where it is necessary to strengthen it.

A knot that is useful in tying two large ropes together is what is commonly called a Garrick bend. It is rather hard to tie, but strong, especially for hawser-laid rope.

When a rope is too long it can be shortened by putting a sheep shank in the rope.

A knot that is easy to tie, liable to slip and hard to untie is the granny. This knot is tied by people of all ages, has caused no end of trouble in trying to untie it, but still is universally used. It comes natural to tie this knot and to untie it—well, cut the rope, that is the best way out of it.

Knot making is a very useful hobby and a liberal education may be very useful. Every one should learn to tie at least the simple knots, so they may be easily untied.

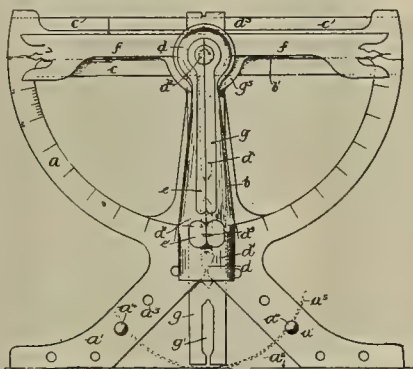


# Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 2, 1904.

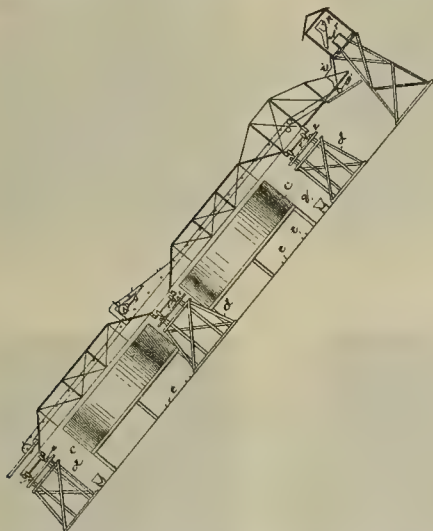
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

LEVEL.—No. 765,858; D. Ricono, Fremantle, Western Australia, Australia.



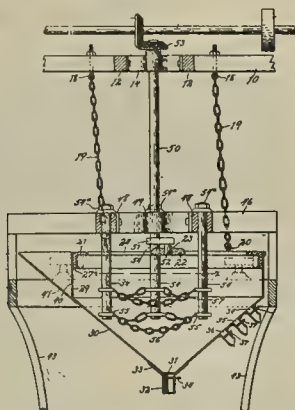
In instrument described, dial having legs at right angles to one another, transverse piece on back of dial, transverse piece and bottom surfaces of legs being parallel to zero line of dial, index hand and plumb-bob box pivoted to dial, plumb-bob hung in box and visible through vertical opening therein, pins in legs and spring metal strip resting on pins and adapted to hold instrument to round body placed in angle between legs.

BELT CONVEYOR APPARATUS.—No. 766,040; J. B. Humphreys, New York, N. Y.



In combination in conveying apparatus, movable conveying belt framework, means for laterally moving and supporting framework, conveying belt mounted and actuated upon framework, and means for discharging material from belt, consisting of mechanism mounted upon framework and adjustable lengthwise of belt.

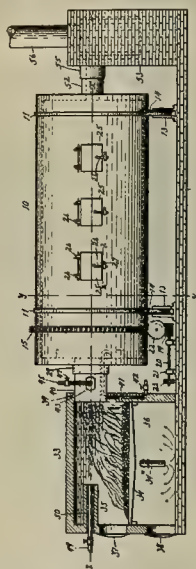
ORE PULP WASHER AND CONCENTRATOR.—No. 766,060; F. E. Parker, Kansas City, Mo.



The combination with receptacle for concentration of metals from ore pulp having valved discharge openings for waste material, of suspensory devices for receptacle, means for communicating oscillatory movement to receptacle and series of stud shafts located at limit of oscillation of receptacle in pairs, horizontal guide rollers on shafts, arms extending radially from side of receptacle and guide pins on arms contacting with rollers, and controlling curvilinear movement of arms, stationary pulp agitating

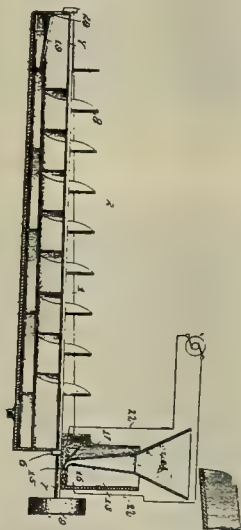
devices located above receptacle and extending downwardly with same and adapted to loosen material at discharge openings in receptacle.

ORE ROASTING AND OXIDIZING APPARATUS.—No. 766,156; L. H. Allen, Kansas City, Mo.



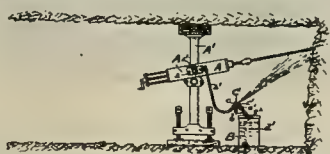
Apparatus for reducing ores comprising rotary ore retaining cylinder having flame conducting opening at forward end, reducing furnace, flame conducting cylinder leading from furnace within opening in cylinder, means for drawing off gases from cylinder and open water receptacle concentric with inner side of cylinder and located at forward end adapted for storage of liquid to be vaporized, and water pipe leading within flame conducting opening of cylinder and discharging downwardly within open water receptacle.

GOLD-SAVING APPARATUS.—No. 766,626; E. S. Kelley, St. Joseph, Mich.



In gold-saving apparatus, in combination, sluice box; bottom trough extending longitudinally thereof; amalgamating partitions in trough; mechanism, portion of which extends transversely of sluice box from side to side thereof and divides sluice box into plurality of compartments; means for actuating mechanism to positively move earth and water with comparative slowness through sluice box to prevent current in or agitation of fluid mass; and pocket having inlet opening in upper side near discharge from sluice box, into which inlet opening gold particles may fall by gravitation.

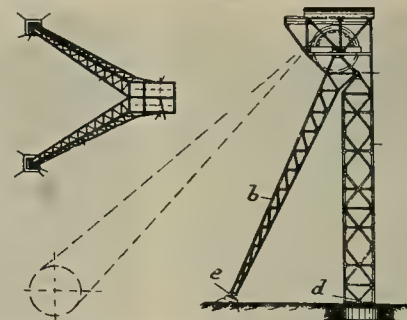
APPARATUS FOR LAYING OR SETTLING THE DUST OR PULVERIZED ROCK CREATED IN BORING OR BLASTING HOLES IN MINING.—No. 766,165; T. J. Britten, Witwatersrand Gold Fields, Transvaal.



In apparatus for use when blasting, bucket or water holder B, nozzle C comprising air and water supply branches, means for fixing nozzle at any desired angle or inclination, water supply pipe d' placing water branch c' of nozzle C in communication with bucket B, and air supply pipe f' placing air branch c of nozzle C in communication with air main F, air main F, air passage c' provided in air branch c formed flat at base and round at top and splayed

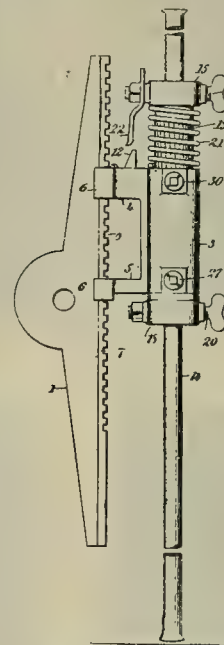
outward or formed with divergent walls at outlet orifice, valve c' for regulating quantity of air passing through air passage, water passage c' formed in water branch c' at angle to flat base of passage c', and elongated in direction of air passage c'.

DERRICK FRAME FOR SHAFT HOISTS.—No. 766,452; A. Klonne, Dortmund, Germany.



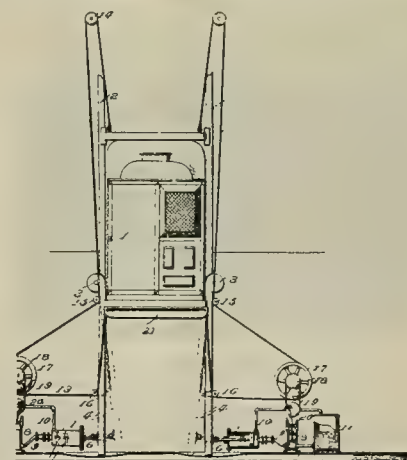
Derrick-like structure for shaft hoists, consisting of upright pillar pivoted on support at its base, pair of inclined struts pivoted to upper end of pillar, pulley journaled in structure above pivotal connection between pillar and struts, and hauling rope passing over pulley and depending centrally within pillar, pivots at upper and lower ends of pillar being located in axial line of pillar and in center line of load, and pillar being of skeleton open-work construction and of hollow rectangular form in cross-section to form a guide for load.

ROCK DRILL.—No. 766,564; F. L. Whitehead, Butte, Mont.



Rock drill comprising guide, carriage movable along guide, drill carrying tube movable in carriage, and means for imparting rotary motion to tube while moving back and forth, rotary motion being at all times in same direction, and means causing degree of rotary motion to increase with increasing length of drill strokes.

SAFETY APPLIANCE FOR ELEVATORS OR MINING CAGES.—No. 766,404; W. P. Ward, New York, N. Y.



Combination with elevator shaft, of car, or cage, bars arranged in shaft at opposite sides thereof and hinged at upper ends, and means for automatically causing lower ends of bars to converge toward one another, whenever the elevator car or cage moves faster than at normal speed.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

The United States Geological Survey has issued reports on the production in the United States during the year 1903 of petroleum, asphaltum and bituminous rock. The petroleum production was 100,461,337 barrels, valued at \$94,694,050, against 88,766,916 barrels, valued at \$71,178,910 in 1902.—Production in California increased by 10,000,000 barrels, while the Texas production decreased 1,000,000 barrels.—The production of asphaltum and bituminous rock was 101,255 tons, valued at \$1,005,466. This was a smaller amount by more than 4000 tons in quantity than the previous year, but its value was 31% greater. Of the total production 45,187 tons, valued at \$522,164, came from California.

## ALASKA.

J. E. Ballaine of Seattle, Wash., president of the Tanana Construction Co., which is building the Alaska Central railroad, reports work on the Alaska Central is progressing rapidly. Twelve miles are completed and in operation, and they expect to have 21 miles in operation by September 1. He counts on having not less than 40 miles of grading finished and ready for the rails before winter. He will push construction through to the Tanana river, summer and winter, and complete the whole road within three years. The road will be 500 miles long. One hundred and thirty-five miles inland from the coast terminus at Seward, the road will tap the coal fields, says Ballaine. The seams on Chicooloon creek, as exposed in the bluffs, measure a total of 264 feet. The road also opens the placer gold districts of interior Alaska, and will have copper properties in three districts. The northern terminus is the Tanana gold fields. The southern harbor is open every day in winter and has good terminal facilities.

Discovery of placer gold is reported on the beach at the fishing port of Sand Point. All available claims are said to be staked out, and the owners are offering \$10 a day for men to work the ground.

## ARIZONA.

### Cochise County.

(Special Correspondence).—There is considerable activity in the Tungsten, near Dragoon. G. Borricke, of the Primos Chemical Co. of Primos, Pa., is working the company's properties and making regular shipments of hubnerite to their works at Primos. A New York firm is operating on some leased claims and working about thirty men. J. D. Burgess, of Tucson, is manager.—T. Clemens is working several men and reports satisfactory results from his placer claims. G. S. Mulkey is working his quartz claims and expects to put in a concentrating plant when he has ore enough blocked out.

The copper camp at Johnson has been inactive for some time. It is reported that the Mammoth and Republic mines will start up this month with a full number of men. Those mines are said to contain large bodies of payable ore in sight.—A. H. Wien reports a deal under way on his Copper Chief group. It is said the Calumet & Arizona company has options on H. S. Wien's property.—It is reported that Eastern people are negotiating for a bond on the Cochise Co. Co. properties.—The Peabody mine was flooded by the recent heavy rains. The extent of the damage is not known.

The Old Terrible M. Co. is sinking a new shaft on its property near Manzoro. H. E. Armitage is manager. Dragoon, Aug. 8.

The San Bernardino M. & M. Co. is arranging for machinery at its property, which is 10 miles east of Douglas and near the international line.

### Cocino County.

At the Eclipse shaft of the Anita C. Co., 3 miles from Anita Junction, near Williams, Superintendent W. H. Hill says sinking is progressing with four six-hour shifts operating two machine drills. During twenty days ended August 6, 89 feet were sunk below the old workings, making the depth 353 feet. At 250-foot level a drift has been run in 40 feet. The shaft is three compartments, 5x10 feet in the clear. Heavy sets of timbers are being put in as the work is progressing. T. C. Woodworth, consulting engineer, says they have struck the first contact expected at the 300-foot level, comprising quartzite porphyry. The last 30 feet of sinking is reported showing mineralization and some copper stain. The hoisting plant is equipped to go to depth of 2000 feet. A 10x14 inch geared steam hoist is used, and 2-inch steel cable. A 2½-ton bucket is in use, but later a 2½-ton skip will be

put in the shaft. The air compressor has a capacity for eight drills. Condensing apparatus is connected with the boiler plant. A telephone line will be put up from the mine to Williams.

### Gila County.

The Old Dominion C. M. & S. Co.'s old smelting plant was partially wrecked by the explosion of furnace No. 2. Fortunately, none of the men working about the furnace at the time were seriously hurt. C. F. Shelby, smelter superintendent, in explanation of the accident, says that one of the north side jackets sprung a leak on the lower flange, near the center of the furnace. The furnace was about to be shut down as a precautionary measure, when a rush of molten matte into the water space of the jacket resulted in an explosion which completely demolished the furnace. The force of the explosion was upward, and sections of the feed floor and roof for about a 10-foot radius were cut out and carried upward with the wreckage of the furnace, falling again to the ground floor. Streams of water were played on the burning debris and the flames quenched. No. 3 furnace, which was slightly damaged by the explosion, has been repaired and blown in. No. 1 furnace had to be shut down because the blowing away of the feed floor completely cut off access to it. Repairs have been made. There were three Mexicans at the furnace on the feed floor, who were blown into the air and came down without sustaining any injury beyond a few scratches.

### Graham County.

Owing to dry weather which recently prevailed in the section, Manager Stevens of the Stevens C. Co., near Clifton, granted permission to the Arizona C. Co. to use water from the main shaft of the Stevens Co., and it has been determined that a regular flow of seventy-five gallons a minute can be had from the shaft. The Cuprite Co., which is located still higher than the Stevens Co., is also developing a considerable amount of water, and it is thought the company will have water sufficient to treat its ores at the mines. The Polaris Co. has also developed water in its workings, and the management expects an abundance of water will be furnished by the mines to run a concentrating plant.

The output of the Arizona C. Co. for July was 1391 short tons of blister copper, as against 1148 tons for the previous month, reports the Clifton-Morenci Mining Bureau. The results for the half year to March 31 are said to show profits, including \$72,085 brought forward from September 30, 1903, of \$793,363. The Arizona C. Co. is continually making improvements at its plants and mines.

### Mohave County.

A discovery of molybdenum ore is reported made 2 miles north of the Berkeley mine, in Cedar district, near Kingman. The veins are large, one being 20 feet in width. The surface ores carry values in copper, but at the canyon level the copper disappears and molybdenum values come in. The mines are owned by E. S. Osborne, H. W. Kemper, Smith & Sawyer, L. J. Lassell and W. J. Connor. A road can be built from the main Cedar road to the mines at small expense.

### Santa Cruz County.

The Joplin group of mines in the Tyndal mining district, Santa Rita mountains, near Nogales, has been sold to E. C. Mallette, manager of the Springfield-Arizona M. Co., of Springfield, Mass. The company has a working bond on the Joplin group for \$20,000. By the terms of the contract the operating company must do at least 100 feet of development work during each month. Operations will start this week.

## CALIFORNIA.

### Amador County.

At Defender the sinking of the shaft of the Defender mine 60 feet deeper, making 350 feet in all, has been completed. A drift has been run north and has cut a 7-foot ledge of quartz. It is expected that the mill, which has been idle for sixty days on account of sinking, will be started up by Sept. 1st on this ore.

The Fremont mine, near Amador City, is reported running smoothly on the "open shop" basis. The number of employees is being increased as the mine is getting into full working order. Twenty of the sixty stamps are dropping. The men are boarded and housed on the grounds.—The Climax mine, east of Jackson, is operating its 2-stamp mill on payable ore.

### Butte County.

Preparations are being made for machinery for a mining dredger by the Cranston Co. on the O'Brien land, on the south side of the Yuba river, near Oroville. Construction will start by Sept. 1st.

### Calaveras County.

President Miller of the San Andreas Gold Channel M. Co. reports that the mill for the Chris Anderson mine, near San

Andreas, is on the ground. It will be put in place and is expected to be started working on the gravel of the mine by Sept. 1st.

Manager G. I. Wright of the Del Monte mine at Railroad Flat reports that the 10-stamp mill of the company was destroyed by fire last week. The fire is supposed to have caught from a spark from the furnace. Nothing could be saved. The loss is estimated at \$5000, insurance \$1900. This is a serious setback at this time. The company was prospecting the ledge struck in the lower tunnel with encouraging results. Efforts will be made to build a mill at once. The company's main office is at Jackson, Amador county.

The Mountain King G. Co. of Los Angeles reports running its mill near Murphys on good rock. Progress is being made. E. Delray is superintendent. A mill is being built at the Hercules-Horsehoe mine and is expected to be ready to run this month.—W. L. Driver, in charge of the Cordelia (or Ohio) property, is taking out ore.—It is stated G. F. Stone will proceed with development work at the Red Gold mine, also near Murphys.

### El Dorado County.

C. H. Duntun, superintendent of the Eureka slate quarry at Kelsey, reports roofing slate is being shipped from the quarry. Large shipments are being made to Seattle and Fort Flagler, Wash., and to Oakland and San Francisco, Cal.

Preparations are being made for extensive development work at the Red Raven (formerly the Uncle Sam) group of mines, 2 miles north of Shingle Springs. Buildings have been put up and the work of laying a line of 11-inch pipe from the Crawford ditch to the mine will be started this week. It will be ½ mile in length. The water will be used on the south for power purpose in operating a hoist and mill and also on the north end of the tract of land for sluicing for the gold contained in the surface dirt. The property is owned by the Red Raven M. Co., having its principal place of business in Los Angeles.

At the Darling gold quartz mine, near Georgetown, the work of putting in an electric plant at the mine is progressing. The hoist and mill will be operated by electric motors with alternating current. Development work is progressing in the mine.

### Humboldt County.

It is reported B. Lucas of Fortuna, with Eureka men, is preparing to develop a group of mines in Willow creek section and that a stamp mill will be built.

### Inyo County.

Work will begin again on the Kearsarge mine, near Independence. Negotiations have been concluded by which T. T. Murray of Detroit, Mich., gets a bond on the property for three \$10,000 payments to be made August 15th, October 15th and December 15th. The first work will be a 1200-foot tunnel to cut the ledges at right angles at least 400 feet below the deepest of the old workings. A factor in this will be the installation of an electric plant in the canyon to the eastward, for generation of power.

### Nevada County.

(Special Correspondence).—Mining operations around You Bet are almost at a standstill, due to the restriction placed on hydraulic mining. J. S. Goodwin has ten men at work cleaning to bedrock on Greenhorn creek. This pays from 25 cents to \$20 to the pan and gives fine gold. You Bet, Aug. 8.

W. Ochs et al. of Salt Lake City, Utah, have bonded a group of quartz mining claims 3 miles east of Washington and in the same belt as the California, Grey Eagle, Yuba and Eagle Bird properties. A mill will be built.

The Ironclad mine at Rough and Ready is again in operation since the pump was repaired. The company is planning to build a 10-stamp mill. A 2-stamp prospecting mill has been in operation since the mine started.

At the Lecompton mine, near Nevada City, the main shaft is to be sunk from its present depth of 400 feet to 1000 feet. Other extensive improvements will be made, says Superintendent W. H. Dunlap. While sinking the shaft is in progress, other work will be discontinued temporarily.

The Red Hill, Ltd., Co. of Glasgow, Scotland, has conveyed back to H. L. Trevasakis the forty-eight acres of patented quartz mining land on Red hill, 2 miles west of Nevada City, where the company operated. A company will be organized and development increased.

The Brunswick mine at Grass Valley is expected to be on a producing footing again this fall. The mine has been unwatered and both the hydraulic and electric pumps are kept going to drain the mine thoroughly. The pumping plant represents an outlay of \$30,000. What little prospecting has been done since the

lower workings of the mine have been made accessible is satisfactory, says C. R. Mallen. The shoot that is being run for is the "Mill" shoot. Ore is being drifted on that assays \$12 in gold, mostly free milling. The number of men at work is being increased, and it is expected the stamps will begin dropping next month.

The Orleans M. Co. has bought from the Sebastopol M. Co. the latter's claim adjoining the Orleans mine, near Nevada City, for a cash consideration. There are thirty-five men employed at the Orleans and work is progressing. The five stamps are dropping on payable ore.

### Placer County.

Superintendent J. B. Patterson says that at his mine they are driving the tunnel, lack of water causing the mill to shut down. There is payable gravel in sight.

The company having a bond on the Big Pine or Bouk mine, below Auburn, has let a contract to sink 100 feet. There is a shaft down 180 feet. It is proposed to drift after the present contract is completed, and then, if the outlook justifies, a mill will be put up. G. Foster is in charge.—The Gaylord mine, near Auburn, is running its mill steadily and will continue as long as they can get water. Besides taking out gravel, they are also making a crosscut for air.

### Plumas County.

Work is in progress at the Five Bears mine in Genesee valley, near Genesee. The property is equipped with a 10-stamp mill, in which the ore will be crushed through 20-mesh, after which the product will pass to a Kinkead mill and there be reduced to slimes, after which it will be elevated by a sand pump into the agitating tanks of the cyanide plant. The cyanide plant of sixty tons capacity is well under way, the tanks having been placed and most of the buildings completed. The cyanide solution and the pulp will be agitated and the values precipitated by electricity upon cathodes, instead of in zinc boxes. For work in winter months the plant will be heated by steam coils being placed in the cyanide tanks, at the jets, all valve openings and at the Pelton wheel. In the mine there is a good reserve of milling ore, which will permit of crushing to begin September 1st. The ledge is 5 to 11 feet wide. Rails have been laid in both tunnels.

Superintendent Goodhue, at Iron Bar, near Quincy, says his company, the Feather River Con., has started the cement gravel mill. For some weeks past twenty men have been at work opening up the ditch filled by the floods last winter. The excavation is 6 feet wide, 3 feet deep and 1400 feet long. The upper end of the ditch is cut 2 feet lower than the old one, avoiding the necessity of a dam across the stream to fill it. In the fall this will be covered over so as to prevent the winter floods from destroying the ditch. The work of mining the cemented gravel deposit at Iron Bar will continue with two shifts. The company will put in a black sand mill to treat the 1500 pounds of black sands saved daily by the cement crusher. The average value of these sands is said to be \$140 per ton.

### San Bernardino County.

(Special Correspondence).—Silver Mountain mining district, of which Victorville is the railroad center, is improving and will become a gold and copper producer, as recent discoveries of gold lodes with promising developments underground are being made. The Fearnot M. Co. has reached a depth of 500 feet, showing a well defined gold-bearing lode to that depth, carrying iron-copper sulphides in white quartz having gold values of \$10 to \$20 per ton. This company owns twelve gold claims. A larger reduction plant will be put in this fall.—The Greenback gold lode, near the Fearnot Co., is opened 200 feet deep with the new shaft and contains lead, copper, silver and gold values.

The Copper Mountain Co., on the east side of Silver Mountain, has several hundred feet of shafts down in veins of copper ore. Several crosscuts show heavy copper veins exceeding 20 feet in width. Character of ore is chalcocite in gangue of magnetite, with values of 5% copper and \$7 per ton in silver and gold. A tunnel is being driven to cut the lode 400 feet deep.

The Copper Chief group, near the Side-winder mine, has a 40-foot free-milling gold ledge with payable values and considerable tunnel work is done toward its development.

The El Dorado-Bonanza, Copper Prince and Bimetallic copper-silver veins in West camp are being sold, says Manager C. F. Blackburn. This group of copper lodes affords a promising surface showing. About 300 feet of shafts show ore with values ranging from \$7 to \$40 per ton in copper, silver and gold. These lodes show mineral croppings between mica-schist and gneiss foot wall and limestone hanging wall. A group of zinc and gold claims and the 100-foot free-milling Mammoth



siliceous gold lode, on which seven claims are held by C. F. Blackburn, will be incorporated and developed.

The variegated marble quarries near Victorville are being patented and will be extensively worked.

The Exploration & Securities Co. of Boston, Mass., W. B. Guild president, owns gold-bearing veins near Victorville. The Mojave river, flowing through the district, affords a reliable supply of snow-derived water from the north slope of the San Bernardino range.

Victorville, Aug. 9.

#### Santa Clara County.

The transfer of the magnesite properties at Red Mountain, south of Livermore, Alameda county, to the American Magnesite Co. of Oakland, which was recorded last month, has resulted in four corporations which are to handle the product of the mines. The United States Steel Corporation is interested in the magnesite proposition through Rubins, Dupey & Fisher of Chicago, Ill. The American Magnesite Co. is to control the raw product of the mines, but the manufacturing enterprises are to be handled by three subsidiary companies. The Magnesite Co. is headed by G. W. French of Chicago, Ill., as president, and H. C. Stilwell of Fruitvale, Cal., as vice-president. Charles H. Spinks of Berkeley is manager and E. L. Richmond superintendent of the mines at Red Mountain. Each of the three subsidiary companies plans to build a factory on tide water in Oakland. The magnesite will be used in the manufacture of firebrick for furnaces of locomotives and other boilers. It is to be manufactured by the Rose Brick Co., headed by J. V. Rose, which will build a plant capable of turning out 100,000 bricks per day. As a by-product a large amount of carbonic acid gas is given off in the reduction of magnesite ore. To handle this the American Carbonic Acid Gas Co. has been formed, of which J. Deere of Moline, Ill., is president and G. A. Wyman manager. A patent brick is to be manufactured from magnesite ore by the Pylastic Construction Co. E. D. Weary of Chicago, Ill., is president and manager and P. B. Jagger of London, England, is vice-president. The Magnesite Co. plans to build a road from the mines on Red Mountain to the Alameda county line, to connect with the county road being built up the Arroyo Mocho from Livermore.

#### Sierra County.

W. C. Oakes has bonded the Dolly Varden quartz mine in Jim Crow canyon, near Downieville, and started operations on the ledge. A tunnel to tap the shaft where a pocket was found is about half completed. Oakes intends putting in machinery to pump out the water and prospect from the shaft.

#### Siskiyou County.

The Pacific States M. Co., J. W. Martin, superintendent, 2 miles from Noltan, will this month finish their flume which is to convey bank water to its new diggings, and has started work on the upper flume to furnish water (a 300-foot head) for the giant. Water is taken out of Fort Gough creek. Mining is progressing in the Classic Hill mine at Happy Camp, worked by Manager Mullins for a Los Angeles company, with J. Wood, superintendent of mining operations and of the work of enlarging the ditch. Three miles of road building is progressing. The company is also putting up a saw mill for the lumber and timber needed.

The Mount Vernon group of quartz ledges at summit of divide between Greenhorn and Cherry creeks, near the stage road, near Yreka, is being worked under Superintendent McLean. The company has built a road around the hill to the mines and has had a survey made towards securing a patent, with intention of putting up a mill on further development.

The San Francisco company of Gresswell & Harvey are working the Mott placer mine at Oak Bar with twenty-four men and expect to reach bedrock by Aug. 20. Mott is superintendent, with P. Mott assistant. The Oak Bar hydraulic mine, under H. J. Barton, closed down for the season on the 26th ult., owing to the water supply becoming short, but will resume operations Nov. 1. The Espey Hydraulic M. Co., at Beaver creek, is still worked. E. J. Harris, who owns a rich quartz mine on Russian creek, Salmon mountain, between Etna and Sawyer's Bar, are building a branch road to the mine and also putting up a quartz mill.

#### Tahtumne County.

From a depth of 1420 feet the shaft of the Dutch mine, at Quartz, will be sunk 150 feet, when drifts and crosscuts will be run. The Eagle-Shawmut Co. has bought the Woods Creek placer, consisting of sixty acres, near their mines and mill, south of Chinese.

W. B. Elkins of Buena Vista, Chaffee county, Colo., has a bond for a deed to the Rainbow, Iron Cross and Mountain

Key quartz mines, a millsite of five acres and 200 inches of the waters of south fork of the Stanislaus river near Columbia for \$25,000. W. Vaughn of Columbia is interested. Operations have been resumed at the Horse Shoe Bend mine, the damage resulting from the recent forest fire having been repaired.

A forest fire in Seminole gulch, south of Carters, last week destroyed the 10-stamp mill at the Mayflower mine, the loss being \$2500. The mine was closed down.

The Vine Springs mine, near Columbia, has ceased operations temporarily. Several days will be required to mill the ore on the dump and then the stamps will be hung up. A. F. de Souza has bought the Reservoir placer mine, consisting of fifty-five acres, 1 mile north of Columbia.

D. Bottini has bought the Gem (formerly the Monitor) quartz claim, 4 miles east of Confidence, near the Mt. Vernon and Excelsior mines.

D. Peri has bought the Santa Maria quartz mine, in Moccasin Creek district, 1½ mile northeast of Hughes station, near Big Oak Flat, near the Monte Cristo mine.

C. H. Carter has an interest in the Worcester and a one-third interest in the Esmeralda and East Esmeralda quartz claims, 1 mile east of Carters. T. A. Piper has a bond for a deed to the Buckeye placer mining claim and other land and mining rights near Columbia for \$20,000, to be paid in three years, 20% of the gross yield to be applied on price.

#### Yuba County.

The dredger of W. P. Hammon & Co. has been put to work, near Marysville, and the second one will be completed this week. Both are in the same pond and will work in conjunction. A hole, 15 feet deep, has been dug by the first dredger and the buckets come up filled with fine gravel. It will be several days before the best pay dirt will be reached, as it is about 50 feet from the surface to bedrock. Electric power is used. The Yuba River M. & Dev. Co., owning the two dredgers near Yuba river, east of Marysville, has established offices at Marysville, says Manager L. P. Moore.

Last week the machinery of a gold mining dredger completed on the Hallett place, 5 miles below Smartsville, began digging for gold in the deposits adjacent to the channel of the Yuba river. These boats are each 265 feet in length, and the cost of each is about \$100,000. The main ladder at the forward end of the structure is 100 feet in length and will permit the buckets to dig to depth of 60 feet. The buckets will hold 6 cubic feet. Twenty buckets can be dumped in one minute, an average to each boat of about 6480 cubic yards in a run of twenty-four hours. Electric power is used to operate the boats and there are eight motors to each of them. The main motor that moves the machinery that operates the buckets is 100 H. P., two of 50 H. P., two of 20 H. P. and others less, the total being 279 H. P. When in running order eight men comprise a shift on each dredge, and they will work eight-hour shifts. The boats stand about 45 feet above the water.

### COLORADO.

#### Chaffee County.

The Buena Vista M. Co. is working at Hancock, near Buena Vista. The company will build boarding house, tunnel house, power house and ore bins on the line of the C. & S. Railroad, with a capacity of 100 tons. A plant of machinery will be placed in position as soon as the buildings are under way. The tunnel will cut the Dave Knox vein at a depth of 500 feet by running a distance of 700 feet. It is in 150 feet and has cut three blind leads. The company's property consists of the Dave group of thirteen claims on Mt. Chapman. The C. & S. railroad has a switch on the ground. The tunnel will cut the Dan Clark vein by driving about 10 feet farther. This vein is 4 feet wide between granite walls and assays 40.

#### Clear Creek County.

The J. D. Williamson I. Co. of Idaho Springs has bought six claims in the Daily district and has put men to work placing material on the ground. The property is on south branch of Clear creek. It is intended by Manager Williamson to drive a tunnel through the mountain for developing the new mining field. A tunnel site has been located, as well as a mill site. E. M. Moscript of Idaho Springs is also interested in that section, and it is his intention to put men on this week. Moscript is also manager of the Butler M. Co., which is putting in a plant of machinery.

The air compressor at the Burleigh tunnel of the Pelican-Dives M. Co. was shut down a few days last week for erecting the smokestack, making repairs to the boiler and putting the machinery in shape, as it is intended, says Manager Eaton, to increase work in the crosscut being driven to connect with the Seven-

Thirty shaft, which will afford ventilation for a large part of the property and enable concentrating material from the Seven-Thirty workings to be brought out to the mill through the tunnel. An attempt was made to use the Pay Rock compressor to supplement the power required for the operation of the company, but as it was necessary to force the air through 3 miles of pipe it was found impracticable to utilize the Pay Rock plant, due to loss by friction. A more powerful plant of machinery for furnishing power will be put in by the company. E. Steffan of Central City is superintendent of the mining operations of the company, Superintendent Reynolds being retained in charge of the engineering and milling work. The local office of the company has been removed from Georgetown to Silver Plume.

Work has been started on the Double Header group, says G. Albertson of Denver, manager of the McClellan Mountain G. & S. M. & M. Co., near Silver Plume. Men have been put to work driving the tunnel which is projected to cut the lodes at greater depth. Last summer the company started driving the tunnel. The property is near that of the Southern M. M. & D. Co.

Manager E. J. Wilcox of the Waldorf Co. has arranged for electric power for operating the Stevens mill, near Silver Plume, and the work of putting up the poles for carrying wires was started last week. Wilcox will drive the Stevens tunnel through the mountain to connect with the Wilcox tunnel being driven from the East Argentine side, where the company has large holdings, as that would give communication between the different properties and afford a means of transporting all ores to the Stevens side where the low-grade ores can be treated at the mill, and it is also a shipping point for the smelting ore which the company has blocked out. The electric line being put in will also afford power for driving the tunnel and can also be used in transporting ores through the tunnel after it is completed. The mill is running steadily and treating fifty tons of material daily from the old stops of the mine, and as soon as the addition to the mill is completed and more machinery set up its capacity will be increased.

#### Custer County.

The Bassick mine at Querida is practically all leased out in blocks from the 1700-foot level, says the Post. The lessees are shipping to Pueblo a good deal of the high-grade black telluride ore and returns on carload lots show an average value of \$100 per ton, of which 60% is in gold. Until the new mill is built on the Bassick mine the company will do nothing in the way of development and will continue to lease out the ground in blocks. A. G. Bassick of Bridgeport, Conn., says the company will experiment to decide what process is needed to handle the bodies of low-grade ore in the mine and then put up a mill.

#### Dolores County.

Superintendent Hooper of the Group Tunnel mill, near Rico, says the pipe for the power plant is laid. The machinery at the mill has been overhauled and is in readiness to start as soon as power is at hand. The San Juan Ore Co. is breaking and hoisting ore at the Argentine mine, near Rico, and is increasing its force of miners. J. Muncester is foreman. At the Pro Patria tunnel the work of catching up caves and retimbering is progressing. A. G. Ellis, recently of Lake City, will have charge of the mill.

#### Gilpin County.

W. Mitchell & Sons have resumed operations after a delay of several weeks, during which time they have put in heavier plant of machinery and erected a shaft building on their Gulch mine in Lake district, near Central City. The plant consists of a 50 H. P. hoist and 70 H. P. boiler. The main shaft is down 235 feet and it is intended to sink at least 100 feet more. The shaft showed a smelting streak which carried gold and copper values. Some drifting work has been carried out. Smelting ores have been shipped running \$150 per ton, while fair grade milling ores have also been shipped.

During month of July the Roderick Dhu M. Co., operating on the Patch on Quartz hill, near Central City, shipped by wagon to the New York mill at Black Hawk 215 cords of ore, or over 1800 tons. Manager J. C. Fleschutz reports the ores averaged 2½ ounces gold per cord and that the tailings ran \$22 per ton. Seven cars of the product were shipped during the month to the Denver smelters.

The Newfoundland G. & S. M. Co. has been incorporated to operate on the Newfoundland group of mines on Gunnell hill, near Central City, the management of which will be under G. W. Mabee. During recent sinking operations the shaft showed a vein from which they took out ores of a concentrating character, and as

soon as sinking operations are resumed they will take out more ore and make a shipment of 100 tons to the Rocky Mountain concentrator in Black Hawk. Another bin is being built for storing ores until they get a sufficient quantity to make a shipment. As soon as sinking operations are completed and more ground is opened up the number of men at work will be increased.

#### Gunnison County.

The Sylvanite mine at Gothic is producing a large tonnage of low-grade ore for the Gothic smelter, which is expected to blow in this month. The smelter was constructed last fall by Illinois men.

#### Jefferson County.

The gold dredger Eleanor No. 3, of the National Dredging Co., was launched at Eleanor, 6 miles east of Golden, last week. The other dredger, Eleanor No. 2, being built at the nearby (Placer) station by the Gold Creek Dredging Co., will be launched this week. Machinery for both dredgers is on the ground and will be set up. The work of dredging for gold will begin October 1. H. J. Reiling, of Denver, is president of the National and Clear Creek Dredging companies, and says their investment represents \$500,000. The companies own 650 acres of flat land, beginning 3 miles east of Golden, and extending down Clear creek toward Denver. The boats are 110 feet long and 58 feet wide. Each will carry 300,000 pounds of machinery and each is capable of handling 3000 cubic feet of gravel per twenty-four hours. Arrangements have been made with the Denver G. & E. Co. for electric power.

#### Lake County.

Leadville reports say that, notwithstanding the depressing effect of the iron market, the shipment of ore from the mines of Leadville district were well sustained during the month of July. A large tonnage of iron is shipped daily from the district under normal conditions. Leadville produces a high grade of iron ore, which is in demand at both the smelters and the iron and steel mills of the West. The production of ore of all kinds from Leadville mines during July is estimated at 70,000 tons. The Moyer mine and other properties of the Iron Silver M. Co. heads the list with a tonnage of 12,000. The Yak, the Fryer Hill M. Co., the Ibox Co. and lessees, the New Monarch, Ollie Reed and other properties in Evans and South Evans gulches, the Rock hill properties, the A. Y. & Minnie mine and mill, the downtown mines and small properties in all parts of the district have maintained their average shipments during the month. From the figures obtained from American S. & R. Co., the various producers of ore and the railroads which haul the ore out of the camp, the estimate of 70,000 tons for the entire district is obtained.

The Coronado mine at Leadville is down 100 feet below the former level of the shaft and is being sunk through the parting quartzite. A drift has been started from the shaft for tapping the water course which was struck in the Penrose, and which caused a suspension of sinking in that shaft. It is expected that the water can be controlled so that the sinking of both shafts can be carried on without further delay. It is expected that breaking of ore in the Coronado will be resumed next week. The lessees on the Ibox properties are meeting with success, says Manager J. F. Campion of the Ibox Co. The lessees, says Campion, are shipping 1500 tons of good grade ore a month. In addition to the shipments, the lessees are carrying on extensive development. The Best Friend tunnel, at the head of Evans gulch, is improving. A body of ore has been struck in the raise which was started from the tunnel to connect with the Best Friend shaft. The ore carries 300 ounces silver and \$20 gold per ton.

#### San Juan County.

The Bear Mountain M. Co., operating a group of claims on Bear mountain, near Silverton, resumed work on its properties last week. The completion of a crosscut, which will tap the main lead of the group at 200 feet below surface, is the principal object of the company, as it is expected the ore shoot of the upper workings will be opened by the crosscut. High-grade shipping ore was marketed from that shoot.

The Gold King Con. M. Co., near Silverton, has put carriage of ores from mine to mill in operation, the entire output from both mines being conveyed to the mill over the American tram. Between every two buckets on the line an extra bucket has been added, rendering the capacity of the line equal to all emergencies. The mill is running under full headway, the daily shipments in concentrates aggregating seventy-five tons, says the Silverton Standard.

#### Summit County.

The Hoosier Gulch G. M. Co., owner of



the Bemrose placer, at base of Hoosier pass, near Breckenridge, on which there are several promising lodes, is sinking a shaft. T. A. Brown is superintending the sinking. In the meantime, placering continues on other portions of the company's holdings.

Breckenridge reports say the Senator M. & M. Co., which is driving a tunnel to develop a group of lode claims on North Star mountain, has put in a compressor and air drills which are to be used to drive the main working tunnel 600 feet additional. The ore opened in the upper tunnels is pyrite running well in gold and silver. The new tunnel will open the property at practically the Blue creek level.

The foundation for the twenty 800-pound stamps that are to be added to the present 20-stamp and concentration mill of the Cashier group of gold claims in Brown's Gulch, near Breckenridge, is completed.

#### Teller County.

Hemby & Co., who are leasing on the north end of the Ramona claim on Bull hill, at Victor, in driving north in the 200-foot level, have opened a shoot of ore that assays \$40. They are breaking fifteen tons of rock a day in that level, which goes \$25 to the ton. Hynes & Co., on the south end of the claim, have started sinking at the depth of 120 feet for additional stoping ground, as the territory above has been practically exhausted of ore. They have put in a plant of machinery. The ore shoot being worked on the Ramona has been proved for 500 feet.

#### IDAHO.

##### Blaine County.

The Quincy Junior M. Co., that bought the Red Elephant group of claims near Bullion, near Hailey, for \$75,000, has made third payment of \$16,000. The company's concentrator has been overhauled and made ready to go into operation this month. There is a body of 2 feet of galena and concentrating ore opening in the mine, with 500 feet of backs, and another body of 6 inches of solid galena has been cut into in the deepest workings.

The output of the Minnie Moore mine, near Hailey, last month exceeded \$150,000, says the Wood River Times.

##### Boise County.

In the Mammoth mine, on Summit flat, near Idaho City, twenty-seven men are employed in and around the mine and fifteen in the timber. Five teams are hauling wood. A 2-foot vein of ore has been struck on the 200-foot level. Two ledges were worked on the 100-foot level and this is thought to be one of them. A drift has been run 15 feet on the vein. The mill of eight stamps will be started this month. Men will be put to work stoping, and the incline on the ledge, down 300 feet, will be sunk 100 feet deeper.

##### Canyon County.

The South Lincoln G. M. Co., Ltd., has been incorporated by J. H. and J. A. Stallings and A. J. Weber of Salt Lake City, Utah, L. A. Wagner and R. D. McDougal of Pearl, Idaho. Its property consists of mining claims in Canyon county. J. H. Stallings is president and manager.

##### Custer County.

F. L. Fearn, manager of the White Knob C. Co. of Mackay, says the smelter is in steady operation, treating 450 tons of ore per day for the company, in addition to 100 tons per day for other parties. The ore averages 3% copper and \$1.50 in gold and silver. Approximately 400,000 pounds of copper is being produced per month. The product turned out from the smelter is only 50% pure, which is shipped to the Atlantic coast for final treatment. Fearn is preparing plans for a converter which will treat the ore after it comes from the smelter. The converter will cost about \$80,000, and it is expected to have it in operation by January 1st. The capacity of the smelter is to be increased by addition of another furnace. The two now in use are not sufficient to handle the ore as fast as it is being taken out. Regarding the strike made in the mine last month, Fearn says the ore is well developed and carries an average of 5% copper. They are breaking a strip 25 feet wide in this body.

##### Shoshone County.

Preparations are being made to continue the Hecla shaft at Burke from the 600-foot level to 900 feet. For this work an electric hoist and an electric sinking pump will be put in at the 600-foot station, says Superintendent McCarthy. Electricity is the exclusive power at the Hecla mine.

Machinery is on the ground for another 500 H. P. compressor to be installed in the Morning mine, owned by T. L. Greenough and P. Larson of Spokane, Wash. The mine is at the mouth of Grouse gulch at Mullan. The drill will be

operated by electric power from Spokane falls, and the power line is being built into the mine. The Washington Water Power Co. furnishes the electric power at the rate of \$50 a year per horse power. The contract calls for a minimum of 300 H. P. all the time.

The King Solomon M. Co. has been incorporated with principal place of business at Wallace. The directors are N. Wittner, J. W. Flink, J. H. Nordquist, G. Champagne of Wallace and O. E. Redlin of Gem. The property of the company is on Canyon creek and adjoins the Formosa, owned by Finch & Campbell.

Work on construction of the Washington Water Power Co. electric line to the Morning mine at Mullan is under way. Men are clearing the right of way, and poles are being strung. The wire leaves the main line on Canyon creek, 2 miles above Wallace.

#### MONTANA.

##### Beaverhead County.

At the Indian Queen mine, near Dillon, another vein of ore, 12 feet wide, has been opened up, which runs 6% copper the entire width of the vein. The ore of the Queen is said to be self-fluxing. The company will sink a double-compartment shaft 500 feet in the granite outside of the tunnel, and put in a stronger hoist. A steam engine is now used for all power, but this will be replaced with water power. A ditch 1500 feet long is going to be run from Birch creek, which will give a fall of 30 feet. By the present method it costs about \$2.50 per ton to handle the ore. The new shaft will also open up the sulphide ores. About sixty men are worked by the Indian Queen Co., and three shifts a day are run at the smelter and two shifts a day at the mine, each shift being eight hours. G. A. Heberlein is superintendent of the mine and smelter. The Indian Queen M. & S. Co. also owns the Bridge Gulch and the Beaverhead claim, which is an extension of the Indian Queen.

##### Fergus County.

The Maginnis properties will be put in operation again after an idleness of twelve years. A deal has been closed whereby E. H. Crabtree of Lewiston will have charge of the works, and operations will begin next week on both the Maginnis and the Globe mines near Maiden. The properties are owned by the Conrad-Stanford Co. of Great Falls and Helena, and E. H. Crabtree has bonded them for two years for \$60,000. A royalty of 20% on all profits is to be paid to the Conrad-Stanford Co. to apply on the price. Both mines will be opened and work will be started in sinking a new 300-foot shaft below the old one in the Maginnis mine. Ore bodies will also be opened up below the old tunnel level. Shipping ore will be taken out from the Maginnis while the Globe mine is getting started. The Globe mine is free milling ore, while the Maginnis is 60% free milling and the rest amenable to cyanide. There is a 10-stamp mill on the ground, which will be repaired and put in operation. The contract calls for a minimum monthly expenditure of \$1000 per month. Twelve men will be put to work to begin with and more will be added as the work progresses.

#### NEVADA.

##### Esmeralda County.

The shaft on the Combination mine at Goldfield is down 290 feet and another level will be run. The value of ore raised daily is from \$3000 to \$7000. Work on the reduction plant will begin this week.

The Spokane M. Co. has been incorporated to operate four claims—Spokane Nos. 1, 2, 3 and 4—which are south of the two Daisy mines at Goldfield. At a depth of 14 feet assays showed a value on a 4-foot ledge of \$40. The work of developing will be increased, the sinking of a shaft having been begun. J. E. Blake is president, with M. M. Ogden and W. C. Parks as officers, and A. B. Acorn of Tonopah, superintendent.

The Vernal group of claims at Goldfield have been bonded to S. Baldwin, F. Keith and J. H. Hammond of Salt Lake City, Utah, and C. E. Knox. The bond runs for six months.

##### Humboldt County.

C. Bell and D. J. Noyes of the American Nickel Co. have started work in their mine at Nickel (Cottonwood canyon), near Lovelocks, with men, supplies and additional machinery to resume work on their mines.

##### Lincoln County.

Thirty thousand dollars' worth of gold bullion, the result of fifteen days' run at the mill, was shipped last week from the Bamberger De Lamar mines at De Lamar.

At the Bamberger mines at De Lamar the management is crushing the auriferous contents out of 10,000 tons of ore monthly, says Superintendent F. P. Swindler. In the extraction he is em-

ploying 130 miners and trammers. That the wealth of April Fool and the Magnolia mines are not being drawn out at this time, says Superintendent Swindler, is that it is not required, while that of the De Lamar ground more accessible. However, they may be relied on for future needs.

##### Nye County.

At the Tonopah terminal of the new railroad cars are being filled with ore and heavy shipments are being made daily. Among the mines shipping are the Tonopah M. Co., the Montana-Tonopah, January, Combination, Curtis & Ridge lease, Bowes & Kernlek lease, and others in both the Tonopah and Goldfield districts. The cars take ten tons each, and from now on it is intended to ship 100 tons a day. The railway is handicapped from lack of rolling stock, says Superintendent Tripp. The side tracks to the mines on slope of Mount Oddie will be finished this week. Considerable freight is going in, but there is a great deal more on the way.

The C. Rouge holdings at Tonopah have been sold to G. S. Nixon, A. C. Brougher, W. J. Douglas, W. H. Lang, G. Wingfield and E. L. Mims & Co., who will increase development work.

Development is reported improving on south side of Mount Butler, 11 miles south of Tonopah, on the group of claims owned by the New England-Tonopah M. Co. That part of the camp has been little prospected owing to large beds of volcanic tuff exposed on the surface between Butler and White mountain. South of that the company sunk a double-compartment shaft on a narrow vein which carried values but dipped out of the shaft in a few feet. A depth of 191 feet has been reached in a mineralized formation carrying values in gold and silver. Another shaft on another claim was started on the dip of a small stringer which, at a depth of 30 feet, shows quartz carrying values in gold. This vein formation has a clean-cut hanging wall, but no foot wall has yet been reached. The company has put up buildings, and three shifts are worked on both shafts. An 80 H. P. boiler and 50 H. P. hoist will be put in at the main shaft, which will be sunk to the andesite before crosscutting. The company owns sixteen claims.

F. E. Williams et al. at Tonopah have organized the Nevada Electric P. & T. Co. The same parties have also formed the St. Frances M. & S. Co., both of which will be affiliated with the Coaldale Co. They are planning to begin operations this week, and all the works will be located at the coal mine sites, whence power will be transmitted wherever required. Two smelters using two different processes will be built side by side. The same parties have acquired copper and lead mines for fluxing purposes.

##### White Pine County.

At Willard Creek, 10 miles south of Osceola, the Pilot Knob G. M. Co. of Monmouth, Or., which owns several gold-bearing quartz mines in the district, is putting up a 2-stamp battery and concentrator with which to test the ore, says the White Pine News. The machinery for the plant is in position, but completion of the plant is delayed by lack of necessary lumber to house it. In the meantime work at the mines continues and the pack train is transporting ore from the mine to the mill, a distance of 2½ miles.

#### NEW MEXICO.

##### Grant County.

The concentrator of the Burro Mountain C. Co. at Burros, in the Burro mountains, was started last week and is running smoothly. The pumps on the St. Louis are raising water that supplies the camp. The concentrator has a capacity of 100 tons and was hauled in from Pinos Altos to Burros.

##### Sierra County.

R. R. Hopper has placed the Porter mill at Hillsboro in repair and has resumed operations. Fire last week caused considerable damage at El Oro mine at Andrews, near Hillsboro. The shaft house, two hoists, the mine stables and a number of ore wagons were consumed. The collar of the shaft was slightly damaged. The blaze is supposed to have been of incendiary origin.

The 20-stamp mill for the Empire G. M. & M. Co. at Hillsboro is on the ground and is expected to be up by Sept. 1. A shipment of forty tons of high-grade ore will be made this week, the second shipment from the Good Hope Bonanza this month. Thirty men are working. Repairs on the shaft of the Snake mine near Hillsboro are in progress. A larger boiler is being placed. The engine at the Opportunity mine will be moved to the Snake mine to do the work of the engine damaged by the fire.

The camp of Shandon, near Rincon, has been moved from the mouth of Apache canyon ½ of a mile up the Rio Grande to the mouth of Trujillo gulch,

where it is considered safer from floods. The population of the mining district is 150. The Silva properties are the only mines that are being worked at present. The owners, as well as several leasers, are employed on the ground. The output of the camp is \$2000 per month.

##### Socorro County.

The Kelly mine, near Socorro, has increased its output to eighty-five tons of high-grade zinc-lead ore a day and 125 men are at work. The present lease will expire this month and C. T. Brown of Socorro is negotiating for a new lease. About twenty-five men are at work at Estey City, principally on development operations. As soon as a sufficient water supply is obtained the mills will be started, there being sufficient ore on the dump. The Dividend Co. has contracted to have a well sunk to a depth of 1000 feet.

#### OREGON.

##### Baker County.

J. G. Lilly of the Last Chance and Baby McKee groups has a bond on the Griffin claim in the Bear gulch section, near Sumpter. This is to be developed as soon as arrangements can be made. Some placer operations were carried on last spring there, but owing to lack of water the run was short.

F. E. Hobson, manager of the dredging proposition to be started at Sumpter, says he is arranging for preliminary work. Drill holes will be sunk on the ground to decide where the first dredgers will be put to work. M. E. Bain, manager of the Overland group, Cable Cove district, states that the men are sacking ore for shipment to the smelter. Over 300 tons are ready for treatment. A. Mohr, manager of the Wisconsin G. M. Co., which has bonded the Nine Strike property, in Cracker Creek district, says development work will be started next week. The property is said to carry an extension of the ledges of the Buckeye group. The Nine Strike has been opened by tunnel work, and the claims extend from the Cracker creek side over the apex of the Elkhorn range into the Rock Creek district.

Improvement is going on at the Columbia mine, Cracker Creek district, near Sumpter. The mill will be overhauled and additional machinery installed. Other outside buildings will be erected and arrangements made for a larger output at the mine.

Baker City reports say the Virtue mine is placing in position an engine with a pumping capacity of 2500 gallons per minute and a hoist for sinking 2000 feet. Development work is being continued. C. H. Stuller, manager of the White Swan M. Co., Ltd., redeemed that company's property last week by paying to the sheriff of Baker county \$3500. The property was sold for debts contracted by the former management. The mine is fully equipped with hoisting plant and mill. Stuller says it is intended to sink a new shaft rather than to unwater the old one. He has arranged for installing electric power for hoist and mill and expects to resume operations this month. The building for the Emma mine's mill is completed. It is at the mouth of the 1000-foot tunnel, which is being driven toward the vein. The ore shoot will be tapped within 50 feet, and it is expected the bins will be full by the time the stamps are in position. Deals are reported pending for the Flagstaff and Cliff mines, and prospects are for work to be resumed. J. H. Davey and son, who bought the pile of tailings at the Virtue mill, are preparing the ground for the erection of a cyanide plant to work them. Work on the buildings will start this week.

##### Grant County.

(Special Correspondence).—The Gam, recently bonded by Simpson & Graham, is being extensively prospected and they will put on a steam hoist and pump.

The Gold Bug mine proposes putting on a hoist and pump in place of the horse whim.

The Badger M. Co., which has been working with reduced force for a year, is increasing its number of men and intends to add more stamps to the mill for accommodation of the Bull of the Woods mine's ores, which property is controlled by the owner of the Badger. They are building a tramway a distance of ½ mile to connect the two. F. W. Bradley of San Francisco, Cal., is manager.

D. B. Stalter, president and manager of the Mayflower group, is doing considerable work on the property, and has run 3000 feet of tunnel and uncovered several free gold-bearing veins. He intends putting on a stamp mill. The Blue Channel placer mines have ceased operations for the year; the management proposes addition of a saw mill to the plant.

Susanville, Aug. 9.

##### Josephine County.

Superintendent A. F. Nelson of the Eu-



reka mine on Soldier creek, south of Grant's Pass, reports that mine in a prosperous condition. Sinking and drifting is being done with two machine drills, and the ore body is 9½ feet in width. Nelson reports 18,000 tons of ore blocked out. The vein is a contact between slate and dolerite and the ore averages \$18 a ton. The company is operating a 10-stamp mill, concentrator and cyanide plant.

Grant's Pass reports say telluride ore running \$100 a ton is being taken from the ledge of one of the claims of the Lewis & Clark M. Co. on Canyon creek, near Kerby. J. M. Layman et al. are owners and have been developing the group with satisfactory results. These men have six claims, or 120 acres, and, aside from the ledges, there are timber and an abundance of water for power and general mining purposes. The company has men at work opening the ledges, building trails and bridges preparatory to bringing out ore for shipment. Layman says the claims on which they are directing principal work shows an 8-foot ledge, with a porphyry hanging wall and granite foot wall.

#### Lane County.

E. E. Cable of Portland reports development work progressing in the tunnels being driven on both the Durango and Princess groups at Blue River, with favorable indications in the vein formation. The Great Northern is doing development work and the 2-stamp mill is pounding steadily and giving satisfactory returns from the ore being treated. The Badger mine is progressing under the management of G. E. Wagner and a road has been completed to get the mill on the ground that is to increase the output. H. A. Tromp has been increasing work on the Uncle Sam mine, and the mill has been moved to a better location, where it is ready for operation. The Treasure mine has ore blocked out. It is extending tunnels, and on the surface timbers are being prepared for use in construction of the mill.

#### Wallowa County.

Developments are progressing at Eureka copper district at the confluence of the Eureka and the Snake rivers in Wallowa county, 52 miles south of Lewiston, Ida. C. O. Howard of Waukon, Ia., president of the Eureka M., S. & P. Co., says his company is building a copper matting furnace. A portion of the machinery is on the ground and the remainder at Lewiston awaiting completion of the steamer Mountain Gem, which will ply between that point and Eureka. The furnace will have a capacity of 100 tons a day and will test the values of the ores to determine the means for their reduction. One tunnel has been driven 640 feet and has a depth on the lead of 350 feet. The tunnel is run on the lead. The ore body is 2 to 8 feet wide. The ore is chalcopryite and carries 5% copper and \$1 gold values. Surveys have been made for running a crosscut tunnel 1600 feet long to tap four leads at depth. It is also proposed to sink to the 500-foot level on one of the leads. They are operating two electric drills. The company possesses water-power rights, which will be improved as the development of the mines justify. Eureka is on the line of the O. R. & N.'s proposed extension from Huntington, Or., to Lewiston, Ida. A saw mill in operation in the hills back of Eureka is connected with the place by a good wagon road. A Chicago company is doing development work on properties in same district. Thresher Bros. and Roger Bros. are at work on promising leads. Adjoining the Eureka Co. claims the New York C. M. & S. Co. owns a group. J. J. Moynahan of Spokane, Wash., is president and A. J. Murphy, superintendent.

### SOUTH DAKOTA.

#### Lawrence County.

Lumber is being delivered for the new shaft house of the Hidden Treasure G. M. & M. Co. on Deadwood gulch, 1½ miles northwest of Lead, and work has started. Part of the machinery has arrived. A hoisting plant is to be installed and the company will then continue the shaft to deeper levels and crosscut. The bottom of the shaft down 70 feet is in ore. The first crosscutting will be done at the 100-foot level. The ore is of commercial grade and at present rate of development will insure the company a supply sufficient to warrant building a mill. There are millsites on the ground and Deadwood creek carries enough water to furnish a plant of at least 300 tons daily capacity. S. T. Cochran of Lincoln is president and W. Lawter, manager.

The main shaft of the Lucky Strike G. M. Co. is 230 feet deep and sinking steadily. It had been intended to cut a station at 200 feet and crosscut, but they will not begin crosscutting until the permanent water level is reached. The ore in the shaft shows copper values in addition to the gold it contains. The company has at its shaft a hoisting plant and machine

drills. The drills are at present being operated with steam, but an air compressor will be introduced. The company's base of supplies is Deadwood, from which it is distant 15 miles. C. A. Allen is manager.

The Minnesota M. Co. has reached quartzite in its shaft at Maitland and is cutting a station preparatory to drifting. Quartzite was reached in the shaft at a depth of 60 feet and some ore was found in the bottom of the shaft. Drifting will be carried on in two directions. The Minnesota M. Co. owns the former Garden City M. Co. and also the Oscar Waller millsite and the Bill Phillips group of claims adjoining. A wagon road has been built to the shaft and it is intended to put in a steam hoisting plant.

The Globe G. M. Co., near Lead, reports increasing development work. The company will build a reduction plant and work of construction will be started this month. The mill is to be a cyanide plant and will be on the company's Bismark group in Whitetail gulch, near the mine, a few minutes walk from the center of Lead. The pulverizing will be done by a Chili mill, says Superintendent Wade. J. Renken of Sheldon, Ia., is president.

The Puritan G. M. Co. will have its plants in operation this month. The hoist has been set, the gallow's frame is up and the company is enclosing the shaft house. Lumber is on the ground for the mill building and the boiler and part of the mill machinery have arrived. The Puritan property lies along Strawberry gulch, 3 miles above Pluma, and the main shaft is 90 feet deep.

#### Pennington County.

The quartz mill of the Black Eagle G. M. Co., near Rochford, is in continuous operation. The mill is a Huntington with capacity of twenty tons of ore daily. On the property adjoining that of the Black Eagle, the Golden West M. Co. is building a flume, driving a tunnel and cutting lumber for the flume and for a mill building. The tunnel is intended to carry the flume through the hill. It will be 140 feet long. The lumber for the mill of the Black Eagle Co. was sawed at the mill of the Golden West Co. The Golden West quartz mill is expected to have a capacity of from 125 to 150 tons a day, a Chili mill being used for pulverizing.

The Empire M. Co. is putting in a plant of mining machinery on its property near Hill City, and the shaft is to be continued to 200 feet. The ore carries pyrite and it is intended to utilize this ore commercially in manufacture of sulphuric acid.

High-grade ore is being taken out from the Burlington mine on Friday gulch, 9 miles northwest of Hill City. It shows free gold. The Burlington shaft is 120 feet deep and the vein has a breast of 20 inches between walls. The Burlington Co. is preparing to resume operations after a suspension of two months. It is expected a steam hoisting plant will be put in, taking the place of the whim now in use. J. B. Taylor of Hill City is president and superintendent.

### UTAH.

#### Grand County.

The Interstate M. Co., with properties at Basin, in the Gold Basin district 25 miles from Moab, is building a mill to work the low-grade gold ores that have been opened up in the mine.

The Overland mill at Sunshine is in operation again, after several years of idleness, and is treating an average of 150 tons of gold-bearing ore daily. The plant has been remodeled. There is ore blocked out in the mine.

#### Juab County.

Under an agreement between the Bingham Con. smelter and the Carisa M. Co., near Eureka, the latter will begin delivery of 50,000 tons of second class ore for reduction at the former's furnaces, says H. Joseph, manager of the Carisa. This class of ore, which has been accumulating, shows an average of 5% copper, four ounces silver and \$2 gold, with a gross valuation of about \$16. To get out these ores which are exposed on every level in the Carisa, it is intended to put in a boiler and hoist at the main shaft.

#### Salt Lake County.

At a depth of 300 feet in the incline off the main tunnel of the Ohio C. M. Co. at Bingham the management reports 5 feet of ore, which affords 15% in copper, while the product of the mill going to the valley furnaces is being marketed on controls showing 30% copper. To determine the extent of the high-grade ores in the incline, Manager H. Catrow says he will begin driving on the strike of the vein. At present only one wall is exposed in the incline, it having been decided to do no crosscutting until a sump was cut. During July the management forwarded to the smelters about 350 tons of concentrates, in addition to five cars of first-class ore.

Operations are progressing at the plant of the Butterfield M. Co. at Bingham,

under control of Lavignino Bros., with F. Whitmore superintendent. Since acquiring the Butterfield, Lavignino Bros. have remodeled the plant, formerly a stamp mill, equipped it with rolls, jigs and other devices. The ores contain lead, silver and gold.

President E. L. Stoddard says the properties of the Bingham & New Haven M. Co., near Bingham, are to be equipped with an aerial tramway to handle its ores, and a large compressor with which to operate its machine drills. Plans for the tramway are in the hands of the management. The route surveyed for the tram spans a distance of 4500 feet, beginning at mouth of main tunnel and extending to a connection with the Copper Belt Railway at the portal of Yampa tunnel. With this means of forwarding its ores, the cost will have been reduced to a few cents, while the present toll by wagon constitutes one of the largest items in the month's disbursements. It is proposed to operate the compressor by electricity, to be derived from the Telluride power plant at Provo. It is claimed at Bingham that the Rio Grande Railroad Co. will next season, if not the present, add another track to its road between the valley furnaces and the copper camp, and otherwise equip for the expeditious handling of an increased tonnage from the mines, with increased volume of supplies into the diggings. It is said the system will be required to equip itself for the transportation of 100,000 tons of ore daily out of camp before the expiration of another year. The management of the Bingham & New Haven Co. Bingham properties has contracted with the American S. & R. Co. to deliver within the next five years 100 tons of ore daily.

The Cornish pump with which the waters of Bingham canyon are raised to the tables of the Utah C. Co.'s mill at Bingham was overcome last week and the pump flooded. Operations were suspended. Two deep-sea divers from San Francisco, Cal., were sent for, and with their submarine apparatus went down the shaft, closed the bulkheads, shutting off the flow, and repaired and put into operation the sinking pump. The water had risen 85 feet in the shaft. The sinking pump raises 500 gallons per minute, and on this supply the mill resumed operations on the 2d inst. High-grade copper concentrates, running well in gold and silver, are shipped to the furnaces in the valley. On the enlargement of the mill work is in active progress, and with the additions being made to it on each side, its capacity by September 15 will have been doubled, says Superintendent Janney.

#### Tooele County.

During month of July the Honerine mine of Stockton marketed five carloads of high-grade ore and twenty-eight cars of concentrates, the product of twenty-five working days.

#### Washington County.

The management of the Utah & Eastern C. Co. will put down a double-compartment shaft. Heretofore the company has been operating with the single-compartment, which has proven inadequate. The company's mines are at Shem City.

### WASHINGTON.

#### Chelan County.

Chelan reports say H. H. F. Buckner has a contract to run an 800-foot tunnel in the upper Horseshoe basin to cut the Davenport ledge at depth of 700 feet. The tunnel is owned jointly by the Cascade G. & C. M. Co. and the Horseshoe Basin M. Co. After the ledge is reached, Buckner will drift on it to the intersection of the properties. Between \$700 and \$800 is being expended on the trail from Park creek to Horseshoe basin, and more men will be put to work on the trail and tunnel. Pearl & Dick are running an 80-foot tunnel on the P. & D. mining claim, 14 miles up the lake from Chelan, and it is showing values. The ledge appears to be 200 feet wide on the surface and assays in gold, silver and copper.

#### Lincoln County.

A copper smelting plant is being built for the Turk M. Co., whose properties are in Cedar canyon, 25 miles north of Davenport. Its construction is similar to the ordinary water jacket furnace, says the Spokesman-Review. One of these parts is charged with fuel, ore and fluxes in alternate layers, as in the ordinary practice. The other is charged with ore and fluxes only. The air blast is introduced at the top of the part containing fuel and ore. The blast passes down through it and up through the one charged with ore and flux. It is claimed that by this method a more perfect combustion and intense heat is obtained. The furnace has a capacity of 100 tons per day. The mine is owned and operated by Davenport men.

### WYOMING.

#### Albany County.

W. B. McNeel, secretary of the Ideal M. Co. of Pueblo, Colo., operating in the Keystone mining district, near Laramie, reports work progressing on the property of the company, the Florence, Keystone and Blue Jay claims. The ore on the dumps of the Florence and Keystone carries gold and it is intended to erect a cyanide plant at the mines and work the ore in the dumps before further ore extraction is started.

H. E. Owen of Norfolk, Neb., manager of the Blanche C. M. Co., says he has shipped to Laramie a plant of machinery, including a hoist, pump and boiler, which will be freighted out to the mine. The property owned by the Blanche company is contiguous to the New Rambler. At the Strong mine Manager Swigart reports ore struck in the 150-foot level. Copper glance is showing and it is thought the ore is the shoot cut at the 100-foot level.

#### Carbon County.

P. S. Delany of Colorado Springs, Colo., interested in the Portland mine, near Encampment, reports development progressing. The North American C. Co., owner of the Ferris-Haggarty mine, has contracted for addition of 800 H. P. to the treatment plant, which will enable it to increase the copper output. The company is treating from 200 to 275 tons a day, has 100 men in the smelter and on the tram and 160 underground. During the summer months power is generated by water. The steam plant to be built will permit of uninterrupted operations the year around. The deepest workings in the mine are down 390 feet. The Portland mine is being developed by the Battle C. M. Co. A tunnel is following a vein from which 13½% copper ore is being obtained, with gold values, says Delany. Owing to lack of a mill and transportation facilities, the ore is being piled on the dump. Ore has been opened at five places on the surface. In a 10-foot surface cut a vein, measuring 18 inches, was opened. It is intended to explore five known bodies, and by the time the railroad arrives the Battle company expects to have enough mineral, of varying grades, on the dump to keep a 100-ton smelter in operation.

### FOREIGN.

#### BRITISH COLUMBIA.

##### Boundary District.

From eight to ten horses are used by the Granby mines, at Phoenix, underground in hauling ore cars, in addition to the two saddle-tank Davenport locomotives. Six furnaces are again handling ore at the Granby smelter, after three weeks idleness for repairs. The ore output from Phoenix camp approximates 2000 tons daily.

The McKinley M. Co. is being incorporated by B. Lequime, D. Whiteside, C. M. Kingston, H. W. Warrington and G. A. McLeod of Grand Forks for working the McKinley claim in Franklin camp.

W. R. Williams, of the Dominion C. Co., formerly owner of the Brooklyn group of mines, says he has turned the same over to the new company. Manager Collins and Foreman Callahan have men at work in the Brooklyn and Stemwinder shafthouses, unwatering the mines. The number will be increased as fast as the men can be used to advantage. In the meantime the Montreal & Boston smelter of the company at Boundary Falls is being prepared for blowing in.

##### East Kootenay District.

F. R. Byron, having placer holdings in the gravel and surface wash on the hillside below the Badger and Red Mountain claims, near Fort Steele, is extensively prospecting them. He has taken water out of Manchester creek. He will complete the ditch and flume built last fall to provide water power for a mill.

##### Rossland District.

The Velvet mine, on Sophie mountain, near Rossland, has 100 sacks of concentrates milled. About twenty men are at work. Since the consolidation of the Blue Bell and the Sophie mines, a few men have been put to work in the 480-foot tunnel on the Sophie mine.

##### Slocan District.

The Ivanhoe mine at Sandon, owned by Detroit, Mich., men, is shipping silver-lead ore which averages from 85 to 100 ounces per ton and is also marketing zinc, says P. Hickey, manager of the company. In the Slocan the mining industry is improving; zinc is adding to the output. So far for 1904 they have shipped 800 tons of zinc concentrates from the Ivanhoe against 500 tons for the whole of 1903. They are sending it to Denver, Colo. The Dominion government's lead bounty has been of great help to the silver-lead mines.

G. O. Buchanan, administrator at Nelson of the lead bounty, gave out last week



checks for lead bounty payments. Fifteen arrived together, representing \$14,999.85, though the checks varied from \$50 to \$3000. The claimants are the Dundee, Arlington at Erie, Lorna Doone, Paradise, Triune, Mountain Con. (two checks), Wakefield at Silverton, Antoine at McGuigan, Echo, Lucky Boy, Slocan Star at Sandon. Three more were received, aggregating \$2100.

West Kootenay District.

Cambridge reports say the Goldfinch stamp mill, which has been idle since last January, has been started again under direction of J. T. Volger. Men are working at the property, operations being confined to a surface showing from which good values have heretofore been obtained.

MEXICO.

Chihuahua.

In the Cierro de Naica, 16 miles west of Concho, on the Mexican Central railway, La Naica M. Co. is operating two mines. In its San Francisco mine it reports ore blocked out, assaying 300 grams of silver, 20% lead and 20% iron. The main shaft is down 125 meters and in ore. The Dolores also shows ore blocked out, assaying 500 grams silver, 30% lead and 20% iron; and its main shaft is down 70 meters. The Lepanto mine in same section is shipping thirty-five cars per month of ore assaying 350 grams silver, 15% lead, with low copper values. The main workings are down 90 meters. There are no steam engines in the camp, either gasoline hoists or horse whims being used in raising the ore. No water has been found in any of the mines—all water used being brought in over the narrow gauge railroad from Concho or in carts a distance of 8 miles.

Durango.

The Evanston M. Co. has bought La Purisima mine, near Gabriel station, on the Inter-oceanic Railway. The ore carries gold, silver and lead values. Development will be increased.

Guerrero.

Superintendent W. W. Miller, at the Mina Grande group, near San Nicholas de Oro, says it is proposed to build a 60-stamp mill at the mine, which is being operated by the Balsas Valley M. Co.

Jalisco.

The American Co., managed by W. H. Lees, has put in operation a 50-ton concentrator at the Soquita Prietas mines, south of Ayuta. The ore is low-grade copper.

Sonora.

J. M. Morrison of Washington, D. C., manager of the Richfield M. Co., says the holdings of the company at Tuape are extensive and carry values in copper. Development work has opened ore bodies, and the company is arranging for building a reduction plant.

R. S. Dewar of the Chicago Gold Placer Co., operating near Saqui Grande, says the company's dredger is at work successfully. He also states that two more boats are to be ordered, so as to increase operations. The dredgers are of the Risdon type and cost \$120,000 each; they have a capacity of 3000 cubic yards of earth each. He says the cost of dredging in Sonora is 12 cents per cubic yard.

G. A. Case et al. are preparing to develop a group of mines which they own near Santa Rosa. Operations will begin next month and machinery will be put in.

No. 8 furnace, nearing completion at the Cananea Con. C. Co. works at Cananea, will be the largest copper furnace in the republic, says the Cananea Herald. It is 56x180 feet at the tuyeres and is capable of carrying a charge 14 feet in depth. It is arranged to be mechanically fed and equipped with steel jackets, which are constructed with staybolts. The furnace discharges into a forehearth, which, as well as the crucible in the furnace proper, is lined with "chrome" brick. The furnace is designed to have a working blast pressure of 35 ounces, and at other places where the same type is in use it puts through 6½ to 7½ tons per square foot of hearth area each twenty-four hours, i. e., 450 to 525 gross tons.

W. N. Ten Eyck, superintendent of the mines of the American-Mexican C. Co., near Llano, says he is preparing to make increased shipments of gold, silver and copper ores, which are being taken out of the mines, to the Copper Queen smelter at Douglas, Ariz., for treatment.

NORWAY.

The final payment on the Utah Nickel Co.'s holdings of nickel-bearing mines on the west coast of Norway was made August 1, says M. Christophersen of Salt Lake City, Utah. The installation of a process with which to reduce the ores will be started this month. Fifty miles away an electrical process is being used with effective results in the extraction of nickel, and it is proposed to employ similar methods at the Christophersen group.

Personal.

W. W. CANBY of Philadelphia is at Eureka, Colo.

NATHAN GREGG has returned to Denver from Silverton, Colo.

J. F. CONDON, a mine owner of Verdi, Nev., is in San Francisco, Cal.

GEO. L. HOLMES has returned from San Francisco to Folsom, Cal.

P. C. WEBER, a mine owner from Ely, Nev., has returned from a trip East.

C. MASSON of Los Angeles, Cal., is in San Francisco, Cal., on mining business.

H. ANDERSON, a mine owner of Chihuahua, Mexico, is in San Francisco, Cal.

R. M. GREEN of Oroville, Cal., is in San Francisco, Cal., on mining business.

CHAS. BORN of Wickenburg, Ariz., is visiting in Silverton and other Colorado points.

H. GATES has returned to San Francisco, Cal., from mine examinations in southern California.

C. M. ODDIE, interested in Nye county, Nev., mines, is in San Francisco, Cal., from Tonopah, Nev.

W. WEHNER is in San Francisco, Cal., from the quicksilver mines at Evergreen, Santa Clara county, Cal.

F. P. SWINDLER, superintendent of the Bamberger mines at De Lamar, Nev., is in Salt Lake City, Utah.

G. L. MOATS returned to Salt Lake City, Utah, last week, from a mine examination at Humboldt, Nev.

S. J. HENDY, of the Joshua Hendy Machine Works, San Francisco, Cal., is in the East on a business trip.

T. J. MURPHY of Needles, Cal., interested in southern California oil properties, is in San Francisco, Cal.

S. K. THORNTON, superintendent of the Shenandoah mine, near Plymouth, Cal., is in San Francisco, Cal.

CYRUS BRADLEY returned last week to Spokane, Wash., from a visit to his mining interests in eastern Oregon.

L. G. HARDY has returned to Salt Lake City, Utah, from making mine examinations near Battle Mountain, Nev.

A. J. McDONNELL, superintendent of the Union and other mines at Virginia City, Nev., is in San Francisco, Cal.

M. R. GALUSHA, manager of the Jumbo mine at Rossland, B. C., returned to Spokane, Wash., last week from the mine.

J. M. BIDWELL, assistant manager of the American S. & R. Co., is in San Francisco, Cal., from Salt Lake City, Utah.

F. WHITMORE, recently at Bisbee, Ariz., is superintendent of the mines of the Butterfield M. Co., at Bingham, Utah.

G. W. MAYBEE is manager of the Newfoundland G. & S. M. Co., operating the Newfoundland mine, near Central City, Colo.

D. McVICHIE returned last week to Salt Lake City, Utah, from Mexico, where he has been making mine examinations.

J. M. MORRISON of Washington, D. C., manager of the Richfield M. Co., is at the company's mines at Tuape, Sonora, Mexico.

P. J. DONOHUE, of the Western Exploration Co., is in San Francisco, Cal., from Salt Lake City, Utah, on mining business.

B. L. BROWN, of Philadelphia, Pa., is president and manager of the New York-Tonopah G. M. Co., operating at Tonopah, Nev.

A. G. ELLIS, recently of Lake City, Colo., is superintendent of the mill of the San Juan Ore Co., at Rico, Dolores county, Colo.

J. W. PROUT, JR., of Tucson, Ariz., has been appointed engineer and metallurgist at the Old Mowry mine, near Nogales, Ariz.

W. N. TEN EYCK, superintendent of the American-Mexican C. Co. at Llano, Sonora, Mexico, returned last week from a trip to California.

N. DUNYON AND A. E. HYDE have returned to Salt Lake City, Utah, from making mine examinations in the Cariboo mining district in Idaho.

G. McM. ROSS, manager of the Union copper mines at Copperopolis, Calaveras county, Cal., has gone to Shasta county, Cal., on mine examinations.

C. K. MCCORNICK, of Salt Lake City, Utah, returned there last week, after at-

tending the annual meeting of the Gold Roads Co. of Arizona, in Paris.

C. H. GODDARD, manager of the Tarasca gold mine, at Torres, Sonora, Mexico, has returned to San Francisco, Cal., from a several weeks' visit at the mine.

G. W. KAISER of San Francisco, Cal., has returned from a visit at the properties of the Zubiate M. Co., at Zubiate, Sonora, Mexico, in which he is interested.

T. C. WOODWORTH, consulting engineer of the Anita C. Co., returned last week to the company's mine at Anita, via Williams, Ariz., from an Eastern trip.

HAROLD HARVEY of Oakland, Cal., is superintending construction of a 30-mile ditch for a Seattle, Wash., hydraulic mining company, operating near Teller City, Alaska.

MANAGER I. E. ROCKWELL of the Minnie Moore M. Co., at Hailey, Idaho, has gone East, and L. Price, Jr., the metallurgist, is in charge of the Minnie Moore mine and mill.

C. H. SPINKS of Berkeley, Cal., is manager of the American Magnesite Co., with mines in Santa Clara and Alameda counties, Cal. E. L. Richmond is superintendent of the mines.

E. P. GILMAN, of the firm of Pellet, Harvey, Bryant & Gilman, of Vancouver, B. C., is examining for the purpose of making a report on mining property on Princess Royal island.

M. S. KETCHUM, C. E., in charge of the Kansas City, Mo., office of the American Bridge Co., has been appointed professor of civil engineering in the University of Colorado at Boulder, Colo.

Commercial Paragraphs.

THE Western School of Mines is now established at Belmont, Cal., to teach practical mining work.

E. A. RIX, of the Rix Compressed Air & Drill Co., has returned to San Francisco from the East, where he arranged with the Chicago Pneumatic Tool Co. for the manufacture and sale of the torpedo rock drill on the Pacific coast.

THE General Metals Co., 11 Broadway, New York, owners of the Moore slimes process, has just closed two contracts in New South Wales, Australia, for the installation of the Moore method of treating slimes. One of these is for a 200-ton per day plant at the Occidental mine, Cobarr, New South Wales, and the other is for the treatment of 250,000 tons of tailings at a dump on the Chappel mine property, in the same section.

THE Wellman-Seaver-Morgan Co. of Cleveland, O., have closed a contract with the Leiter Coal Co. for the construction and erection of a hoisting plant at their mines at Zeigler, Ill., consisting of a steel head frame and double-cylinder hoisting engine. The contract was awarded to the Wellman-Seaver-Morgan Co. in the face of severe competition, and they were given the job on account of their ability to promptly execute the work. This is the second contract that the Wellman-Seaver-Morgan Co. have from the Leiter Coal Co., the first consisting of a complete hoisting and coal handling plant, which is now in successful operation.

THE J. Geo. Leyner Engineering Works Co. of Denver has recently shipped a complete machinery plant, including compressor, hoister and drills, to the Violet Mines, Ltd., of Alaska; a large air compressor to the Westport Coal Co. of New Zealand; an air compressor and several drills to Japan; a complete mining plant to the Red Mountain Railroad, M. & S. Co.; compressor and hoister to the Dakota M. & M. Co. at Deadwood; compressor and drills to the Nobles gold mines in California; a single-decked mine cage to the Columbus Co. at Deadwood, and two double-decked mine cages to the Uncle Sam mine at Roubaix, South Dakota.

THE Power & Mining Machinery Co. started business a little over a year ago, having secured the works of the Hulthoff Mining Machinery Co. at Milwaukee, where it immediately commenced extensive improvements for the manufacturing of its gas machinery. The extension of these works was begun in August, 1903, and will be ready within sixty days for extensive operations. In the meanwhile the company has taken upwards of a million dollars worth of orders for Loomis-Pettibone gas apparatus and Crossley gas engines, which are being constructed in their shops at the present time. These orders have been placed with the most representative and conservative companies, among which are the following: Velardena M. & S. Co., Velardena, Durango, Mexico; F. W. Snow, Hillburn,

N. Y.; Gould Coupler Co., Depew, N. Y.; D. Lovejoy & Son, Lowell, Mass.; Ramapo Iron Works, Hillburn, N. Y.; Pennsylvania Steel Co., Steelton, Pa.; Dufréne & Locke, Montreal, P. Q., Canada; Milford Electric Light Co., Milford, N. H.; Motor Engine Co., 15 William street, New York City; Potosins Electric Co., San Luis Potosi, S. L. P., Mexico; Amparo M. Co., Drexel Building, Philadelphia, Pa.; International Steam Pump Co., 114 Liberty street, New York City; Atha Tool Co., Newark, N. J.; Elmira W. L. & R. Co., Elmira, N. Y.; Sayles' Bleacheries, Saylesville, R. I.; W. H. Cone, Berlin, Ont., Canada; Bay State Forge, Cambridge, Mass.; Newton G. & E. Co., Newton, N. J.; Lexington Ry. Co., Lexington, Ky.; Wellington Meat Export Co., Ltd., Wellington, New Zealand; Avino Mines of Mexico, Ltd., Avino, Durango, Mexico; Phelps, Dodge Co. (Moctezuma C. Co.), Nacozari, Sonora, Mexico; Taylor Manufacturing Co., Columbia, S. C., and others.

At the plant of the Edison Electric Co. near Redlands, Cal., a Pelton water wheel is operating under a head of 1950 feet—equivalent to 850 pounds pressure per square inch. This wheel is direct coupled to an electric generator of 1000 H. P. capacity, the current is transmitted to Los Angeles, Cal., the station being only one of many controlled by this electric system, which has a large number of Pelton wheels in use, under heads ranging from 100 feet up to the above named, 1950 feet. Under such an extreme pressure the water issuing from the nozzle may be likened to a bar of steel; by experiments it has been found that a sledge hammer has no effect upon it, owing to its density. The demands for cheap power, together with the advantages of water at hand, naturally led to the development of a water wheel to supply the connecting link, and it was a pioneer Californian, L. A. Pelton, who first conceived the idea of a water wheel to operate under high heads. In the days of '49 this wheel was called the "Hurdy Gurdy" wheel, and consisted of a wooden rim, to which was bolted cast iron cups, or buckets. The water impinging on the buckets, through a round nozzle, caused the wheel to revolve, and the peculiar shape of the buckets enabled a high useful effect to be obtained from the water. "Later on the fundamental patents were acquired by the Pelton Water Wheel Co., who, by experiment, further developed the original idea—of course making radical changes in design and construction—and succeeded in producing a wheel from which most satisfactory results are obtained. An efficiency of 90% has been reached by the use of this wheel, which, however, was under most favorable conditions; but efficiencies of 80% and 85% are realized in actual practice." The Pelton Water Wheel Co., with headquarters in San Francisco, Cal., have built up a large industry in the manufacture of water wheels alone, having given exclusive attention to this specialty. In the last sixteen years they have installed over 11,000 wheels, aggregating in excess of 1,000,000 H. P., the power ranging from a fraction of 1 H. P. up to 10,000 H. P. in a single wheel unit. It is indicative of enterprise that one may find this California machinery product in use for driving fans in a bungalow in India, and again, for operating a 30,000 H. P. electric plant in Oregon.

Trade Treatises.

"Before and After," a folder from the Ingersoll-Sergeant Drill Co., 26 Cortlandt street, New York, graphically portrays past and present, in a condensed account, of operations of the Cleveland Stone Co.'s quarry, showing resultant economy by use of their central compressed air plant.

"Some Golden Opinions by the Other Fellow on Water Leyner Air Rock Drills," being extracts from letters received from pleased patrons, is the name of a little treatise in black and gold from the J. Geo. Leyner Engineering Works Co., Denver, Colo. These letters are "from all over," and make a fine recommendation. The J. Geo. Leyner Co. furnish complete drilling and hoisting plants. Their exhibit at St. Louis is in the Palace of Mines and Metallurgy, block 81.

"What We Do" is the terse title of a 36-page folder from the Wellman-Seaver-Morgan Co. of Cleveland, Ohio, which gives a cursory but impressive idea of the great scope of their work, which embraces among other things the building of all sorts of equipment for any and every operation involved from extracting ore to turning out the finished product therefrom. Any one interested in a large mining or engineering proposition could read this folder with profit.



## Latest Market Reports.

SAN FRANCISCO, August 12, 1904.

## METALS.

**SILVER.**—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c, refined (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 45½c New York.

**COPPER.**—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.75; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £55 10s spot per ton.

**LEAD.**—New York, \$4.25; Salt Lake City, \$3.50; St. Louis, \$4.12; San Francisco, \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 16s 3d long ton.

**SPELTER.**—New York, \$4.85; St. Louis, \$4.75; London, £22 2s 6d per ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

**TIN.**—New York, pig, \$26.65@26.85; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, \$30@32½c. London, £121 6s spot.

**PLATINUM.**—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@82c per gram.

**QUICKSILVER.**—New York, \$42.00@44.00, large lots; London, £7 17s 6d San Francisco, local, \$41.50@43.00 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.00@42.00.

**BABBITT METAL.**—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

**ZINC.**—Metallic, chemically pure, \$3.10, 50c; dust, \$3.10, 10c; sulphate, \$3.10, .04c.

**NICKEL.**—New York, 40@47c per lb.; ton lots, 40@47c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

## STRUCTURAL MATERIALS.

**IRON.**—Pittsburg, Bessemer pig, \$12.60@12.85; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00@23.00; San Francisco, bar, 7c to 12c per lb.

**WHITE LEAD.**—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5-lb. tins, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

**LUMBER.**—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50@5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00@35.00.

**NAILS.**—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

**LIME.**—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

**CEMENT.**—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

## GENERAL SUPPLIES.

**ANTIMONY.**—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2.00 per keg. CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50@7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

**FUSE.**—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

**CHEMICALS.**—Cyanide of potassium, 98%—99%, jobbing, 23@24c per lb.; carloads, 22@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur,

French, 3½@3¾c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

**OILS.**—Linsseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Spem, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S. bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Spem, crude, 63@68c; Natural White, 65c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

**ALUMINUM.**—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

**BONE ASH.**—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

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**BISMUTH.**—Subnitrate, \$3.10, \$2.10.

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(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING AUGUST 2, 1904.  
765,485.—VEHICLE—J. E. Armstrong, Santa Cruz, Cal.  
765,583.—BOILER—T. J. Barbour, S. F.  
765,416.—WATCH WINDER—J. H. And, Fresno, Cal.  
765,420.—FACET—E. J. Calley, S. F.  
765,666.—RECORD MEDIUM—E. D. Casterline, Los Angeles, Cal.  
765,595.—ORNAMENTAL DEVICE—L. B. Christopher, San Jose, Cal.  
765,670.—SHOVEL—T. Cox, Portland, Or.  
765,599.—CANDLE HOLDER—E. W. Curtiss, Baker City, Or.  
765,341.—GRAPHOPHONE—E. Gilbert, Portland, Or.  
765,689.—SASH FASTENER—W. Goodcell, San Bernardino, Cal.  
765,694.—DIE LIFTER—E. B. Hawkins, S. F.  
765,247.—TOOTH BRUSH—C. Heilrath, Sacramento, Cal.  
765,349.—FOLDING BED—S. J. Herrick, Seattle, Wash.  
765,188.—BRIQUET—G. W. Hopp, Olympia, Wash.  
765,624.—SOAP HOLDER—T. P. Jarvis, S. F.  
765,700.—MOTH EXTERMINATOR—H. H. Kennedy, Goodyear's Bar, Cal.  
765,764.—WATER SEAL TRAP—J. E. Keyt, S. F.  
765,447.—RIFLE SIGHT—C. Kliesig, San Diego, Cal.  
765,505.—CHILL ROASTER—Knapp & Ortega, Los Angeles, Cal.  
765,510.—CAN CLEANING MACHINE—W. Munn, S. F.  
765,515.—ELEVATOR—E. C. Northrup, San Jose, Cal.  
765,885.—STEP LADDER—O. Richardson, Applegate, Cal.  
765,380.—HALFTONE SCREEN—A. G. Russell, Los Angeles, Cal.  
765,395.—SPRING BOARD—C. W. Schilling, Portland, Or.  
765,400.—MANUFACTURE GAS AND COKE—J. C. H. Stut, Oakland, Cal.  
765,553.—APPARATUS FOR GAS AND COKE—J. C. H. Stut, Oakland, Cal.  
765,554.—MANUFACTURING GAS—J. C. H. Stut, Oakland, Cal.  
765,515.—APPARATUS FOR MAKING GAS AND COKE—J. C. H. Stut, Oakland, Cal.  
765,780.—VEHICLE WHEEL—H. H. Taylor, San Jose, Cal.  
765,782.—NUT LOCK—E. Wacker, Stockton, Cal.  
765,478.—GAS MACHINE—R. H. Walters, Los Angeles, Cal.  
765,208.—IRONING BOARD—C. H. Williams, Fowler, Cal.  
765,565.—FISHING GEAR—A. W. Wilson, S. F.  
765,786.—TYPE CLEANER—A. M. Wing, Spokane, Wash.  
765,788.—ARC LAMP—O. N. Wiswell, Snoqualmie Falls, Wash.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

VEHICLES.—No. 765,485. Aug. 2, 1904. J. E. Armstrong, Santa Cruz, Cal. This invention relates especially to the mounting or suspension of the body of the vehicle upon springs by which it is supported from the axles or running gear. It consists in a novel means for suspending the body by swinging links and hangers and in the connection therewith of springs which are operated in unison to depress all parts of the body simultaneously without reference to the part upon which the load may be placed.

CAN CLEANING MACHINE.—No. 765,510. Aug. 2, 1904. Wm. Munn, San Francisco, Cal., assigned to Alaska Packers' Association of San Francisco, Cal., a corporation of California. This invention consists in the combination, with a mechanism by which the cans are transmitted to the cleaning device and they are advanced and arrested while they are continuously rotated, of a blast and a valve mechanism by which said valve is automatically opened whenever a can is presented and

closed after the can has passed beyond its influence. It also comprises means for controlling the supply of cans to the endless traveling chain by which they are advanced to the cleaning device and a means for regulating the tension of the conveyor chain.

## ASSESSMENT NOTICE.

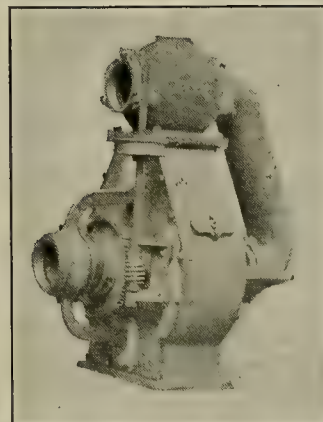
ORLEANS CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 6th day of August, 1904, an assessment (No. 2) of seven and a half (7½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 10, No. 324 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of September, 1904, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 31st day of October, 1904, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

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GEO. F. THURSTON, Secretary.  
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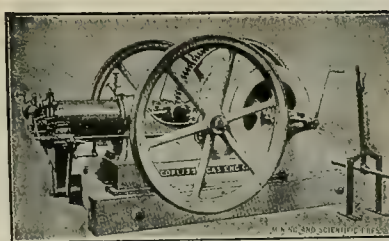
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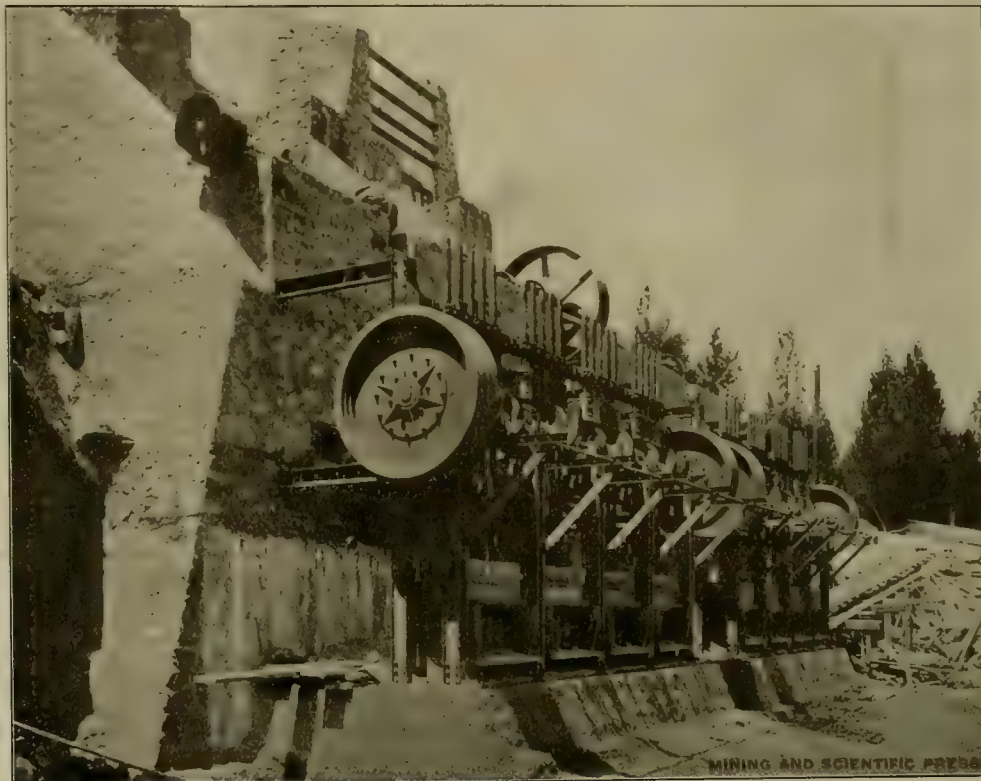
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## Systematic Mine Development.

While undoubtedly the miners' maxim, "follow the ore," is a good one, and as a general principle is a better one than that which advises vertical shafts and mine workings laid out with absolute mechanical accuracy, it is unwise for the mine operator to follow the ore so closely that no prospecting beyond the walls of the vein is undertaken. Many good mines have been shut down and abandoned for years, simply through the failure to extend the work of exploration beyond the walls of the vein. Ore shoots in veins pinch out, overlap, and send out branches, and it should be the aim of the careful mine superintendent to keep in sight all the possibilities of his mine, by means of properly-directed crosscuts, as well as to explore the single fissure in which he chances to find a body of pay ore. Some years since a mine operator bonded a mine in the Southwest, pushed development work expeditiously, but always in the ore shoot, stopping work as soon as the workings ran out of ore. As a result the extent of the ore shoot was soon determined, and the mine was disposed of at a price much below that which had been anticipated. A short time thereafter the disappointed operator described the conditions found at the mine, saying that the ore shoot "feathered out" on the edges, the walls not being in sight—there being heavy selvages of clay present. A mining engineer, to whom these conditions were described, at once gave it as his opinion that the ore shoot was only one of a series and that another would be found by crosscutting either to foot or hanging, and this proved to be the case, for within 6 feet a second shoot was discovered by crosscutting to the hanging side, and this proved to be characteristic of the occurrence of ore in that mine. When a mine is first opened, it is wise to have the workings follow the vein closely, but



Concrete Walls and Steel Frame of North Star Mill While in Course of Construction, Grass Valley, Cal.—(See Page 120).

later, when the development of the vein justifies it, it is often more economical to sink a vertical shaft in the hanging wall, which will intersect the vein at an angle in either foot or hanging wall, preferably the latter, that ore might be hoisted at less expense and in greater amount than through a shaft having numerous changes of dip and other irregularities.



Power House of the North Star Mines, Grass Valley, Cal.—(See Page 120).



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## Ditch Right of Way.

The United States District Court at Nome has rendered a decision in the Nome ditch cases which is likely to delay to a great extent the completion of several important ditches and deter the starting of other similar enterprises. The greater part of the rich known placer deposits has been exhausted, and the future activity of placer mining in that region depends to a great extent upon the development of water for hydraulic mining. To this end several large concerns have secured water rights, and were engaged, until enjoined by the court, in running ditches to points which will give a sufficient head for hydraulic operations. This required the construction of many miles of ditch, which afforded employment to hundreds of men; but of necessity these ditches pass over a greater or less number of mining claims in their course. The mining law effective in Alaska is the general mining law of the United States Statutes, which makes provision for right of way for railroads over private property, but none for ditches.

The conditions in Alaska, in the absence of local legislative power, have resulted in the passage of numerous local regulations, enacted by the miners of the numerous districts; but these are extremely uncertain in their operative force, and, until passed upon by the courts, can not be depended upon. The companies engaged in ditch construction entered into these various enterprises in good faith and had the moral support of the greater number of miners and claim owners; but upon the discovery that the ditch builders were not permitted by law to construct their canals over the property of others, and could not condemn a right of way for this purpose, as mining is not recognized as a public utility, there was a rush for the unclaimed lands along the surveyed lines of ditches, and numerous "bench" claims were located and their value fixed at exorbitant figures. While the claims located prior to the establishment of the ditch line will undoubtedly be able to maintain their demands, those located subsequently will probably be held subject to the prior existing rights of the ditch owners. In the case in question, that of the owners of Claim No. 6 on Dexter creek vs. the Miocene Ditch Co., the court held that the company was a foreign (California) corporation, and that the laws controlling Alaska lands made no provision that a foreign corporation could exercise the sovereign right of eminent domain. In the United States the right of eminent domain may only be exercised by public utilities, such as railroads, etc., and as in the United States mining is recognized as a private industry, it has not this supreme right. That the action of the claim holders is the result of shortsightedness is evident, as they obstruct the further development of an important industry, while not in any way promoting their own interests.

## Theory vs. Practice.

In all practical industries, of which mining is an illustrious example, there arises as an outgrowth of practice numerous theories—ideas of scientific, practical in, often of an impracticable sort. One may have a conception of how fine or how coarse a certain ore should be crushed, but the fact is, it must be tried by experiment before the truth can be positively known. A concentrator man says, "Your machines are running too fast." "How do you know?" inquires the man being criticised. "Because," is the reply, "at the Golden Giant we ran this kind of machine at 160 revolutions and did fine work, and you are running 200." "Well," was the reply, "this is not the Golden Giant, and our tailings run 20 cents." This is the real test of the efficiency of the method, provided the capacity is not so far reduced as to cause the close saving made to be more costly than the result achieved. So it is with the operation of rolls, the running of a smelter, or the sinking of a shaft. The mine and the mill superintendent cannot afford to drop into a rut, but must keep abreast of the times and vary their practice to suit the conditions, greatly varying in different mines and often changing with time at the same mine. He must have ingenuity, but the practical always dominates the purely theoretical; but these two should always go hand in hand to produce the best economic results.

## Modern Mill Equipment.

The tendency in modern milling equipment is toward that which is more substantial and enduring than that usually found in similar constructions in the past. Twenty-five years ago when a thoroughly equipped quartz mill was completed and supplied with every requirement at that time considered necessary to a first-class and up-to-date plant, it was thought that a mortar would not last longer than five to six years with active surface, and when the mortar was worn out it was also generally time to repair or completely renew the mortar blocks, battery posts and other heavy parts of the mill. With the passing years these things have undergone many changes, each being somewhat of an improvement on that previously in use, until to-day are found radical changes as compared with the "modern mill" of a quarter of a century ago. The first important improvement was to place iron liners in the mortars. These being replaceable, at once prolonged the life of the mortar indefinitely. Then the mortars were cast heavier. From a maximum of 4800 pounds, mortars were increased in size and are now cast weighing 6000 and even 7000 pounds, and, in some instances, these heavy mortars are set on massive "anvil blocks" of cast iron. The old-style solid timber mortar blocks have been replaced in new construction by built up blocks made of 2-inch planks solidly spiked together. More recently concrete-mortar blocks have found favor in some districts, and, in a few instances, massive blocks of granite have been placed above the concrete foundations, and on this the mortars have been set. These several changes have all been along the line of greater solidity and more enduring qualities in that most important part of a quartz mill—the foundations and mortars. A desideratum in mill construction is absolute rigidity, and this it is difficult to secure without massiveness, and is not always obtainable even then, if details are neglected. The tremendous vibration set up by the dropping of a battery of sixty or more 1000-pound or heavier stamps 100 times per minute, is only understood and appreciated by millmen and engineers whose task it has been to find a means of overcoming this undesirable element in mill construction. The most recent innovation in California mill building is that found at the North Star mine at Grass Valley in Nevada county, Cal., described in some detail elsewhere herein. Here the foundations are of concrete and solid masonry. The battery frame is of channelled steel and everything about it is as substantial and rigid as it seems possible to make it. The mill has been carefully designed with a view to enduring qualities and economy of operation. As this is the first large steel battery erected in California, the result will be watched with interest, and it is doubtless only the first of a large number of mills to be built on similar lines. A mill of this construction not only has the merits of solidity, but it is fire proof and will probably last as long as the mine, even if that be a quarter of a century more or longer.

THERE still remain many unsolved economic problems in metallurgy, though these are being constantly diminished by the careful experimentation of professional chemists and other. Ores of almost every known composition, no matter how complex, can be successfully treated by known methods, but often these methods are commercially impossible owing to the cost. The field of metallurgical and chemical knowledge is being searched by many competent and careful investigators who are seeking methods of cheapening known processes or hoping to devise new ones to supplant the old. Success has attended these efforts in the past and much increased knowledge may be anticipated in the future, both in the chemistry of metallurgical processes and in their mechanical application.

THE refusal of over 400 Japanese who were recently landed at Santa Rosalia, Baja California, under contract, to abide by the terms of their agreement with the Boleo Copper Co., presents an interesting complication. The mines are in Mexican territory, the owners are French, and the refractory laborers are Japanese. As the company advanced transportation and other expenses, the authorities have interfered to compel obedience.

## Revival of Interest in the Comstock.

The success attending the work of drainage of the middle section of the Comstock lode at Virginia City, Nev., by means of the hydraulic elevators placed in the C. & C. shaft, has led to the serious consideration of a second attempt in this direction in relation to the mines at the south end at Gold Hill. These mines had been flooded to the Sutro tunnel level for twenty-five years or more until the lowering of the water in the C. & C. shaft showed its influence all along the line. The zone of saturation at present is approximately that of a concave oval, with its lowest plane just below the 2350 level of the C. & C. shaft. At the Combination shaft, sunk in the hanging wall, and several thousand feet distant, the water is 200 feet below the Sutro tunnel level, but is 400 feet higher than at the C. & C. shaft. In the Gold Hill mines the water is higher still, but somewhat below the tunnel level. It is proposed to install an elevator in the shaft of the Alta mine, which will be equipped for the purpose, and it is thought in this manner the Gold Hill mines can be unwatered to the bottom about 3000 feet. It is believed that most of the old excavations are caved in these long flooded mines, and no great rushes of water are anticipated. Work in the lower levels of these mines was brought to a standstill when a rush of water from the Exchequer mine flooded the adjacent properties with hot water, driving the miners out, who barely had time to escape. The volume of water from that source has never been determined, but the hydraulic elevators have long since proven their efficiency in handling a large volume of water, and an installation of this kind at the Caledonia shaft would probably result in a renewal of activity in these long abandoned mines.



## CONCENTRATES.

THE condensing engine will need twenty-five gallons of water to condense the steam evaporated from one gallon of water.

MILL shafting should be examined frequently to see that it remains in alignment. When shafting gets out of line it greatly increases the friction of running the machinery, and it usually causes the babbling of the boxes to cut.

It is stated that when the peasants in the Baku oil region of Russia desire to make lime they pile limestone over one of the many vents of natural gas found in that section and apply a torch, and the limestone is converted into caustic lime at no further expense.

WHERE ores are coarse—carrying sulphides in comparatively large crystals or masses, rather than in finely disseminated grains—rolls and jigs are often more satisfactory than stamps and concentrators, these latter being better adapted to the ores containing the finely disseminated sulphides.

THE new camp of Goldfields, in Nevada, is about 25 miles from Tonopah in a southerly direction. There are three separate camps there, mostly tents. The prospects extend for a distance of about 4 miles, and there are a number of veins on which good ore has been found. Some of the ore is very rich in gold. It is stated that in one shaft, down 300 feet, water and sulphides have been encountered.

It is thought by electrical engineers that the limit of high voltage in electrical transmission is rapidly being approached, with the present insulating system and devices. With currents running at 60,000 volts and over, when switches are suddenly opened or closed in high tension plants, it is said the insulation is practically worthless momentarily, owing to the destructive discharges of the subtle fluid.

THE first mechanical rock drill was introduced in the United States in 1838, and was called the "drop" drill, from the fact that it was employed in cutting "down" holes, the drill being raised by a cam something like the stamp and allowed to drop. Later springs were attached to increase the force of the blow. The first drill approaching the modern construction was the Burleigh, which was operated by steam.

A CROOKED SHAFT is never satisfactory. It causes hoisting ropes to become more quickly worn. It interferes with the expeditious handling of ore, men and materials, causes delays and difficulties when putting in pipes, etc., and is for numerous other reasons less desirable than a straight shaft, even if the latter costs more. It is not always the most economical practice to seek for and follow the softest ground in sinking.

THE temperature of saturated steam in a boiler varies greatly with the pressure. Thus, when the absolute pressure is 10 pounds per square inch the temperature will be 193° F.; at 30 pounds the temperature is 250°; at 60 pounds the temperature is 292.5°; at 100 pounds it is 327.6°; at 150 pounds it is 358°; and at 200 pounds, 381.6°. These figures are theoretical, and in employing steam in pipes for heating or drying purposes considerable allowance is necessary for radiation, etc.

"AMPLIACION" in Mexican mining parlance means an increase in the number of claims or pertenencias previously taken. To secure this increase in claims the owners of the claims must subject themselves to proceedings similar to those provided for applications for concession. If this increase is made after publication of the summary of the previous filing, the first must be withdrawn and the new application substituted in its stead.

THE cyanide treatment of slimes is in each individual case a separate problem within itself. The determination of the best process to adopt can only be arrived at by experiment. Some slimes are readily treated by decantation, and in other instances this method fails to produce commercially successful results because of the time required. Filter pressing works well with some slimes, but this method does not find favor in the handling of some ores, though probably it is more generally applicable than the decantation method.

PETROLEUM OIL occurs in sands and shales, saturating these rocks. Its presence is not always denoted at the surface, as the strata containing the oil at the outcrop may be covered by debris to such a depth as to effectually hide the signs of oil seepage. Usually the oil occurs most abundantly in the crest or dome of anticlinal folds, though also occurring in strata of slight, but practically uniform, dip. Where the strata are flattened and along the lower portions of the anticlines, there is a greater likelihood of finding water rather than oil.

NEITHER steel nor iron will rust in the presence of dry air, but water in the presence of air will cause rust. It was formerly thought the presence of carbonic acid

was also necessary to cause this oxidation to take place, but it has been found by experimentation that the latter is not absolutely necessary. Steel oxidizes more readily than iron. Blued surfaces of either iron or steel is less quickly attacked by rust than bright surfaces that have been planed or otherwise mechanically polished. The formation of the blued surface during the manufacture of the bar or pipe seems to protect it from oxidizing influences.

RUBBER HOSE used under steam pressure will last a long time without serious leaks about the coupling joints if the steam be kept turned on continually, but if shut off and the hose allowed to cool, the iron or brass couplings contract while the hose shows scarcely any contraction, and when the steam is again turned on a leak will usually appear at these joints, which by repetition of the process becomes more and more pronounced until the loss of pressure is so great that the hose has to be renewed. If the hose is to be used in connection with a sinking pump it would be better to put in a slip joint in the steam line.

IN establishing the character of land, as to its relative mineral or agricultural value, the United States Land Office at Helena, Mont., has recently rendered a decision which has been sustained by the Commissioner of the General Land Office at Washington, to the effect that to be considered mineral land need not necessarily have a paying mine upon it, but shall show sufficient evidence that mineral actually exists in sufficient amount to justify a person in exploring and developing it. Where the prospector considers the showing sufficiently good to locate the land and to work upon it, the land may reasonably be considered mineral.

WHEN roasting gold ores for chlorination, it is not customary to add salt in the furnace except in very small amount, as this causes a material loss of gold by volatilization. Aaron advises not to exceed 3 pounds of salt per ton of ore. When salt is added liberally—3% or 4%—the loss of gold on some ores is as high as 50% to 80%. When properly roasted, ore will assay more per ton than when raw, due to the fact that the ore loses 15% or more in weight by the expulsion of sulphur, which is not wholly replaced by an equal weight of oxygen. The amount of gold lost by volatilization is greater with a very high temperature than with a more moderate one.

TINSTONE was first recognized as such in the Black Hills of South Dakota early in 1883. The first discovery was made in the Etta mine, near Keystone, which at that time was being worked for mica. A number of heavy black minerals were sent to a competent mineralogist for determination, and among them were columbite, wolframite and cassiterite. At about the same date a miner, who was familiar with stream tin, recognized this mineral among the debris of the sluice boxes of the placer miners in the Bear Gulch region. It is stated that Richard Pearce of Denver, Colo., had previously recognized cassiterite in gravel sent him from the Black Hills, but little attention was paid to it at the time.

THE Simplon tunnel driven through the Swiss-Italian Alps has been completed, the first construction train having passed through a few days since. The tunnel is 12½ miles in length and presented numerous unusual engineering difficulties for a tunnel. Among these was the problem of ventilation. Hot springs were encountered about midway of the tunnel in the heading driven from the Switzerland side, and the heat became so great men could no longer work. The tunnel was completed by driving the heading from the Italian side. The temperature before the connection was made is stated to have been 107° F., which is not nearly so hot as the lower levels of the Comstock mines at Virginia City, Nev. The tunnel was commenced in 1898 and cost over \$15,000,000.

ALASKA is not a Territory, or at least has never been officially so considered. It is referred to as a district for all purposes in which its lands, courts, etc., are considered. It has an executive and an organized judicial system, but no legislative branch such as exists in the Territories. Congress legislates upon all matters directly connected with the district. As a consequence the Federal laws alone are applicable to affairs in Alaska, but the general land laws have not, as yet, been applied to Alaska. The following congressional acts affecting lands in Alaska are in force at the present time: The general mining laws; the coal land laws; townsite laws, and the law providing for the sale of lands for trade or manufacture; and the homestead laws, and provision for the right of way for railroads.

THE altitude of a mine has absolutely nothing to do with the geological conditions, nor with the character and value of the ore, though it may prove to be an important factor in the operation of a mine. In Alaska mines occur at sea level, descending beneath the ocean. In the interior of the United States, in California, Michigan and elsewhere mines are worked far below the level of the sea. In the Sierra Nevada mountains of California there are mines at an elevation of 11,000 and 12,000 feet. In Colorado a great many mines are above 10,000 feet, Leadville and Cripple Creek being examples. There are mines in Colorado (in Park county) at altitudes exceeding 12,000 and even as high as 13,000 feet, and there are mines in Peru, South America, at still greater eleva-

tion. Cerro de Pasco, the famed silver mining district, is at an altitude of 13,673 feet. These latter mines are now being equipped for copper production.

It is advisable to keep cam-shaft boxes in the quartz mill covered with caps, or, at least, with canvas aprons, to keep out as much dust and grit as possible, as these cause undue friction and are likely to start the boxes to cutting. In many mills the cam shafts are given but little attention, and get into very bad condition on that account. If the battery posts are not firmly set on a substantial foundation, the cam shafts are often subjected to violent vibration and the wear upon them is great under such circumstances. In cam shafts there is a tendency for the weight and friction of the tappet on the cam to thrust the shaft to one side. This is greatest just at the moment of the cam leaving the tappet. To counteract this "end thrust" the cams are made right and left handed—that is, placed on the right or left-hand side of the stamp stems—all of those dropping in one mortar of a 10-stamp battery being placed on one side and those of the adjoining five stamps being placed on the opposite side. One set tends to thrust to the right, the other set to the left, thus equalizing this tendency.

IN the case where the mill and compressor are both operated by water power from the same pipe line, and the operation of the compressor being intermittent, the water overflows at the pressure box when the compressor stops and it is desired to save this expense, a partial, if not a complete, remedy may be found in the construction of a large tank or reservoir on a level with the intake of the pipe line. This will permit of cutting down the amount of water bought, as when the compressor is idle the water required to run it will flow into the tank or reservoir and stored for use there when the compressor starts up. If a total of 300 inches are required under the present condition, of which the compressor requires 100 inches, the arrangement should make it possible to get along with 240 to 250 inches, depending on what portion of the time the compressor is idle. A tank containing 40,000 gallons should be built under ordinary conditions for less than \$400, including grading on a hillside. In figuring this matter, the maximum and minimum lengths of time that the compressor runs and is idle must be considered.

IN the cyanide vats the sulphide of antimony combines with the potassium to form sulphide of potassium, an objectionable element in cyaniding. The remaining sulphur combines with the cyanogen to form sulphocyanogen. Antimony sulphide dissolves in solutions of metallic sulphides, such as sodium sulphide, forming salts of sulphantimonious acid. Antimony is a most undesirable element to have associated with ores of gold and silver, and its treatment is a perplexing problem. When ores containing antimony are roasted, antimonious oxide is formed, which is oxidized to antimonic oxide in the presence of air, though in some cases a mixture of antimonious and antimonic oxide is produced. When sulphates are present during the roasting reactions these are often converted into antimonates, the sulphuric acid furnishing oxygen to the antimonious oxide, the antimonious oxide produced replacing the sulphur. When silver is present it will form an antimonic oxide of silver. The presence of a large amount of pyrite with the antimony aids the volatilization of the undesirable element, and if the ore does not possess this iron sulphide should be added to the charge. A mixture of a small amount of coal or coke dust with the ore will greatly facilitate the removal of the undesirable antimony, and also of any arsenic that may be present.

ALTHOUGH steel plunged at the yellow or bronze color given drills results in a much harder steel than that obtained by plunging the tool at purple or blue, the temperature of the steel when it reaches the yellow color is much lower than when it reaches the blue stage. The yellow color occurs at about 230° C. and the blue at about 300°. There is a great difference in the action and working of steel, depending upon the amount of carbon present. For drills and picks, if steel be heated to a temperature sufficient to burn out the carbon, the steel is destroyed. Many good mine blacksmiths temper steel well without the slightest knowledge of the real principles governing the action of tempering, but are successful because they "understand" it from practice and are accustomed to a certain brand of steel. H. M. Howe says in his work, "Iron, Steel and Other Alloys": "If steel of 1.1% carbon be heated to a temperature of 700° C. and then suddenly cooled in water it will not be hardened; but if it be heated to a temperature considerably higher, say 880° C., then cooled to 700° slowly and then quenched in water at 700°, it is hardened." Steel hardened at this temperature is too hard and must be "tempered." This is accomplished by reheating it to 220° for straw color for drills and 300° to 320° for blue and purple colors for picks. The picks are not nearly so hard as the drills, but this loss in hardness is the less of two evils. The harder temper of the drill will not stand the shocks to which the pick, with its small point, is subjected. The drill is much more massive and blunt, and is able to withstand the shock produced by impact with the rock. Where cold, hardened steel is reheated and plunged; the process is called tempering. When the cold steel is reheated to low red and then allowed to cool slowly, the process is known as annealing.



## Some of the Essentials of a Mine Report.

Written for the MINING AND SCIENTIFIC PRESS.

The purpose of a mine report is to furnish reliable information of commercial character to those who may be interested in the same. As usually the persons to whom the report is presented have never seen the property, it is necessary to note every fact which may in any way have a bearing upon the proposition from the economic standpoint, both in relation to mining and metallurgy. Following is an outline, or general form, which may be used in describing a mining property:

**LOCATION.**—State; county; nearest large city; nearest town; nearest railroad point and distance from same; postoffice of the mine; county seat.

**TITLE.**—This is important and should be fully investigated, if upon preliminary examination the property appears to justify further examination. It should be looked up before complete and exhaustive examination, as, if the title is not clear, the chances for selling the property will be few, if that be the purpose of the report, as investors do not like to buy a prospective lawsuit.

**SITUATION.**—Topography of country about the mine. Character of roads, if any; if not, the extent of same required and probable cost. Timber available; if no suitable timber, so state, and note where suitable timber can be had and at what cost.

**WATER SUPPLY.**—This is important and should be described in detail. If running streams, state whether or not same are permanent or only living during part of the year. Can water be obtained for power? If so, state under what conditions. Give volume of water available and under what head same may be had.

**POWER.**—This is another most important factor. State what power is available—water, electric, steam, gas engine. Give full details of either or each and cost of same; also, if supplied by a power company, what is the cost per horse power per month? If steam is necessary or advisable, give kinds of fuel that may be had and cost of each (wood per cord, coal per ton and kind of coal), or if obtainable, cost per barrel of crude petroleum.

**COST OF TRANSPORTATION.**—In isolated regions the cost of transportation both to and from the railroad is an important factor. Machinery and supplies must be hauled in, and concentrates and ore usually shipped out. Often the freight from the mine to the railroad is less than that from the railroad to the mine. State cost of both per ton, if there be any difference; also, give railroad freight from largest city where most supplies will be bought.

**TIMBERS.**—If these are to be procured at a distance from the mine, state cost per thousand feet B. M. delivered at the mine and kind of timber, whether Oregon or native pine or other timber is to be used; also, price of lumber, if there be any difference in price. If round timbers are to be used, give price. In different districts round timbers are measured differently. In some places the price is fixed by the diameter at the small end of a log, usually 16 feet in length, the price being 8 to 12 cents per inch of diameter. In other camps a stated price is paid for these logs—thus, \$2 for a 20-inch log, \$3 for logs over 24 inches, \$1.50 for logs 10 to 14 inches (stulls), etc.; at others the logs are uniform in price for all sizes. State cost of 5, 6 and 7-foot split lagging. Always state kind of timber—whether spruce, fir, sugar pine, yellow pine, etc. Spruce timbers are superior to the other kinds and, consequently, worth more. "Second-growth" timber is usually inferior to the older timbers of "first growth." All timbers used in mines should be peeled and well seasoned. Those which are not should be had at a discount, based on length of time they have been cut. Old timbers are worse than green ones.

**HISTORY.**—While the history of a mine is not usually of first importance, it is often interesting and has properly a place in a report. In this, state the date of discovery, extent and character of early operations in the mine and progress of metallurgy. Give production from various sources. Thus: Free milling, from concentrates; from shipping ores (give as nearly as possible percentage of shipping ore as related to the entire bulk of ore mined). If smelting ore, so state. In this connection give name of smelters or other custom works to which ores were sent. Always give costs of these operations if obtainable.

**GEOLOGY.**—Give geological description of the mine with sketches. State kind of rock in which vein or ore deposits occur. Note all dikes, their direction and dip, and relation to the vein. Give strike and dip of vein. If there are other veins give strike and dip of these also. In some regions the geology is of much more importance than in others. Usually the general geology of the district is of less moment than that in the immediate vicinity of the mine, and this should be studied carefully, particularly with reference to faults, dikes, and general character of the vein. State whether or not the walls or either of them are well defined, or if the ore is "frozen" on

both sides. Give size of vein—maximum, minimum and average widths and also length of pay shoots. Notice and state if the ore occurs as a "pay streak" filling part of the vein or does it fill it from wall to wall. Is there a rich pay streak in a low-grade vein? Is the ore hard or soft, oxidized or sulphuretted? State character of the walls as to hardness, and condition—slaty, schistose or massive. If the latter, are the blocks large or small. These considerations are of importance in the cost of "deadwork" usually necessary in operation of the mine. If the vein cuts across the formation this should be noted. The dip of the vein is of importance, particularly if it lies at a less angle than 40° from the horizontal. If flatter than this angle more or less shoveling of ore in the stopes will be necessary, which increases the cost of mining. Mining in a large low-dipping vein is somewhat cheaper than in a small vein dipping at the same angle.

**DEVELOPMENT.**—How is the mine opened, through shafts (vertical or inclined, in the vein or in the wall rock) or by tunnels? If the former, can tunnels be run to advantage? What depth can be reached, and whether by crosscut or on the strike of the vein. Give length of crosscut or drift probably necessary to reach pay shoot. How many openings (shafts or tunnels) are there? Make a sketch (drawn to scale) showing the mine workings.

**EQUIPMENT.**—Give full description of all the machinery, hoists, pumps, mill, smelter or other works on the property. Also enumerate all buildings connected with the mine, in the way of shops, sheds, etc., with their equipment for handling materials, making cars, skps, etc., and for making repairs. All of these things are generally necessary about a mine, and if not already provided must be added, and the cost charged to capital invested.

**THE MINE.**—As the mine, after all, is the principal thing, it must be studied from every standpoint which has a bearing on the economics of its operation. Under this head must be grouped all of importance related to the development of ore bodies, their extent, value and character. The measurement of the vein at stated distances and a careful sampling of each station is imperative to the determination of the value of the property. There is a great deal of literature on "mine sampling" and this subject is here merely referred to incidentally. The definition of the terms "positive" ore in sight, "probable" ore, and "possible" ore are well understood. Positive ore is that exposed on four sides within reasonable distances—100 feet. In this some engineers include ore cut on three sides. "Probable" ore is that cut on two sides, and "possible" ore that cut on one side. The variations in method of sampling are numerous, owing to varying character of ore bodies, but as the value of the estimate of ore reserves, and that of the probable future of the mine, depend to a great extent upon the accuracy and thoroughness of the sampling, it is important that this should be done with the greatest care. There are two main factors which form the basis of the determination of the value of a mine. These are the amount and value of the ore, and the cost of turning this ore into money. Consequently costs in every department are as essential as the ascertaining of the gross value of the mine. Among these costs, one of the most important is that of mining. This necessarily includes actual mining of the ore, timbering, filling, tramming, hoisting (including power, ropes, skips, repairs and labor), ventilation, drainage, deadwork, trackage, cars, blacksmithing, superintendence, and various incidental expenses, in addition to the general expenses, such as interest on capital invested, taxes, insurance and office expense. Each of these branches must be taken up and considered separately. Another consideration is the reduction of the ore either in stamp or other mills, or in smelters, with all of the variations in the practice of metallurgical operations which may be necessary in the treatment of the ores of the mine under consideration.

**COST OF MINING.**—In this must be considered the size and position of the ore bodies, the physical character of the ore (soft or hard), also that of the walls, and the timber required to support the walls of excavations. Filling may or may not be necessary. If required its source and the cost of obtaining same must be stated. State whether mining is to be done by hand or with machines. Here must be included cost of compressing air. On this matter the magnitude of operations has a direct influence on cost. It is manifestly cheaper to mine in a large mine than it is in a small one. There is more variation in the cost of breaking ore, as between large and small stopes, than in the other items of expense above enumerated under the head of mining costs generally, such as tramming, ventilation, etc.

**HOISTING.**—The cost of hoisting varies greatly with the depth of the mine, the extent of operations, cost of power, amount of water to be handled if the mine is drained by baling, and to some extent on the size of skip or bucket, or, if cages are used, on the size and number of cars raised at a trip.

**COST OF ORE TREATMENT.**—This is a question of paramount importance and is often the stumbling block to what otherwise might be a financially successful operation. Except in large low-grade and

free-milling mines the cost of ore treatment usually exceeds that of mining. In most cases the cost varies with the magnitude of operations and somewhat with the situation, cost of labor, power, supplies, etc. If the ore is not almost wholly free milling, then must be considered the method and cost of concentration, and possibly also the treatment of tailings by cyanide process. The concentrates must either be shipped or worked at the mine by chlorination or some other process. In the event that the ore is of the smelting sort, then arises the question of its chemical composition; the fluxes needed; the possibility of obtaining them—iron, lime and silica and their cost. Fuel (oil, coke or charcoal) for smelting, power and water are indispensable to the smelter. The transportation problem is again involved, as the fuel must be brought to the mine, and also, probably, fluxes, and crude bullion or matte shipped out. The smelting problem is a complex one and requires an extensive technical knowledge of its requirements and costs, and this is a matter which must be treated in detail. It must also be remembered that no metallurgical process extracts all of the value from the ores, 90% being high extraction in most instances.

**LIFE OF THE MINE.**—The amount of ore in sight and the capacity of works to treat it are the factors which determine the life of the mine, if development work does not increase the time indefinitely. If the mine has not reached a producing stage the report should state the length of time and expense probably necessary to place it on a producing basis. If the investment is large it is important that this condition should be reached as quickly as possible, and it is desirable to place the mine in production as quickly as possible under all circumstances.

**DISPOSITION OF THE PRODUCT.**—If the mine be a producer of any other metals or substances than gold and silver it is important that the market for the base metals—copper, lead, zinc, tin, quicksilver or other metal or mineral—be ascertained and stated, together with the costs of transportation, discounts, commissions and other charges against the same, all of which are directly chargeable to the output.

As each mine must stand upon its own footing and as there is a very wide range in the character, size, situation and magnitude of mining operations generally, comparisons are of little value except they be made with those of similar kind operated under essentially the same conditions in the immediate neighborhood. The statement that the "Noble Grand" mine has produced twenty millions in gold, and is only a mile distant from the Chancellor, may be a gratifying statement to those immediately concerned, but it adds no actual value to the Chancellor mine, which is undergoing examination for the purpose of the report. This sort of information is often embodied in a report for promotion purposes, but as each mine must stand upon its own merit, the mention of such facts concerning other mines is only of passing interest and does not even indicate the possibilities of the mine under examination. W. H. S.

## Coal and Hydrocarbons in Colorado.

Along the projected line of the Moffat road, in Colorado, extensive areas of bituminous coal, with considerable bodies of anthracite are reported in the Yampa coal field in Routt county, northwestern Colorado. The area of the coal field is estimated at 900 square miles and the total thickness of workable coal at 75 feet. Several of the bituminous coal seams are said to be from 10 to 14 feet thick, and a seam of alleged anthracite shows an outcrop of 9 feet thickness.

The anthracite is probably due to the proximity of an intrusive sheet of igneous rock which has altered the bituminous coal into an anthracitic condition near its contact. This anthracite seam is assumed to underlie a large area dependent upon its proximity to the igneous rock. For the most part the seams are approximately horizontal or with gentle dip and easily developed.

Where the coal ends there the hydrocarbons begin. The hydrocarbons consist of petroleum as yet but little developed, together with asphaltum and its forms known as gilsonite, elaterite and ozocerite. Some of these are in Colorado; some just over the line in Utah.

The total area in which the hydrocarbons occur is estimated at about 10,000 square miles. The tonnage of the five gilsonite veins, which run through portions of the country in wide veins for miles like broad paths or roads, is estimated at 32,000,000 tons, and when this elaterite is quoted at \$65 per ton f. o. b. in Utah and \$41 per ton f. o. b. in Denver, the value of these peculiar deposits seems enormous.

The gilsonite at Duchesne, Utah, is mined in a long, open trench  $\frac{1}{2}$  mile long and 90 feet deep and presents a novel example of mining.

A VALUABLE AND INTERESTING article on rope knots and fastenings appeared on pages 107 and 108 of last week's issue, the text and illustrations for which were kindly furnished by The Edward Christman Co., Massillon, O. In the article credit was given "The Edward Christian Co." The name should have been "Christman."



## The North Star Mines.\*

(FROM A STAFF CORRESPONDENT.)

The property of the North Star M. Co. extends for about a mile south of Grass Valley, Nevada county, Cal. A number of mines and mills are located on the property, but the North Star mine and mill and the Central shaft and mill are the only ones running at present, the Gold Hill being shut down, the compressors alone being run.

Electric power and compressed air are supplied to the Central and North Star from the power plant shown in the illustration on the front page.

The North Star mine was opened on the incline. The Central shaft is vertical, 1600 feet in depth, sunk in the hanging wall and connected by a raise with the North Star from the 4000 (incline) level. To keep the excess of water in the rainy season from running down to the Central, an electric pump was installed at the 1400-foot level of the North Star in March, 1904. As seen in the accompanying illustration, it is of the Aldrich type, modified by putting in extra anchor bolts to make it more solid and by making changes in the valves. It has a capacity of from 100 to 800 gallons, there being three ways of changing the capacity. In the first place it is belted to a two-speed motor, again the motor pulley is made in steps and the change is readily made from an 8-inch to a 16-inch pulley. Lastly, the suction valves may be changed so as to modify the capacity. The pump throws 325 feet.

The most important improvement recently made is the construction of a new 40-stamp mill at the Central shaft. Being of recent construction and embodying a number of new ideas, it represents an advanced type of California mill installation. Important features are the masonry foundations, the arrangement of the power, the structural steel battery posts and the plate holders.

The mill was built by the Union Iron Works of San Francisco, Cal., and was constructed to handle the output of the Central mine, which is one of the North Star properties.

The ore bins are built entirely of masonry, and the battery frame is built of structural steel, wood being practically eliminated throughout the whole plant, even to the jack fingers, which are made of steel T-bars cast into iron sockets.

The mortars are of special rapid crushing design, with extra wide bases, and are set on masonry mortar blocks.

The battery framing is arranged in two units of twenty stamps, each unit having five double posts made of heavy channel steel, which are bolted to cast iron anchor plates, the whole being securely anchored to the masonry mortar blocks by means of heavy eye bolts and T-rail anchors. The double posts are tied together longitudinally by means of structural steel guide girts top and bottom, and laterally by means of heavy cast iron yokes which perform the duty of camshaft boxes also. The entire frame is anchored at the back in a method somewhat similar to the back knee wood frame system by means of heavy steel I-beams, two to each battery post, which are embedded for one-third of their length in the solid wall which forms the front of the ore bin.

This method of construction reduces the possibility of vibration to a minimum, as it renders the batteries practically self-contained, anchoring them to the heavy walls and mortar blocks in such a way as to render them thoroughly rigid.

The power for running the batteries is supplied by a 50 H. P. motor belted to a countershaft located at the top of the front ore bin wall, the batteries being driven by pulleys of the Gibson friction clutch type, the operating mechanism of which is readily accessible in order that any part of the batteries may be shut down instantly in case of an accident or to make repairs.

The sulphurets in the new mill will be handled by eight standard 10-foot Dodd circular riffled tables, which will effect a separation into three grades—concentrates, middlings and tailings—the middlings being carried by launders to a special Dodd table and reconcentrated, and the tailings being run over a canvas plant.

The general arrangement of the masonry walls and foundations can be seen in the photograph showing the mill during construction. In making this masonry, rock from the dump is cemented together, the mixture being five of sand to one of Portland cement being poured in between all interstices. The cement is made so wet as to fill all cracks, and the whole is kept damp until it has set. Except for the floors there is no concrete in the construction. The mortar and lower ore bins' masonry foundations are placed on the solid ledge. The dump was built out to near the mill and the upper bins built on this. Some settling and cracking have naturally occurred, but can be readily repaired. All the main masonry walls are on solid rock. The mortars are placed on 8 feet of solid masonry and held in place by 2-inch anchor bolts built in solid. The ore bins are built of masonry with sloping bottoms. The front of the bins consists of iron plates held in place with I-beams built into

the wall on either side. The grizzly surface is very large, there being somewhat over 400 square feet in the two grizzlies on either side of the mill, being made up of sections, 3 feet by 10 feet, each section being supported by I-beams being built in the masonry. The cleanup and settling tanks are concrete, painted with P. & B. paint.

Electric motors are used throughout for power except for the two giant rock crushers. These are run by a Pelton water wheel and the water run into a stone tank, from which it is drawn to the batteries. It is planned to run the rock breakers during the day and utilize the power for a dynamo at night. In each case the motors are placed on masonry piers behind and above the countershafts. This throws every belt tight on the lower side, the slack belt being on top. The smaller pulley is also above and the belts lead down to the larger one.

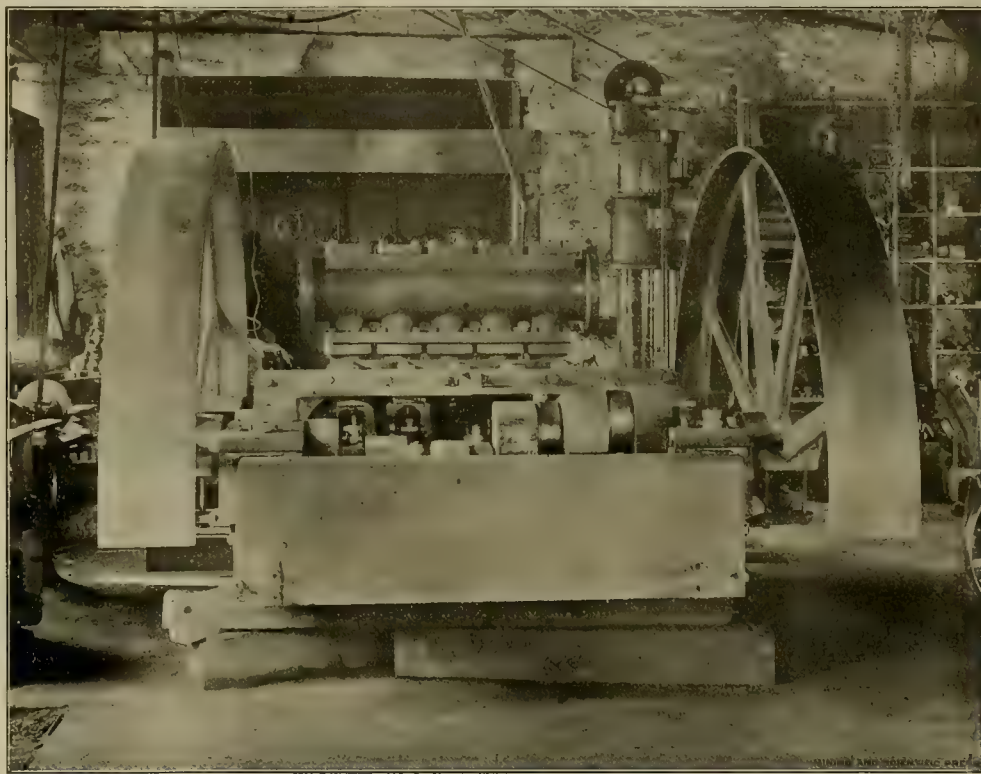
The illustration shows the central pier between the two rock breaker piers on which a 75 H. P. 60-cycle general electric induction motor is placed. This is belted to a countershaft, which in turn is connected with the cam shaft. Leather belting is used throughout.

The amalgamating plates are placed on iron frames or holders, especially designed by Superintendent A. D. Foote for this mill. These are built up of flanges

thence the tailings are run into a settling tank. The slimes and sands are allowed to settle to the bottom and the clear water flows gently over the circumference. Lime is added to hasten settling. An air pump forces the sands and slimes from the settling tank to the solution and precipitation tank. The cyanide solution, pumped from the sump tanks and made of proper strength, is added to the pulp. A continuous circulation and agitation is produced by forcing air through a pipe up the middle of the tank, carrying the solution with it. The solution goes up the center and comes down the sides. In the bottom of the tank a series of amalgamated copper and iron plates is arranged concentrically about the center and connected to a plating dynamo of one and one-half volts and fifteen amperes. This deposits the gold from the cyanide solution upon the amalgamated copper plates, which are subsequently treated as are battery plates to recover the gold.

Experiments show that this method gives 90% to 95% extraction with the fine slimes, which carry three-quarters of the assay value of the tailings, and 70% extraction with the coarse sands. The tailings run about \$2 per ton, and the estimated cost of treatment by this method is 50 cents.

The plant for treating the tailings from the North Star mill has been installed at the lower end of the



Pump 1400 Level of North Star Mine, Grass Valley, Cal.

and ribs so as to give a table of 19 feet 8½ inches total length and 44 inches width. In its length it is supported by six cross braces, placed three on either side, and connected by two cross braces in cross-section. These are supported by feet raised from the floor by wedges so as to give the requisite slope. The concrete floor has a uniform slope of 14.6%.

In placing the amalgamating plates on the holders the edges of the plates are curved and bent over. The edges are then fastened down with brass tacks. The curve along the edges allows the plate to expand without buckling.

For cleanup purposes and for handling the shoes and dies a carriage is suspended on tracks supported in front of the mortars so as to be run above the plates. Punched steel screens, 400 holes to the square inch, are used in the battery. Wire cloth screens are placed at the end of the plates to catch the coarse material and keep it from passing to the buddles. Mercury traps are placed in the floor beneath the ends of the plates.

The cleanup room is well appointed and conveniently arranged. The mill is well lighted, both by day and by night. Windows have been placed on either side of the mill and in all vertical walls at the end. Incandescent lights have been placed wherever needed. For completeness of equipment and attention to detail this mill is one of the best in the country.

The method of cyaniding the sulphurets and tailings at the North Star mines has received considerable well-merited attention for originality of method and experimental success of working. The plant at the North Star mill will be ready for work by the middle of August, while another plant for the new Central mill is now being constructed. Until the completion of the plants, a description of the process as carried on experimentally on a working scale and an outline of the plants in course of construction will suffice. The method was introduced by O. L. Oliver. The pulp from the plates is run over Dodd buddles,

mill under considerable disadvantage as to space and arrangement because of existing conditions. As installed, the plant consists of six settlers, six agitation tanks, each of ten tons capacity, and two sump tanks. These are all built of wood and similar in design to those in the experimental plant. It will consist of three settling tanks, each of 60 tons capacity, six agitation tanks, arranged in two rows of three each, and two sump tanks. These are for treating the tailings. In addition there are to be two tanks for treating the sulphurets. These are to be ground to a proper fineness in a Chile mill. The sulphurets from the North Star mill are to be hauled over in wagons and those from the Central to be run to the plant in cars.

Grass Valley, Cal., Aug. 1.

## The Cleanup Barrel.

TO THE EDITOR:—In my paper on gold milling, appearing in the MINING AND SCIENTIFIC PRESS July 16-30, there is one point I should have explained—that is, how I come to make the barrel cleanup inside of four or five hours, instead of twenty-four, as is usual.

In order to be able to retort the next day after cleaning up the mill, I have had to devise some quick method, which is based on the following facts:

First—The sand left in the battery above the dies contains little or no amalgam. This is, therefore, returned and does not go to the cleanup barrel.

Second—The amalgam adhering to pieces of iron is only partially recovered in the barrel, as can be proved by examining such pieces after undergoing the action for a day, and can only be removed entirely after the iron has rusted. I, therefore, am not very particular how long the iron remains in the

\* See illustrations on front page.



barrel, for I put it by to rust and clean it separately, the amalgam going into the next cleanup.

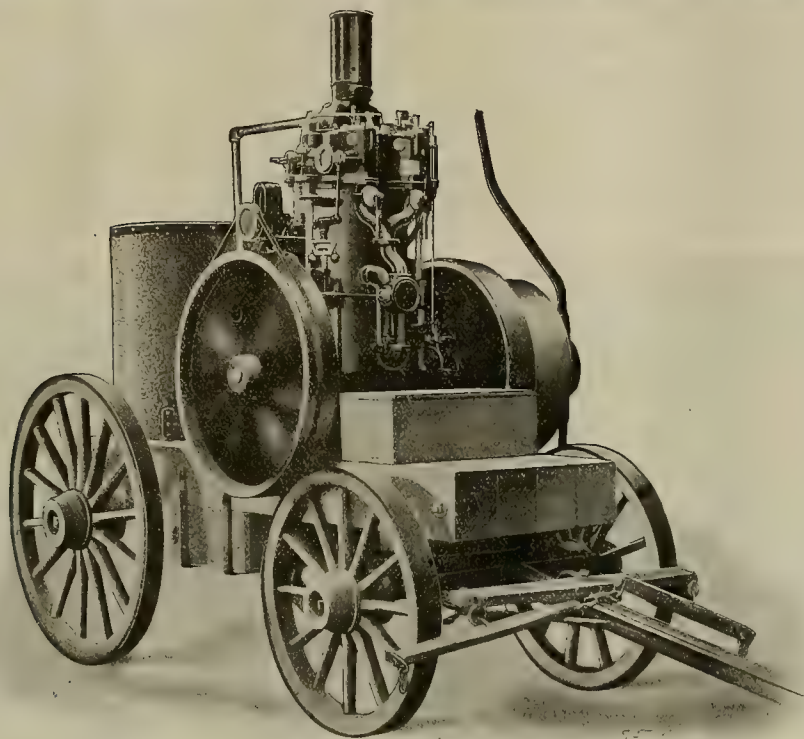
Third—The tailing sand from cleanup barrel, after extraction of iron and wood, is returned to the battery, for it may still contain values.

Now, whether this is not as good practice as grinding the sand to a slime, and consequently some of the quicksilver and gold, is open to discussion.

ALGERNON DEL MAR.

### Pumping Outfit on Wheels.

The accompanying illustration shows a wagon equipped with a 25 H. P. "Union" double-cylinder stationary engine. A circulating tank is mounted on



Portable Pumping Outfit.

the wagon and an oil tank is attached underneath. The engine is fitted with a friction-clutch pulley. The outfit is used for pumping purposes. It is the property of the Cutting Packing Co. of San Francisco, Cal. The net weight of the engine, without battery, friction-clutch pulley, oil tank, etc., is 3860 pounds; the weight of the complete outfit is 6500 pounds. This outfit is made and furnished by the Union Gas Engine Co. of San Francisco, Cal.

### The Juneau Gold Belt, Alaska.

Examinations of the known gold prospects in the belt tributary to Juneau, Alaska, indicate that they are of sufficient promise to warrant all the work now in progress and the expenditure of still more capital in development work. A. C. Spencer has written a short paper on the "Geology of the Juneau Gold Belt, Alaska," which is published by the Survey in Bulletin 225, entitled "Contributions to Economic Geology, 1903."

The Juneau gold belt resembles the gold belt of California in several ways. The various rocks that occur in this southeastern part of Alaska are similar in character and partly equivalent in age to those forming the country rock of the mother lode of that State, and there is also a definite linear distribution of some of the gold-bearing veins parallel with the general strike of the bedrock formations. As in the California gold belt, however, there are many independent deposits lying outside the main complex of lodes.

Prospecting has been in progress in different parts of this belt since 1876, but the main incentive to vigorous exploration came with the discovery of the Gold Creek placer and the foundation of Juneau in 1880. The first mine to be put upon a productive basis was the Alaska-Treadwell, on Douglas island, about 2 miles southwest of Juneau. This property was opened in 1881, and it continued to grow in importance for several years, so that by 1889 it had reached practically its present rating as one of the great mines of the world. The discovery of the Klondike, however, in 1896 gave a great impetus to prospecting in the interior of British Columbia and Alaska and caused the mineral region tributary to Juneau to be temporarily abandoned as a field for investment. It may be said that only now, after seven years, has the district regained the position which it appears to have held in 1896.

A large number of properties have recently changed hands, a number of well-known engineers have been making examinations in the field with a

view to acquiring property for their clients, and there appears to be a steady demand for experienced miners. It is estimated that 1440 miners and laborers are engaged in this region, about 30% of them being engaged on development work, and indications are that the exploration of properties recently purchased by outside parties will materially increase the proportion of men engaged in work not immediately productive.

In 1903 there were seven productive mines in the district, in addition to the placers of Porcupine and adjacent creeks. These were the Alaska-Treadwell, Alaska-Mexican and Ready Bullion, on Douglas island; the Silver Queen, on the mainland opposite; the Sumdum Chief, 60 miles to the south, now worked out and abandoned; and the Alaska-Juneau and

Iron Ores," N. P. Hulst; "Supply Systems," W. M. Jeffrey; "A Study of Faulting at the Ashland Mine," L. Eaton; "Sinking a Sand Shaft at Maas Mine," W. W. Graff; "Sinking a Shaft in Quicksand at the Susquehanna Mine," H. B. Sturtevant; "Iron and Steel Consumption," G. H. Abeel; "The Bisbee District of Arizona," G. A. Newett.

### The Ore Deposits of Bisbee, Arizona.\*

NUMBER VI.

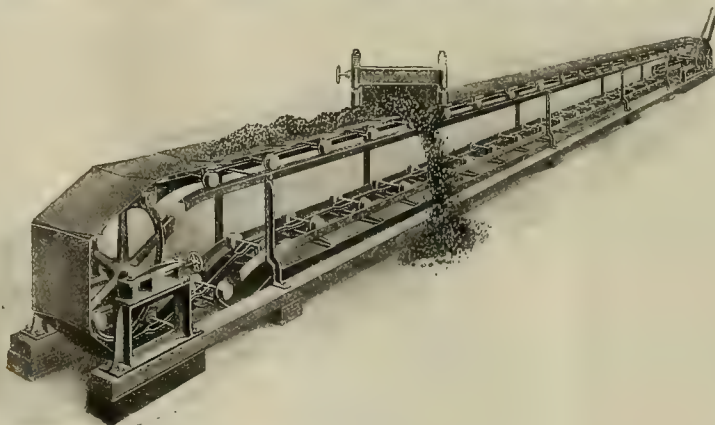
Written by F. L. RANSOME.

**RELATION OF PRINCIPAL ORE BODIES TO ESCABROSA LIMESTONE.**—Although the ore bodies as a rule have their greater dimensions in the planes of bedding, they are not confined to any particular bed or to any definite stratigraphic horizon. The original Queen ore body occurred in the lower part of the Escabrosa limestone. The ore in the Baxter tunnel, near the Holbrook shaft, occurs in part in the lower part of the Naco limestone. In the latter formation, also, probably occurs a portion of the ore in the Calumet & Arizona mine, and almost certainly that so far discovered in the Lowell mine. The problem of determining the stratigraphic horizon at which most of the great ore bodies of the Copper Queen and Calumet & Arizona mines occur is a difficult one. Not readily distinguishable over the quadrangle at large, the Naco and Escabrosa limestones cannot be separately identified in the mines, where metamorphism has altered the original texture and composition, obscured much of the structure, obliterated all of the fossils, and transformed both limestones to similar aggregates of silicates and pyrite. When upon such metamorphism there is further imposed widespread alteration into limonitic clays and oxidized ore, the possibility of distinction between the two original limestones vanishes. Structural relations render it very probable that the great ore-bearing member of the Paleozoic series is the lower Carboniferous or Escabrosa limestone with a thickness of about 700 feet. More exact and assured conclusions might be drawn from general structural relations as interpreted in the structure sections, were there less local disturbance in the beds, were the presence and effect of faults in the limestones more readily determinable, and did the underground workings afford some direct check on the deeper structure as projected from studies on the surface. The probability, however, is strong that the Escabrosa limestone, while not the only ore-bearing formation, is the one that contains most of the great known ore bodies in the Copper Queen and the Calumet & Arizona mines.

Facts lending some additional support to this hypothesis are (1) the known occurrence of the original Queen ore body in the Escabrosa limestone; (2) the greater depth at which other ore bodies were subsequently discovered southeast of the Queen incline, suggesting that they were formed in the same limestone as the Queen ore body, but occur at a lower level, because that limestone had been dropped prior to the general mineralization of the Czar fault; and (3) the progressively increasing depth at which large ore bodies are encountered in developments pushed toward the southeast. The correspondence between the increasing depth of the larger ore bodies and the

### Triumph Steel Belt Conveyor.

Herewith is illustrated a steel belt conveyor made entirely of iron and steel, of any size and length desired, for conveying ore, coal, crushed stone, clay,



Steel Belt Conveyor.

marl, castings and similar materials. There is a steel sprocket wheel at each end fastened to steel shafts; at the front end are stands with take-up boxes. The drive end has steel countershaft with gears and drive pulley. On each link is a saddle attachment for supporting the steel belt, which is made in sections 24 inches long, one end fastened to the saddle attachment, the other end so fastened as to move forward and back, allowing it to pass the sprockets at the end, these pieces of steel thus forming a continuous steel belt or troughing conveyor. It is manufactured by the C. O. Bartlett & Snow Co., Cleveland, Ohio.

THE Lake Superior Mining Institute held its annual summer meeting at Ironwood, Mich., this week, proceeding thence to Milwaukee, Wis. Among the papers presented were: "Titanium and Titaniferous

augmenting thickness, from northwest to southeast, of the overlying wedge of relatively barren Naco limestone, while it cannot be shown to be exact, is at least roughly demonstrable and can scarcely be a chance coincidence. It contains a strong suggestion that the maximum deposition of ore in the general zone thus far exploited was directly connected with the Escabrosa formation.

**RELATIONS OF THE ORE BODIES TO STRUCTURES OTHER THAN BEDDING.**—Bedding planes are not the only elements of geological structure that have influenced the deposition of ore. In the deeper workings of the principal mines, particularly of the Calumet & Arizona, there is a well-marked and significant tendency of the original pyritic impregnations to concentrate along minor zones of fissuring and shearing

\* Abstract Professional Paper No. 21, U. S. G. S.



in the generally mineralized limestone. This tendency, clearly shown on a small scale, usually below and at a little distance from the main ore bodies, is not merely a minor phenomenon, but illustrates in miniature what has taken place on a much larger scale in connection with the great ore masses. In the case of the latter, however, the important part played by fissures in ore deposition is to a considerable extent obliterated by later changes wrought in ore and country rock by general oxidation and secondary concentrations. Inspection of the generalized map of the underground workings of the Copper Queen mine shows that the horizontal distribution of the ore bodies is related to certain structures that are nearly vertical. These are the Czar and Dividend faults and the main limestone-porphry contact. The ore bodies on the whole constitute a broad belt, about 900 feet in width, which, beginning (so far as present explorations show), at a point about 2000 feet southwest of the Czar shaft, continues northeasterly, chiefly along the southeast side of the Czar fault to the Czar shaft, thence southeasterly along the southwest side of the Dividend fault to the contact with the Sacramento Hill porphyry. Here the ore belt swings to the south, skirting the porphyry mass toward the Spray and the Calumet & Arizona shafts. Whether it continues to skirt the porphyry eastward, past the Gardner and Lowell shafts toward Mule gulch, is yet to be proved by underground work.

The Czar fault is a well-established, but remarkably inconspicuous normal dislocation, with an estimated downthrow of about 500 feet to the southeast. The identification of the fault in the underground workings is unsatisfactory. The drift from the Czar shaft to the Queen incline on the second level ought to cut across the fault. It does in fact cross two distinct fissures, one about 300 feet from the Czar shaft, striking north 35° east, and dipping northwest at an angle of 70°, and another about 110 feet east of the bottom of the Queen incline. The latter is nearly vertical and has a local strike of about south 10° west. This is possibly the Czar fault, although the strike as observed in the short exposure in the drift is too southerly for the general trend of that dislocation. The long crooked drift running southwest from the Queen incline on the second level probably crosses and recrosses the Czar fault. It was found impossible to identify the fissure, however, owing to the prevalent decomposition of the disturbed and altered limestone to the soft, ferruginous, clayey material known as "ledge matter." In general, the fault seems to separate extensive areas of this "ledge matter," containing large ore bodies and extending eastward toward the Holbrook shaft, from harder less mineralized limestones on the northwest, in which no important ore bodies have yet been found on this level. It is probable, although by no means certain, that the "ledge matter" on the southeast of the supposed fault line is altered and decomposed Escabrosa limestone, and that the harder limestones on the northwest is Martin, or perhaps in part, Abrigo limestone. The stope worked for converter clay in this part of the mine is probably in altered limestone. If the foregoing interpretation of the structure is correct, it affords a reasonable explanation of the failure to find ore bodies on this level on the northwest side of the supposed fault line. For it is evident that the bottom of the particular limestone, probably the Escabrosa, that carries the ore on other parts of the level, must be sought for above this level on the northwest side of the fault.

It was probably in consequence of the Czar fault that so much difficulty was encountered in finding new ore bodies after the exhaustion of the original Queen stope. That great cylindrical ore mass was on the northwest side of the Czar fault, while the bodies afterwards discovered at lower levels have been in the downthrown southeast block.

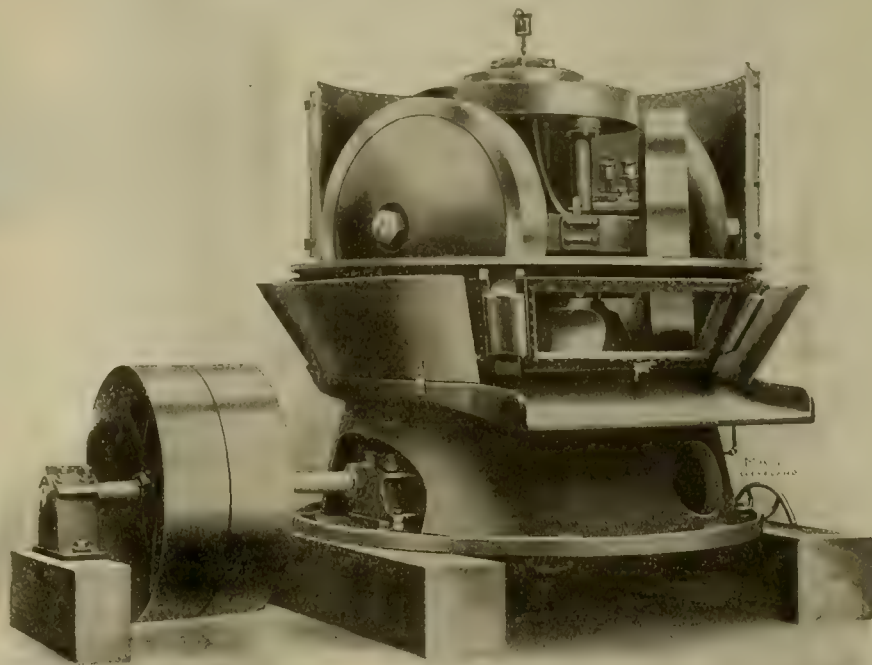
The detailed relations of the ore bodies of the Copper Queen to the Dividend fault are very obscure. Large bodies of ore have been mined and are still being worked in the vicinity of this great fissure, but the ground is soft and openings in it very difficult to maintain. Such crosscuts as have been run northeasterly beyond the ore bodies are no longer accessible, and it is not known whether any of them penetrate the schist, which at the surface forms the country rock northeast of the fissure. The ore bodies in this part of the mine were apparently formed for the most part in limestone, but the mineralization and subsequent alteration has been so intense that very little of the original country rock can now be identified. Masses of earthy oxidized ore and bodies of crumbling pyrite, more or less enriched with chalcocite, occur very irregularly amid abundant soft clayey and limonitic material. The general parallelism of the ore bodies with the bedding planes of the limestone, elsewhere in these mines a noticeable feature, is much less distinctly shown in these workings near the Dividend fault.

(TO BE CONTINUED.)

A GRAVITY TRAMWAY near Hedley, B. C., is 9000 feet in length, with a difference in elevation between the terminals stated to be 4000 feet. An electric train runs from the head of the tramway, a distance of 2 miles, into the stopes of the mine known as the Nickel Plate.

### The Akron Chilian Mill.

The accompanying cut illustrates the Akron Chilian mill, designed and built by the Webster-Camp & Lane Division of the Wellman-Seaver-Morgan Co., Cleveland, Ohio. In the construction of this mill attention has been devoted to substantial construction



The Akron Chilian Mill.

combined with easy accessibility to the wearing parts, convenient means for adjusting rolls, evenly distributed and steady feed, large screen capacity, free discharge. The manufacturers say: "Among the noteworthy constructional features embodied in the mill are the following: Vertical adjustment of drivehead and rollers, the adjusting mechanism so arranged that they may be lowered or raised while the mill is in operation, by means of a hand wheel conveniently located outside of the sub-base. Hence the location of the rollers in reference to die can be readily varied at any time, and the revolving parts can be lifted to facilitate starting the mill after being stopped with a charge in the mortar. The main drivehead is provided with roller bearings so located as to receive either upward or downward thrust. An efficient method of lubrication is effected by an oil cup located directly over center of the driving shaft. The oil passes from this cup to cavity in top of the shaft, and is conducted to a point directly over the outer surface of the hollow spindle, the top of this spindle being chamfered so as to form a groove between it and the inner surface of the drivehead. This groove catches the oil as it drips from the pipe, and it is then conveyed to a circular groove in upper end of the spindle bearing, where it is held in sufficient quantity to thoroughly lubricate this bearing. Separate provision is made for oiling the lower spindle bearing."

"Each roller bearing is provided with three grease

cavity, from whence it is drained into the inside and through bottom of drivehead.

"In order to entirely remove the pulp from the mortar, a drain is provided from the inner edge of the mortar, having an outlet underneath the launder, this outlet being closed by a plug except when the mortar is to be drained.

"The spindle and the trunnion bearings are very

large, insuring rigidity of mill and smoothness of operation. The center of gravity of rollers is so located that the centrifugal force developed adds to the crushing effect. Increased capacity is obtained by increased size of screen openings and by making the bottom of the launder with semi-circular cross section instead of flat, thus allowing greater capacity with the same amount of water.

"The mill is under driven and is equipped with three rollers, fitted with heavy tires of forged steel running on a forged steel die. Driving gears are of cast steel, heavy pattern. The mill is provided with tight and loose pulleys, and can be equipped with Pitkin patent friction pulley if desired.

"The housing is made in sections, held together by hinged bolts which permit a section to be thrown back without entirely removing it from the mill. The screen area is exceptionally large. All working parts of the mill are readily accessible, facilitating inspection and repair."

Other details will be promptly furnished upon application to the manufacturers.

### The Atlantic Steam Shovel.

Ten years ago the standard railway shovel weighed 25 tons and carried a dipper of 1½ cubic yard capacity. The shovel of to-day weighs 60 to 70 tons and has a dipper of 2½ to 3½ cubic yards capacity. Shov.

The Atlantic Steam Shovel.

cups, and to prevent the oil from reaching pulp which may be contained in the body of the mortar the roller shaft is provided with lips which arrest the outward flow of the oil and direct it to cavities from which it may be readily drained. To prevent oil from working its way along the roller shaft to inside of the rolls and thence to mortar, an oil thrower is turned on roller shaft which throws the oil into a

els are in use which weigh 90 tons and carry a dipper of 5 cubic yards capacity. More weight and size, however, do not give efficiency in service. Great weight, which is necessary in a locomotive, is a disadvantage in a steam shovel, because it not only makes it cumbersome and difficult to hold on temporary rails and soft ground, but makes it slow of movement. The steam shovel illustrated herewith is a new



machine, now being introduced by the Atlantic Equipment Co. of 25 Broad street, New York. It is built by the American Locomotive Co. from designs by A. W. Robinson, member of the American Society of Civil Engineers. This machine is the result of many years' experience in the design and operation of steam shovels and dredging machines.

The steam shovel has become an indispensable machine to railroad companies and contractors engaged in construction work, who realize that the best results are secured by the most efficient appliances. The work which the steam shovel is called upon to do is probably the most severe and exacting of any mechanical appliance. A good shovel must be quick in its movements, easily handled and very strong in all its working parts, and constructed so that it cannot get out of order with any kind of handling.

The shovel illustrated is one in use by the New York Central & Hudson River Railroad. It is a class 38-16-2½ machine. This means a shovel having a pull upon the dipper of 38,000 pounds, a clear height of lift of 16 feet and a capacity of 2½ cubic yards. This system of numbering is designed to express any combination of these three elements in a shovel. Another shovel of this size is at work on the new Pennsylvania Railroad terminal excavation, New York City.

What may be considered the distinguishing feature of this shovel is the direct wire rope hoist, which has been used successfully by Mr. Robinson for some years in large dipper dredgers.

The Atlantic shovel has a special advantage where high lift is required.

The illustration shows that the hoisting engines are incorporated in the base of the boom, so that the whole hoisting machinery revolves together. The drum is very short, of large diameter, and fits easily between the sides of the boom which constitute the frame.

The A frame is made of solid steel bars having solid forged pin connections at feet and a cast steel head. It is stepped upon the ends of the jack-arm truss, in such a way that it forms a continuation of the jack-arms, giving stability and relieving the car frame from strains.

The boom has a straight taper, deepest at the inner end. The upper members of the boom are steel channels set vertically, the lower members set horizontally. The web is a solid steel plate.

The main engines are of locomotive type, with outside cylinders. A sheet steel casing is provided for protection. They have solid cast steel frame for both engines in one piece and steel crossheads, with all parts easy of access. Steam is carried by a pipe having a double ball and socket joint on top center, and the exhaust is carried to the smokestack by a pipe through the bottom center.

The hoisting drum is of large diameter, grooved for steel wire rope. There are two parallel ropes, each bearing half the load, equalized round a small sheave or thimble at the dipper. The two ends of the rope are secured by clips at the drum. The cost of renewal of a steel rope 1½ inch diameter, 108 feet long, is about \$40.

In the construction of the dipper Mr. Robinson has discarded the bail and sheave and attached the double hoisting rope directly to the back of the dipper in such a way that the lines of force meet in a point situated in the plane of the resistance, or in line with the strain applied to the teeth.

The shovel is mounted on two all-steel trucks of diamond pattern specially designed for the purpose. The axles are of best hammered iron, with M. C. B. standard axle boxes. The bolster is formed of a steel box girder composed of two 9-inch I beams, with steel plate top and bottom. The main arch bars are 6 inches wide. The rear truck is fitted with hand brakes.

Coal and water supply is amply provided for by water tanks of large capacity and a coal platform attached to and projecting from the rear of the shovel. This coal platform is built entirely of steel and is hinged in such a way that it folds up against the rear of the machine when not in use.

### A Modern Coal Cutter.

In some coal chain undercutters only a small portion of the working time is utilized in cutting, the remainder being consumed in withdrawing the machine from the cut, setting and resetting, and getting the machine across the face into a new position. Such conditions waste time and contribute toward trouble, for unless great care is exercised the cuts may be put in at different heights, thus making an uneven floor and leaving bottom coal to be lifted; or a rib may be left between the cuts, making the coal difficult to excavate.

The electric chain machine, manufactured by the Sullivan Machinery Co., consists of the following principal parts (see Fig. 1):

(1) A bar, on which a cutter chain moves in a horizontal plane, the chain consisting of links, in which steel cutters are mounted;

(2) An electric motor, providing power by which the chain is operated by means of gearing;

(3) The bar and chain with motor are mounted on a frame which supports it while cutting the coal and

while being moved about the mine, and the frame with other main parts are mounted on another frame called the pan.

The machine itself makes the first or "tight" cut in the ordinary manner, except that the feeding is done by means of a chain instead of a rack and pinion. After the first cut is finished the back end of the frame or pan is detached (see Fig. 2), the feed

blasting of the coal, thus requiring the minimum amount of powder and increasing the percentage of lump coal (see Fig. 3).

The machine cuts close to the bottom, leaving practically no bottom to be taken up. By means of a taper skid or by raising or depressing the feed chain, sharp irregularities may be followed. The machine will follow ordinary rolling bottom without

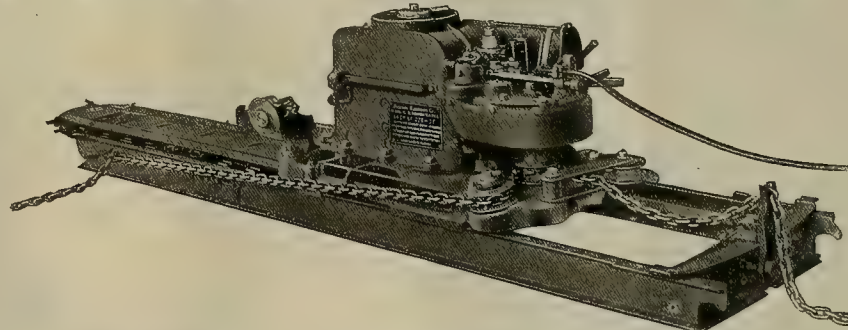


Fig. 1—Sullivan Electric Chain Machine, Showing Position at Middle of "Tight" or Corner Cut.

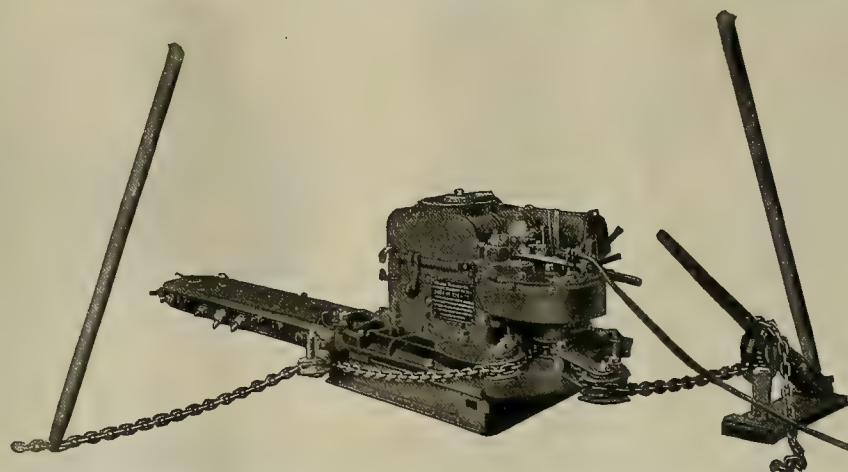


Fig. 2—Sullivan Electric Machine, Showing "Pan" Detached and in Position at Starting of Side Cut Across the Face.



Fig. 3—Sullivan Electric Machine Cutting Across Face

assistance. Timbers may be set about 5 feet from the working face, being about one-half the distance required for the breast machines, insuring the safety of both machine men and loaders. Owing to the continuous nature of the cut and the method of setting the jacks, there is no vibration to affect a weak roof. The machine propels itself by power to any desired position in loading or unloading and in moving about the mine.

The machine will operate on any pitch up to 30°, when rooms are driven across the pitch; it will work straight up the pitch, providing this does not exceed 12°.

The motors are of the multipolar, vertical, shunt wound, direct-current type, built for 210, 250 and 500 volts, and the machine will undercut to 5, 6 or 6½ feet. The armature is drum wound, with formed coils imbedded in the slots; it is built on a separate

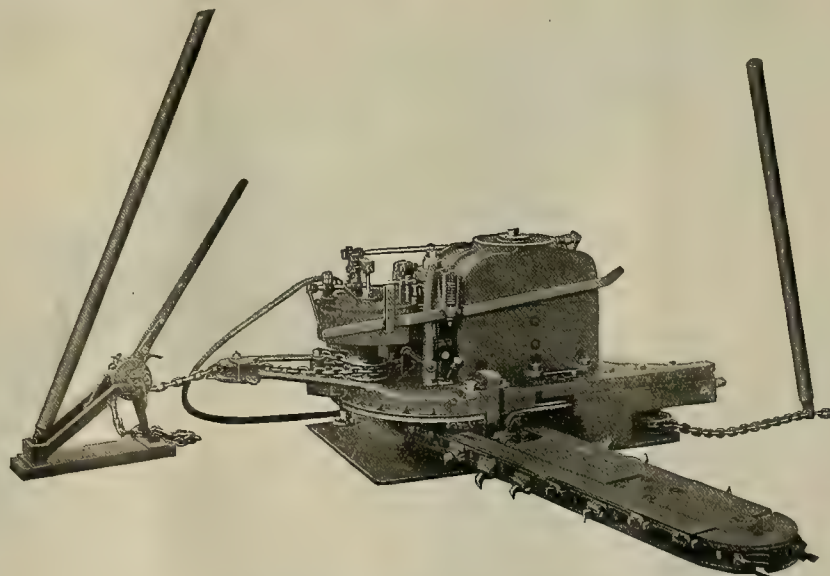


Fig. 4.—Sullivan Long Wall Machine in Position for Cutting.

chain is anchored in the left corner of the room, and the machine is then started at cutting sideways from right to left across the room, not stopping until the breast is completely undermined. After the room is undercut completely, the machine is loaded by its own power upon a mule or power truck for moving about the mine.

As the machine makes a continuous cut, it leaves no stumps or sprags to interfere with the proper

sleeve, making the shaft removable. The motor is especially designed for this machine. A ventilating fan and ball bearings decrease friction and heating and increase efficiency. The controller connections are mounted on a slate base. The reverse switch is interlocking, and the current cannot be reversed when the machine is in operation. The rheostat is made of laminated iron punchings with mica insulation and is practically indestructible from burn-outs



and grounds. The main frame and pan described support the motor, gearing and cutter bar, and are connected by gibs. The feed mechanism is driven by a friction clutch, adjustable by spring and nut, which slips when unusual strain is brought upon the cutter chain; as when sulphur or other hard substances are encountered. The cutter chain is of a new type, of the link and strap pattern, with liberal dimensions, running in close gibbed guides.

As will be noticed from the illustration (see Fig. 4), the machine slides along the floor of the mine on a sheet steel shoe, requiring no heavy and cumbersome rails, and it will work in little space both as regards height and distance between face and props. The advance or feed of the machine is effected by a driving sprocket engaging with a chain securely fastened some distance ahead of the machine, and stretched parallel to the face of the coal. As the machine advances, the slack in the chain is taken up by the back chain; that is, the chain is in one continuous piece, and as the machine advances the slack is fed out at the rear end, by means of which the machine is always kept up to its work and at the proper angle to the face of the coal. Should it be necessary to alter the angle of the machine with the face of the coal, the tension on the chain may be changed by the ratchet at the back end of the chain and the machine made to assume any desired angle with the face. This machine is driven by electricity, and, with the exception of the changes mentioned, otherwise conforms to the electric chain machine. The motors are wound for 210, 250 and 500 volts direct current, and the machines are built to undercut up to 5 feet deep. To illustrate the capacity of these machines, it may be added that one of them has a record of 500 feet, with a 5-foot undercut in an eight-hour shift, in very hard coal. This was in the mines of the Bolen-Darnall Coal Co., at Craig, I. T., in a vein pitching at an angle of 24°.

These machines are fully described and illustrated in a special catalogue, which may be had on application to any of the offices of the manufacturers, the Sullivan Machinery Co., main office, Railway Exchange, Chicago, Ill.

### Placer Mining in Colorado.

[FROM A STAFF CORRESPONDENT].

For the past forty years the placers around Breckenridge, Colo., have been worked in a primitive and ineffective manner. The past few years many improvements have been made. There are probably 50 square miles of good placer ground within a radius of

9 miles of Breckenridge along the valleys of the Blue river and its feeders. One of the most noted of these placers is the one owned and operated by the Gold Pan M. Co. This company owns 1700 acres of patented placer ground, commencing at Breckenridge and extending up the Blue river for 7½ miles, with an average width of 1000 feet.

The plant of this company, which is illustrated herewith, consists of a ditch 8 feet wide on the bottom, 4 feet deep in the solid and 12 feet wide on the

top, having a capacity of 7000 miner's inches, is taken out of the Blue river at a point about 4 miles above the lower portion of the placer and is brought along the hillside 2½ miles. This is succeeded by a pipe line 8000 feet long and 5 feet in diameter made of steel boiler plate varying from  $\frac{3}{8}$  to  $\frac{7}{8}$  of an inch in thickness. (See illustration).

The outlet of this line is connected with a system of Evans' hydraulic elevators, which will work down to bedrock 70 feet below the surface, discharging the material 20 feet above it, making a total lift of 90 feet. The gravel passes through elevated sluice boxes equipped with riffles. The water through these elevators operates under 350-foot head, at a static pressure of 150 pounds per square inch.

The material is handled by Evans' patent carrier ways. Derricks for this purpose are made of steel lattice girded work and are 110 feet high, capable of handling at each trip three tons of small boulders or other material, making the round trip of 1000 feet in one and one-half minutes. The plant as now equipped has a capacity of 2000 cubic yards in twenty-four hours.

Breckenridge, Colo., Aug. 1.



Pipe Line American Gold Dredging Co., Breckenridge, Colo.



Hydraulic Elevators of American Dredging Co., Breckenridge, Colo.

### THE PROSPECTOR.

Within the week the press dispatches contain the news of the death of several miners in southeast Arizona, who returned to the face of a drift to ascertain why several of a series of blasts had failed to explode. As is too often the case, they arrived at the time that the belated shots exploded. If several blasts out of a number which have been spit fail to explode, give them plenty of time. Defective fuse sometimes hangs fire an hour or more, while the tape slowly burns through a section of the fuse which is without powder or is otherwise imperfect.

Float always works down hill, never up hill. If you are searching for a vein or deposit from which you have discovered the float, continue to search up the hill as long as a fragment can be found. Often the mistake is made of working where the float is most abundant. This is sometimes the proper thing to do when the ledge comes close to the surface; but, if it be buried beneath the rock slide and alluvial, it will be found that the outcrop is above the float, appearing at the surface, and the flatter the slope of the hillside the more distant will it generally be.

The mineral specimens from Kasaan, Alaska, are: No. 1. Quartz diorite, with disseminated copper sulphide. No. 2 is an aluminous rock stained with iron and manganese oxide. It may be from the wall of a vein or from a fissure in the rocks.

The mineral from Midas, Nev., is pyroxene, a meta-silicate of calcium, magnesium, iron, etc. The composition is variable.

The two samples of blue ore from La Sal district, Colorado, are azurite, blue copper carbonate. The samples sent are of good grade—over 30% copper.



## Tin Deposits of the York Region, Alaska.\*

NUMBER II.

Written by A. J. COLLIER.

On Tin creek, which enters Lost river from the east about 4½ miles from the coast, a large body of granite was found intruded in the limestone. This granite outcrop is believed to be nearly circular in outline and probably ½ mile in diameter. Around its margin the limestone was found to be considerably altered, and some small dikes of fine-grained pegmatite were found cutting the limestone, apparently parallel with the contact of the limestone and granite.

In Tin creek, which flows for some distance along this contact, many boulders and pebbles, some of considerable size, were found to contain minerals, which are the result of contact metamorphism.

The main tin-bearing ledge outcrops nearly half a mile north of this granite boss. It is a white, porphyritic dike, cutting the limestone, and striking nearly east and west. It has been traced from Tin creek westward across the mountain to Cassiterite creek, a distance of about 1 mile, but has not been found beyond these streams in either direction. All of this rock has been more or less altered, so that it is practically a greisen having crystals of cassiterite disseminated through it. Specimens collected near Tin creek appear, in the hand specimen, to be a white aplite or porphyry with some small spots and large patches of purple. Under the microscope many of the original minerals are seen to have been replaced by fluorite, to which the purple color is due. Pseudomorphs of fluorite take the place of most of the feldspar crystals and of some of the quartz grains. In specimens which are still more altered, collected from the same dike, near Cassiterite creek, probably very few of the original minerals remain. The rock here is found to consist of calcite, fluorite, lithia mica, and quartz, proportioned in the order named. The limestone, on the south side of the dike, is altered for several hundred feet, and contains many greenish minerals, among which epidote and garnet have been identified. The limestones north of this dike are reported to contain many small stringers of tin ore for several hundred feet. The ore obtained from the main ledge varies considerably in general appearance and character. Some of the weathered ore from the outcroppings is highly siliceous, and has the appearance of weathered, iron-stained vein quartz with small black cassiterite crystals disseminated through it, while other specimens show clearly their granitic origin and contain comparatively little vein quartz. In the ore of the latter type the cassiterite occurs both as disseminated crystals varying in size from that of a pinhead to that of a walnut and as veinlets and irregular masses. The granitic ore consists principally of calcite, fluorite, quartz, and large crystals of lithia mica; and in addition to the cassiterite, tourmaline, topaz, pyrite, garnet, and galena were observed in small amounts. In the float of this dike large specimens of galena, wolframite, and some malachite were collected, and in the altered limestone near the contact some large specimens of garnet were obtained. The siliceous ore mentioned above, when examined with the hand lens, sometimes showed spangles of free gold. Among the loose material from the croppings of the ledge a large piece of galena, coated with yellowish alteration products, was found. This may have come either from the ledge or from the altered limestone near the contact. An assay shows that it contains 0.08 ounce of gold and 7.76 ounces of silver per ton. Both on Tin creek and on Cassiterite creek tin ore in angular, unworn crystals is reported to have been found in the gravels of the stream beds. One specimen of placer tin of this kind obtained near the croppings of the large dike on Cassiterite creek consists principally of crystals of cassiterite, but contains also wolframite and garnet.

The tin-bearing dike is readily followed from Cassiterite creek eastward over a mountain having an elevation of about 1000 feet to Tin creek, a distance of about 1 mile. At the time the ledge was examined, in the latter part of July, 1903, no excavation had been made on it, and it was impossible to measure the exact width at any point, but surface debris indicated a width of about 100 feet. Since that time crosscut trenches have been made on the ledge near Cassiterite creek, and the above estimate is reported to represent the facts. The cassiterite was found to be distributed through the whole width of the dike.

Tin ore in the form of stannite or tin pyrites has been found on Tin creek at the upper contact of the large granite area which has been described, and about half a mile below the cassiterite ledge. Specimens of mineralized granite were collected at this place, which, on examination in the laboratory of the Survey, are found to contain a small amount of tin in the form of stannite, together with other sulphide minerals.

CAPE MOUNTAIN.—Cape Prince of Wales, the most western point of Seward peninsula, is marked by a high peak known as Cape mountain. At the south-east base of this mountain a settlement called Tin City has grown up within the last year. From the

summit of the mountain, East cape and other points on the Asiatic coast, 60 miles distant, are plainly visible on clear days. On its west and south sides this mountain slopes down to bluffs that drop perpendicularly into the sea.

The greater part of the York region is occupied by the York plateau, which is from 200 to 600 feet above the sea and is a result of erosion occurring during the period in which was produced the bench described in connection with the Lost river deposits.

This plateau is trenched by the streams which drain the region, and the valleys have V-shaped cross

## Progress Around Reno.

Written for the MINING AND SCIENTIFIC PRESS by SAMUEL C. WIEL.

Many of the important interests of Nevada are within a day's drive of Reno, and many of the permanent interests are there. Virginia City and Carson City have retained their importance while many other places have risen and declined. It is a well known characteristic of Nevada that the center of interest shifts irregularly with the discovery and exploitation of new mining districts; yet the region



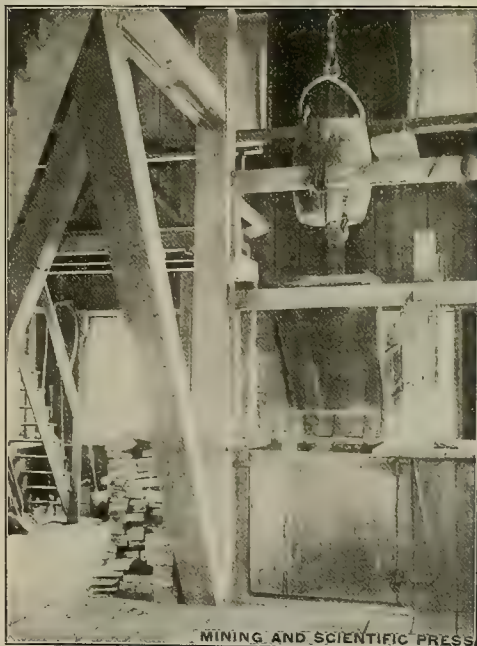
Mill of Reno Star Mine, Sparks, Nev.

sections, characteristic of newly established drainage. At the base of Cape mountain, which rises to an elevation of 2300 feet, the York plateau has an elevation of about 300 feet above the sea. The interbedded schists and limestones above described form the bedrock of the plateau surface surrounding Cape mountain, but the mountain itself is composed almost entirely of a granite boss intrusive in the limestone. The contact relations of the granite and limestone have not been studied in detail, but from data gathered in the hasty reconnaissances it appears that the granite cuts across the bedding of the limestone.

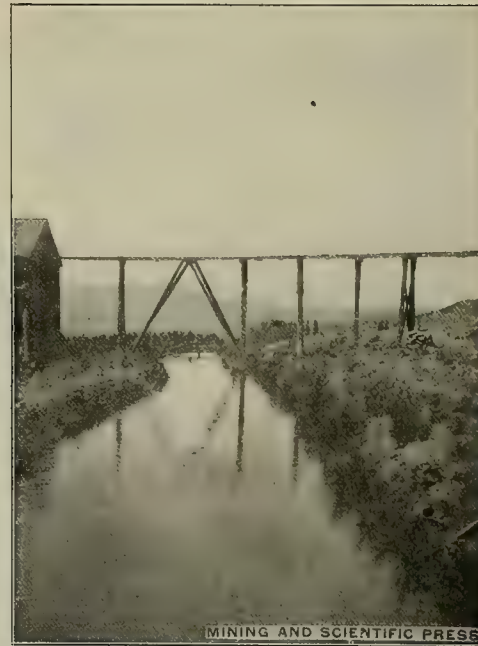
At the time of the writer's visit to this locality, specimens of tin ore were obtained from surface debris, which undoubtedly came from the surface of

around Reno has been of a constant importance through these changes. Engineering and the application of water power from the Truckee river has been the marked feature about Reno. Most notable is the plant located at Floriston. There are substations at Reno and Carson City, while Virginia City is now lighted from top to bottom, from the surface to the 2300-foot level of the C. & C. mine.

Mining about Reno has not equaled in importance the progress in industrial engineering. Prospecting in the hills about Lingley gulch is being carried on with some results. The only large mining development in the vicinity of Reno was that undertaken at the Reno Star (see accompanying engraving). This mine is largely owned by Governor Sparks of Ne-



Shaft of the Reno Star Mine, Sparks, Nev.



Irrigation Ditch Crossing Reno Star Mine, Sparks, Nev.

the mountain, though the ore was not definitely traced to its position in the solid rock. It is reported that tin ore has been found in three distinct places on this mountain, and that it occurs in somewhat irregular deposits which have an east-west trend. Several short tunnels have been driven into the mountain, but are reported not to have reached any ore bodies. The granite from some of these tunnels is partially altered to greisen, and justifies the belief that the ore bodies may be not far distant.

The ore obtained at Cape mountain differs in general appearance from that seen at Lost river. Large pieces of nearly pure cassiterite, one of which weighed fully 9 pounds, are said to have been found on the surface of the mountain. A specimen which the writer obtained weighs nearly 2 pounds and is nearly pure cassiterite, showing few crystal faces, but embedded in it and surrounding it are long, slender needles of tourmaline.

(TO BE CONTINUED.)

vada, and is situated near the new town of Sparks. The surface improvements have been extensive. The mine is down 350 feet. But little work is being done at present. A curious illustration of the diversity of interests in the vicinity of Reno is shown by the large irrigation ditch which runs over the surface of the mining claim, crossing it just in back of the mill, to supply the ranches beyond. The use of the Truckee river for irrigation is likely to do more for Reno than anything else. It has been shown by Dr. Taylor in a Bulletin of the University of Nevada, published in 1902, that the whole of Nevada cannot possibly be reclaimed by irrigation. Nor can any very great fraction of it. The total possible water supply is too absolutely limited. The very small rainfall and the limited drainage areas are not enough to go around. But of the available water, the best supply is that from Lake Tahoe and the Truckee river, from which Reno is more likely to benefit than any other part of the State of Nevada.

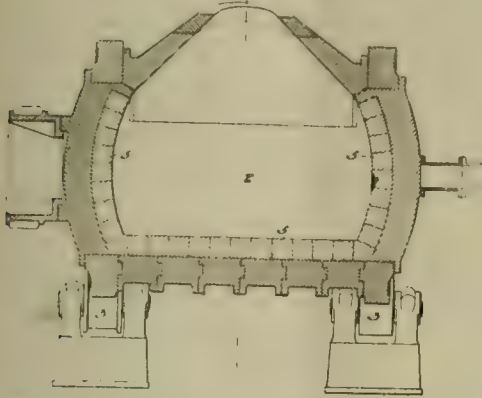


# Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 9, 1904.

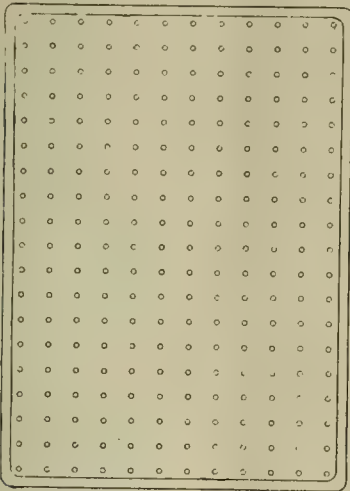
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS

METHOD OF RECOVERING VALVES FROM ORES BY DISSOLVING IN MOLTEN BATHS.—No. 766,654; R. Bag-galey, Pittsburg, Pa., and C. M. Allen, Lolo, Mont.



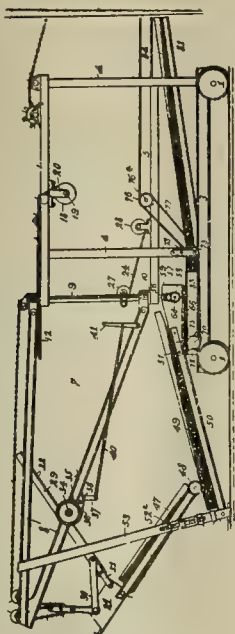
Method of producing matte or copper, which consists in forming molten bath of matte, blowing air thereinto, adding ore relatively high in silica, fluxing thereby iron of bath, and replenishing bath with material relatively low in silica and high in matte-making compounds.

METHOD OF SAMPLING COPPER.—No. 766,579; R. Baggaley, Pittsburg, Pa.



Method of sampling copper plates or slabs, by casting on surface of such plate or slab marks indicating location of sampling holes, and obtaining samples from various slabs at differently located portions of plate.

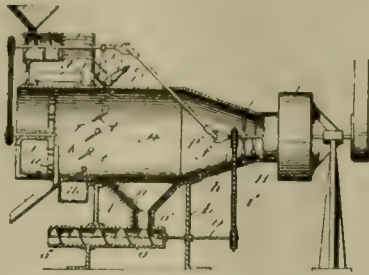
EXCAVATOR.—No. 766,888; J. H. Miller, Kansas City, Mo.



Excavator comprising frame, crane mounted at one end thereof, shovel carried by crane, and one or

more traveling conveyers leading from shovel to rear of frame for receiving and conducting material from shovel to rear end of machine.

ORE CONCENTRATOR.—No. 766,718; H. E. Marsh, New York, N. Y.



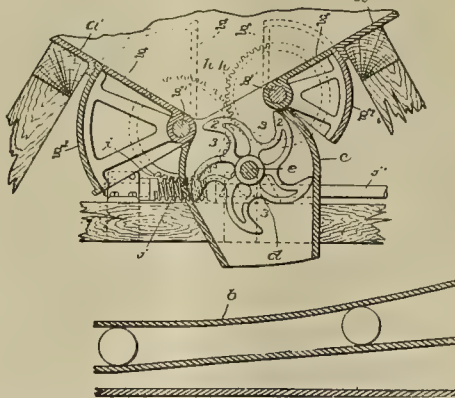
Combination with drum having magnetic disk at one end thereof and feeding mechanism upon drum; of suction fan at opposite end of drum, and series of baffle plates interposed below hopper and between disk and fan.

HOISTING MECHANISM FOR SUCKER RODS.—No. 767,135; W. M. Brown, Gibsonburg, O.



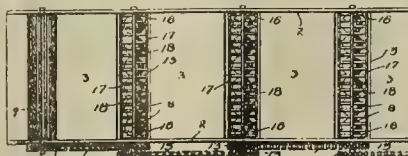
In device of class described, vehicle, cable-supporting member pivotally secured thereto in such manner as to cause base of member when in vertical position to be suspended from pivotal point, drum rotatably mounted at base of member and movable therewith, cables supported by member and connected to and adapted to be moved in opposite directions when drum is rotated.

APPARATUS FOR FEEDING ORE, COAL, ETC.—No. 766,539; W. R. Smith, Buffalo, N. Y.



Apparatus comprising hold or receptacle having outlet chute, belt conveyer arranged to receive material from chute, and rotary gate located in chute and extending across same, gate having curved wings forming pockets which are arranged to deliver charges of material in close proximity to each other upon conveyer, edges of wings being rigid to force their way through resisting material.

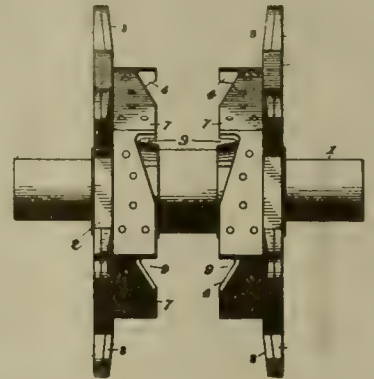
AMALGAMATOR.—No. 767,365; W. E. Vandenburg, Chicago, Ill.



Amalgamator comprising fixed conduit for pulp, mercury trough in conduit, spherical bodies revolvable

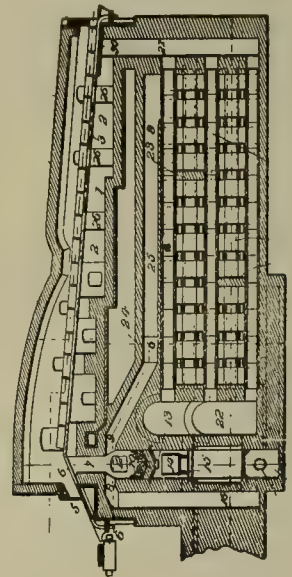
in mercury in trough, and rings spaced from and extending around spheres, also revoluble in trough and disposed with relation to spheres and in planes parallel with current of pulp.

TUMBLER FOR GOLD DREDGING MACHINES.—No. 767,009; O. B. Perry, San Francisco, Cal.



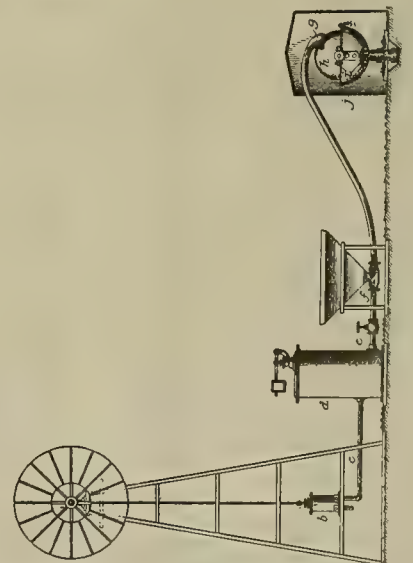
Tumbler for dredging machines and the like, having its bearing faces shaped to conform to bearings of buckets, and provided with flaring openings through which boulders and other obstructing matter are forced to clear tumblers.

CONTINUOUS HEATING FURNACE.—No. 767,243; J. Reuleaux, Wilksburg, Pa.



Continuous heating furnace provided with receiving and discharge openings, bearings for line of slabs or billets extending from receiving opening to discharge opening, and having inclined portions, fuel port opening into such furnace at point beneath and intersecting inclined portions, cinder pocket in line with entrance of such port into furnace, and means opening into port intermediate upper end thereof and cinder pocket for supplying fuel to port.

DRY SAND AMALGAMATOR.—No. 767,276; F. J. Hoyt, Redlands, Cal.



Combination with amalgamated mercury floated rotary sphere, of pipe, and nozzle thereto, to discharge on sphere, air reservoir, air compressor and an air engine, connected to operate.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

The Alaska-Perseverance mines, near Juneau, are reported sold to a company of London and Paris men. W. J. Sutherland of San Francisco, Cal., is manager.

Nome reports say development of that region has been arrested by a decision of the U. S. District Court in Nome and all ditch work is practically at a standstill pending the hearing of the case on appeal. The decision was rendered in the suit of the Miocene Ditch Co., which attempted to condemn a right of way across No. 6 on Dexter creek. The court held that the plaintiff, being a corporation existing under the laws of California, is a foreign corporation, and that "nowhere in the Alaska code can we find any provision which delegates to a foreign corporation the sovereign right of eminent domain." Nearly all the ditch companies operating on the Seward peninsula come under this interpretation of "foreign," since it is only recently that it was possible to incorporate in Alaska. The immediate result of the decision, it is said, has been to send stampedeers to stake up everything within the survey lines of ditches in course of construction. Some of the ditch companies have rushed their own men into the field to stake ahead of the stampedeers. Many of the richest claims in the section are worked out and the future of the Seward peninsula depends on ditches and hydraulicking. The report states: "On every hand short-sighted claim owners, who a week ago were glad to get a ditch through their land, are now asking thousands of dollars for the right of way through undeveloped wildcats."

## ARIZONA.

### Graham County.

Work is progressing on the new concentrator of the Detroit C. M. Co. at Morenci. The foundations for the concentrator are being laid and the material for the bins is arriving. In the old concentrator several jigs are working at full capacity, in competition for the order for the ore treating machinery with which the new building will be equipped, says Superintendent Mills. The piers for the coke and coal bins near the smelter are finished, and the iron work is on the ground ready to be placed in position.

The Monte Cristo mine is reported sold to the Arizona C. M. Co. of Clifton. Shipments of ore have been made which average 20% copper.

The Federal M. Co. has started up its smelter 1½ mile north of Safford. The ores run through are from the San Juan mine of the company, and consist of high-grade oxides and sulphides. The matte produced assays 60% copper, \$7 gold and \$5 in silver. The smelting plant is in the building erected by the Arizona C. S. Co., and consists of a 20-ton water-jacket furnace, blower, 50 H. P. Corliss engine, 40 H. P. boiler and a hot-air blast. A reservoir on the mesa overlooking the building is supplied with water pumped from a well. The building is lighted at night by two gasoline arc lamps. The Federal M. Co., operating the property, consisting of twenty-four mining claims, has done considerable development work, principally on the San Juan claim. Contract has been let to crosscut from the new shaft to the old San Juan shaft to tap the sulphide ore and work same from new shaft. The ledge will be cut at 80 feet. This sulphide ore carries copper up to 10%, and also gold and silver values. Two shifts of men are kept at work at the smelter, and at the mines fifteen men are employed.

### Gila County.

The old smelting plant of the Old Dominion C. M. & S. Co. at Globe closed down on August 15th and the furnaces in new smelter will be blown in by Sept. 15th. There will be no reduction in the number of men meanwhile, as more men will be put on to hurry to completion the work about the new smelter.

F. A. Wright of Chicago, Ill., vice-president of the Arizona-Colorado Copper Belt & Gold M. & M. Co., says he is arranging to resume development work on the company's property, 3 miles north of Globe. The company has had nineteen claims surveyed and amended notices of location filed. Two new locations have also been recorded. The principal opening is a double-compartment shaft 170 feet deep, timbered and equipped with a steam hoist and other machinery, buildings, etc. The shaft cut a streak of lead-silver ore which is 2 feet wide in the bottom, and in addition to the lead and silver values carries copper. When work is resumed by the company this shaft will

be sunk several hundred feet deeper and open the copper lead which crops north of the shaft.

### Maricopa County.

The Goddard M. Co., operating 2 miles from Wickenburg, reports progress. The main shaft is down 185 feet. A body of ore has been opened up, and the vein crosscut for 36 feet. This ore runs 15% copper and about \$10 in gold. Enough ore has been taken out to pay for development and it will be shipped to the smelter.

H. D. Bradford, manager of the Major G. M. Co., 9 miles east of Wickenburg, and owned principally by Indianapolis, Ind., men, says considerable development work has been done on the property, which consists of twelve claims, including two shafts 150 feet deep, besides several from 30 to 60 feet deep. A 5-stamp test mill has been put up, and when sufficient ore has been opened up, a larger mill will be built and water piped from the river.

### Pinal County.

The concentrating plant for the Troy-Manhattan C. Co. is on the ground at Troy and will be set up at the Davis shaft to treat the wulfenite ore opened up.

### Santa Cruz County.

The mill of the Hermosa M. & M. Co., near Nogales, has been completed and operations started. The mine is a silver producer.

### Yavapai County.

Prescott reports say the Climax G. M. Co. has entered the black dike which was struck in its tunnel and is again in ore. The vein is 3 feet wide and free milling, giving values of \$47 per ton gold. The tunnel is in 230 feet.

## CALIFORNIA.

### Amador County.

At the South Eureka mine, at Sutter Creek, grading for the mill is in progress and much of the material is on the ground. A new cable, weighing 5600 pounds, has been put in. It is 2800 feet long and has a lifting strength of forty-nine tons.

W. E. Stewart has men at work on the Butte Basin gravel claim at Butte City, near Jackson. He has sunk a shaft 100 feet deep and drifted west. The auriferous gravel is tapped 40 feet below where it has heretofore been worked. The gold-bearing gravel is being accumulated on the surface, preparatory to washing in the winter season, when water is plentiful. Water is troublesome, necessitating a steam pump. When winter rains set in it will be impossible to work underground on account of water. So the pay gravel is hoisted in the dry season, allowed to slack by contact with air and washed in winter. The gravel bed is 5 feet thick.

The work of adding forty additional stamps to the Kennedy mill at Jackson is progressing.

The Glenn mine, at Volcano, has been idle for the past two months, owing to the water supply being used for other purposes; but arrangements are being made for improvements to the mill and the taking out of ore will be begun on a larger scale. As soon as the present top tunnel reaches the Fogus mine, the ore shoot will be tapped at another and more advantageous point.—At the Madrone mine the 9-stamp mill is nearing completion. Lessley & Co. are owners.

### Butte County.

It is reported J. M. Beck of Pasadena has bought the Beik mine near Forest-town. Beck et al. are interested in the mine on the Humphrey ranch and are also the parties who have bought the Clipper Mills property.

### Mariposa County.

(Special Correspondence).—Reopening the Princeton mine is progressing favorably. Only twenty-four days have passed since the fire, yet all the top wreck has been cleared away, the machinery which is good put back, the shaft reopened 55 feet and the tunnel cleaned out, retimbered and connection made with the shaft for ventilation. Four shifts are sinking, working six-hour shafts; about a set (5 feet) each twenty-four hours is made. The gas from the burning timbers (monoxide of carbon) is particularly bad, compelling the men to take turns about working. The whole shaft may have to be retimbered clear down—a depth of 1600 feet. The surface immediately surrounding the shaft has sunk 15 or 20 feet, and until that is hoisted out the amount of work necessary cannot be estimated; but from the continual flow of gas through the caved ground it is supposed that the timbers below are still smoldering. If so, the shaft undoubtedly will cave to the depth of burning, as both foot and hanging wall are heavy swelling ground. Great credit is certainly due the management for the amount of progress made in such a short time under such difficulties.

Mount Bullion, Aug. 13.

### Nevada County.

The Central mill of the North Star M. Co., near Grass Valley, is dropping

twenty of the forty stamps. The foundations are of concrete and rock, the building, walls and roof being of corrugated galvanized iron, and as near fireproof as a building of its kind can be made, the timber utilized being merely to skeletonize the interior of the structure. The equipment consists of forty stamps with amalgamation plates and a concentrating battery of ten Dodd buddles. The mill, when all the stamps are dropping, is expected to handle 120 tons of ore daily. It is run entirely by electricity, except the rock breakers, which are driven by hydraulic power. There is a battery of three electric transformers on the ground floor. The quartz is conveyed from the collar of the Central shaft in V-shaped ore cars on tracks leading to the attic entry of the mill. It is dumped into the ore bins over grizzlies. The mortars are set on concrete foundations. The concentrates from the buddles drop into bins, while the tailings pass out of the building, running through to the cyanide plant down the hill, which is being built with cement tanks. A. D. Foote is manager.

### Placer County.

(Special Correspondence).—J. E. Belden and W. J. Esteb are opening up the Side-winder mine near Bald mountain, east of Westville. The ledge of quartz is 10 to 14 inches wide, carrying free gold, and crops on the surface for 40 feet.

Westville, August 17.

### Riverside County.

E. A. Fano, of San Diego, part owner of the kunzite mines in the Cahulla range of mountains, northeast of Pala, says Tiffany & Co., of New York, who have contracted for the entire output, have sold several large stones for as much as \$5000 each. Fano et al. have fourteen claims, 25 miles from San Jacinto, in the Cahulla range. They are down 200 feet and have done considerable drifting on the ledge. The gems are usually found in pockets. Sometimes they are in the rock and sometimes in the coarse gravel. All of the dirt is hoisted as in ordinary mining and put through different meshed screens. It is then closely examined for the stones. In addition to the gem mines they are opening up the mineral claim, the Effie. It is near the gem mines and is a gold proposition of free milling quartz. Development work on it will be increased. The surface ore assays \$20.

### San Bernardino County.

(Special Correspondence).—The Triplex copper mine has resumed operation under Manager Vance of Los Angeles. The mine, which is 1 mile west of Manvel, has been idle two months.

Manvel, Aug. 15.

### Shasta County.

(Special Correspondence).—The Mountain Lion mine is a group of eight claims in Shasta mining district, which extends to near Whiskeytown. The general formation of the district is light colored porphyry and granite, with slate. The Mountain Lion is owned by R. G. and A. L. Parmley. Tunneling has been done to extent of 800 feet and they are connected by winzes and raises. The 5 stamp mill has been run by water until lately. Power is now had from the Mount Shasta electric plant, 1 mile away. Average mill run tests of the ore gave return of \$20 per ton in gold.

The Gladstone mine, near French Gulch, after seven months of labor trouble, is again working. The main tunnel is in 3100 feet. Air connections, not direct, are made 700 feet to the surface. The air shaft at breast of tunnel is down 150 feet. At that point in the tunnel a chamber is being cut and a three-compartment shaft will be sunk and cages used. The main shoot from which ore was mined during development of last year is 600 feet in length and is thought to hold good 400 feet above. At 150 feet below the ore body is the same in character and value. The mill has twenty stamps, Frue vanners and Wilfley concentrating tables. The power used in mill and lighting the mine is transmitted from power plant 4½ miles.

French Gulch, August 16.

Redding reports say that in a mine that has been abandoned for twenty years, near Whiskeytown, A. Egerton and W. P. Flinner last week struck a pocket and in one shift took out \$430 in gold, including a \$60 nugget. L. Riehl took out \$600 from a pocket he found on the same claim a month ago.

It is reported the Mad Ox mine near Whiskeytown, near Shasta, owned by L. Reel and S. Schilling, will be sold to J. Bamber, who has had a bond on the mine with R. K. Gilson of Minneapolis, Minn.

### Sierra County.

At the Golden Scepter mine near Bunker Hill, near Downieville, pay gravel was struck last week. This mine was formerly the New Orleans, but is now owned by the Golden Scepter Quartz & Gravel M.

Co. P. H. Mason is superintendent and has eight men at work. He has been cleaning out and repairing the bedrock tunnel. A raise of 50 feet was made and then drifted 35 feet, when the gravel was struck. The bedrock was pitching at an angle of 45°; the company will run a tunnel to the east and expects to find the bottom of the channel in about 50 feet, says Mason. Lumber is on the ground for a new reservoir to be built and the company expects to be washing gravel Sept. 1.

### Siskiyou County.

(Special Correspondence).—The property of the Yellow Rose G. M. Co. consists of 860 acres on the divide between Siskiyou and Trinity counties and adjoins the Dorleska mine on the Trinity side. G. L. Carr of Carrville is president and manager and J. C. Boddeker is superintendent. Development consists of 600 feet in a diagonal crosscut, tapping the 15-foot ledge, then following it for the other 500 feet, which will be continued till under the top of the mountain. There are two other tunnels—one in 650 feet and the other 550 feet. These are connected with a winze at 85 feet in on No. 1 tunnel. The general formation and ore are similar to those of the Dorleska—serpentine with free-milling porphyritic ore—although sulphurets are coming in as depth is gained. The milling plant consists of a ten-ton Huntington mill, with amalgam plates and a Springer concentrating table. The milling ore has a value of \$15 to \$20 per ton in gold. The management intends working all winter and will put in a thirty-ton cyanide plant next spring. The mountain side above Salmon river is precipitous, so that the company has found by survey that it can drive a 4500-foot tunnel and tap the main ledge 2000 feet below the surface croppings.

Along the divide between Trinity and Siskiyou counties, near the headwaters of South Salmon and Swift creek (a tributary of the Trinity river), and about 2 miles south of the Dorleska mine, Trinity county, and the Yellow Rose, Siskiyou county, are several groups of promising claims. The country rock is largely serpentine with diorite, schist and porphyry, cutting the same in dykes. The gold is found in talcose schist and easily milled. At depth, sulphurets are found. These groups aggregate twenty claims and are owned severally by J. A. Gulick & Sons, I. N., J. H. and K. Miller, B. West and J. C. Phelps. Each of them has several prospecting shafts and tunnels and has performed assessment work for five to seven years, but is unable, without aid, to develop to 150 or 200 feet below surface. Depth to 300 and 400 feet below surface can readily be gained by tunneling.

At Le Roi group of seven claims, owned by T. Clarey, G. W. Payne and A. J. Keenan, said to be the extension of the Dorleska and Yellow Rose mines, prospecting has exposed several ledges and development now is by driving a tunnel to tap the largest ledge at depth. Assays give values of surface ores at \$9 in gold.

Carrville, Trinity Co., Aug. 16.

(Special Correspondence).—The twelve lode claims and Little South Fork placer mine of the Caribou G. M. & P. Co. are on Caribou mountain, near headwaters of the main fork of Salmon river. The ledges are in mica schist near the granite. The schist is cut by dikes of diorite, porphyry, diabase and lime, and along the dikes three quartzose veins are found. There are two systems of veins, one trending north and south and the other east and west. All carry ore, some being high grade, although the general average without sorting may at present development be placed at \$8 per ton in gold. The three ledges have high-grade shoots. N. W. Keith is manager and he has men at work developing. The main tunnel is in 125 feet, and at 1000 feet it is expected to cut the main ledge at 500 feet below the surface. The water rights owned by the company, when put to full use, will develop 5000 electric H. P. The power covered by the water rights is derived from the falls of the Three Lakes on the west and from the falls of the Salmon river on the north, both of which are within 1 mile of the central group of claims. The Caribou G. M. & P. Co. is composed principally of Le Roy, Ill., men.

Forks of Salmon, Aug. 16.

### Trinity County.

(Special Correspondence).—Clarey, Payne & Keenan control 700 acres of land along both banks of Trinity river near Trinity Center. They are for the third season operating a dredger on that ground, the bedrock being about 18 feet below the flow of water. The dredger is said to be too small in capacity in proportion to showings made at clean-ups. The richness of the gravel at the point where work is going on is attributed to the fact that the waters of Haskin creek flow into the river a short distance above. While operations can be carried on during the



winter, the season usually begins in May and ends in December.

The Big placer in operation above Trinity Center, T. McDonald manager, is now engaged in regular clean up and until December repairing and preparing for the next season's work will be carried on. As is the case with most of the gravel mines of Trinity county, the run this year has been satisfactory.

On the north side of Battle creek, and on same contact as the Three Peaks mines, is located the Deacon Gulch mine, composed of four claims, owned by and being worked by G. Cook and W. R. Conant. Development so far is by crosscut tunnel 300 feet in, cutting 6-foot ledge at 110 feet below surface. The 100-foot shaft is in ore, a white quartz showing an average assay value of \$10 per ton in gold. Development will continue until winter months.—In same mineral belt as the Deacon Gulch mine and at head of Hard-scabble gulch is the Tom Keating property, sold to Redding parties. Development consists of 600 feet of tunneling and ore is being treated at a 1-stamp Kendal mill.

The Trinity G. P. M. Syndicate, Ltd., main office London, Eng., owns on Coffee creek, 14 miles from Carrville, 800 acres, and also 4 miles along Union creek, which connects them with Coffee creek. W. Maitland is manager. To make dumping ground a 900-foot tunnel was driven. Work this year has been development, running ditches and cuts in order to go farther up Coffee to a new and larger bar. The 1200 feet of sluice boxes will be so arranged as to break ground on the two sides. The company owns a sawmill and has thirty men on payroll.

Systematic development on the Strode mine, near Carrville, is showing satisfactory values. The apex of the mountain, where outcroppings were first discovered, is 1630 feet above the mill, and the width of the ledge at that point is nearly 6 feet. The ore of the mine is free-milling, with values in gold, 85% being saved with batteries and plates, and the tailings saved for future cyaniding. Development is by a series of tunnels following in on the ledge, which is white sugary quartz in slate and serpentine. There are several tunnels, the 750-foot one being in 1300 feet and the 1000-foot, or lower one, in 1200 feet. The several tunnels are connected by raises or winzes and all ore is brought out and trammed to bins from the lowest one. In the lower tunnel, at 1000 feet in, is a chamber 32 feet in length by 12 feet high and 12 feet wide, where a 100-foot shaft has been sunk. The bottom of the shaft is 1100 feet below top of mountain and the ledge shows 30 feet in width. The 5-stamp mill is arranged for placing five additional stamps and run by water power. The mine is also known as the Oro Grande and \$40 ore is milled. High-grade tailings are saved for cyaniding.

The Three Peaks mine, on Iron mountain, near headwaters of Battle creek, a tributary of Coffee creek, has been bonded by G. Cook, H. Weiser and W. R. Conant to T. S. Henderson & Co. of St. Louis, Mo. In the groups are five claims and a millsite; on the latter a 10-stamp mill has been built, with arrangements for five more stamps. Development shows the main ledge 3 to 8 feet in width, a contact between porphyry and serpentine, with gold values. Diorite dikes cut through this formation with vein matter in connection carrying silver values. The vein matter of the contact ledges is a white, sugary quartz at times showing free gold. The water right in connection with the property has to the mill a fall of 700 feet of 500 inches of water, coming from springs 3 miles away. The same water to level of Battle creek has a fall of over 200 feet. W. R. Conant is in charge as manager, and development is to be increased by sinking shaft from top of ledge at outcrop.

Trinity Center, Aug. 16.

(Special Correspondence).—The Sherwood mine, on Battle creek, 2 miles north of the Mountain Boomer mines, is in the New River district, and was located in 1883. Over 1000 feet of tunnel have been run, nearly all of which is on the ledge. The mine is equipped with a 2-stamp mill run with water power. A recent crushing of 187 tons ore realized \$20 per ton, free milling, and about 2 tons of concentrates saved with a Frue vanner. It is the first time that sulphurets have been saved with a concentrator in the district.

The Trinity County Development Association, organized in February, 1904, by residents and persons interested in Trinity county, is working to call attention to opportunities for profitable investment in Trinity county. The furnishing of reliable information concerning every section and industry of the county and inviting examination and development of its resources, are its objects. Permanent headquarters are established at Weaverville, and an ex-

hibit of minerals and products of the county is there maintained. A splendid map of the county has been prepared and a prospectus concerning the county will be issued and distributed. The Association is asserting itself against the maintenance of forest reserves in that section, and is endeavoring to arouse public sentiment towards an effort to get wagon roads and railroads from the Sacramento valley to Eureka.

Weaverville, Aug. 17.

(Special Correspondence).—Four miles below Denny on East Fork is the Sherwood mine, owned by J. W. Bartlett of Weaverville. The ledges, 3 to 15 feet in width, are in serpentine and porphyry and the ore is free milling and concentrating quartz with values \$20 per ton in gold. The 1000-foot tunnel gives a backing at the breast of 250 feet to the surface.

The Enterprise mine is a group of fourteen claims, 1 mile from Coleridge on the East Fork of the North Fork of the Trinity river. The general formation is granite and slate, with the latter for hanging wall. The ledges lie at an angle of about 30°. The main tunnel follows ledge 1200 feet and to a depth of 500 feet below the surface. The lower tunnel at the mill, 300 feet below the 1200-foot tunnel, is connected by stopes and raises. It is estimated that between the long tunnel and winze in upper tunnel 50,000 tons of ore are ready to be stope out. On the Lone Jack claim of the group \$50,000 was taken out by former owners above the 100-foot level. The ore is free milling gold, with small percentage of sulphurets, average value \$20 per ton. This property is bonded to M. Manley for Boston, Mass., men. Manley will place forty men at work and do development through the winter. On the property is a 10-stamp mill, a Frue Vanner and a Woodbury concentrating table. All machinery is run by water power.

The Yellowstone is a group of sixteen claims near Coleridge. Six of the claims are held by U. S. patent. The property has been bonded by M. Manley for Boston, Mass., men, who propose working it during the coming winter months. Granite and slate formation with ledges of 2 and 3 feet in width are shown, with over 5000 feet of development. Ore milled from a 1-foot ledge gave average value of \$50 per ton in gold. A 200-foot shoot of a 3-foot ledge gave average value of \$8 in gold. There is a 10-stamp mill. In October men will be put at work. G. R. Woodin is at the head of the Boston companies bonding the Yellowstone and the Enterprise mines.

The gravel and placer mines of Trinity county have been doing well this season and all cleanups have been satisfactory to owners. The Hupp mine of 512 acres patented ground, 4 miles from Weaverville, has been worked for forty-six years, and no season to better profit than this one. Two and a half acres of ground were worked. The banks are about 30 feet thick.

Weaverville, Aug. 17.

(Special Correspondence).—The Dorska mine of the Union Con. G. M. Co. is on the divide separating Siskiyou and Trinity counties, near headwaters of Union creek, a tributary of Coffee creek. This property, at an altitude of 6500 feet, comprises 1200 acres of U. S. and railroad patented land. The main ledge is 8 feet in width between serpentine walls, with a body of talcose schist next to each, carrying free gold. The ore is porphyritic in character and free milling with a small percentage of sulphurets. The main shaft is down 300 feet and a drift from the 300-foot level cut a 120-foot shoot of ore 10 to 22 feet in width. At the 300-foot level drifting extends north 1300 feet from shaft. From 200-foot level drifting amounts to 92 feet. All stoping has been done between 200-foot and 300-foot levels. The 2000-foot tunnel—the greater portion being of snowsheds—taps the main shaft at the 300-foot level. In sinking the shaft, the walls were cut through at 320 feet, the last 150 feet of the shaft being in solid serpentine. The crosscut 45 feet to the 120-foot ore shoot was then made. The mill consists of a Huntington, ten stamps and two Frue vanners and crushes thirty tons of ore daily. It is estimated there are over 6000 tons of tailings in the pond awaiting construction of cyanide plant. H. Z. Osborne, of Los Angeles, is president and manager and M. H. MacIlwaine is superintendent at the mine.

Rogers & Denton have leased and bonded the Keno mine, which includes 160 acres of patented ground near Doblen station on the Trinity Center and French Gulch stage road, 20 miles west from French Gulch, Shasta county. The workings are entered by a 400-foot tunnel. The ledge is 1 foot in width, being on the contact between porphyry and slate; character of the ore a decomposed white quartz, free milling, with value of \$7 in gold per ton. The mill is two stamps and

run by steam. Rogers & Denton are driving a new tunnel to strike the ledge at 140 feet in depth.

The Van Ness Bros. are working in connection with S. J. Robinson a group of four claims 2 miles west of Doblen station. The vein matter is 20 inches in width in a greenstone and porphyry formation. At 150 feet in on the ledge and 200 feet below the surface, the ore shows free gold and assays \$30.

The North Mountain Power Co. is digging a ditch, tapping the water of Canyon creek, 2½ miles above Junction City. The ditch, when completed to the power plant on Trinity river, will be 9 miles in length. The purpose is to transmit light and power over Redwood and South Fork mountains to Eureka. The plant is expected to be completed January 1, 1905. It will be of 2250 H. P. and there will be two transformer stations on the route. The water rights were bought with the gravel mines opposite Junction City from the Cie Francaise de Placers Hydraulique.

The Fairview mine, near Minersville, has 125 men at work. The millmen and carpenters are putting in twenty additional stamps and plates. A dynamo will be placed for lighting the works and running the air compressors for drills used in No. 4 tunnel near the mill. When the water power plant is completed, there will be two 6-foot Pelton wheels in use, driven by an 80-foot head. Water will be brought from Stewart's Forks, a branch of Trinity river, 2½ miles away.

The May Queen property, a group of nine claims, on North Fork of Coffee creek, 2 miles from the Nash gravel mine, and owned by R. G. Abrams, M. H. MacIlwaine and G. W. Payne. A ledge of 3 feet in width in schist, serpentine and porphyry shows ore at surface, free milling with \$8 per ton in gold. Development is by a 125-foot tunnel following ledge.—The Boomer mine, near Denny, is owned by the Bobs Farm M. Co., and employs twenty men, who are developing the property under management of W. Montgomery. The formation is serpentine and porphyry and the ore free milling. The lower tunnel follows a 2-foot ledge 450 feet and is 900 feet below upper discovery. Ore is treated on the property in a plant containing a Huntington mill, five stamps and plates. All machinery is run by water power.

Trinity Center, Aug. 17.

#### Tuolumne County.

(Special Correspondence).—The John Royal gold mine on Experimental gulch, 1 mile north of Columbia, has been sold and a 10-stamp mill is being built. There are over 3000 tons of high-grade ore on the dumps. The ledge is large and in early days rich ore was extracted, but little work has been done since then. The Pine Log placer is at one end of the gulch and the Tres Pinos at the other end. W. G. Phipps is superintendent.

Columbia, Aug. 17.

The Buzzard Hill mine, near Tuttle-town, which has been idle for six years, has been relocated by D. Oneta et al. A shaft is being sunk on the vein which is 9 feet wide and carries free gold and sulphurets. Development work will be increased.

The Blue Bell G. M. & M. Co. has bought the Blue Bell No. 2 quartz mine, on east slope of Provost mountain, 4 miles east of Carters. W. J. Symons has deeded to same company Blue Bell No. 3, first northerly extension of No. 2.

At the Jumper mine, at Stent, the 40-stamp mill is steadily in operation. Nothing but development work is being done. Manager Kerr is preparing to sink and is pumping the water from the 1200 level.—Manager McGovern of the Republican mine, at Jacksonville, reports main shaft is sunk 60 feet below 600-foot level. The 20-stamp mill is in continuous operation.

#### Yuba County.

L. Pieratt has bonded the Gottwals 130 acres of bottom lands along Feather river below the Gridley bridge, 9 miles above Marysville, for \$7800. The land is to be prospected for gold with a view to placing dredgers upon it, and the drills are to begin work within two months. C. Gottwals reserves all his uplands, but will prospect them for gold, and if they prove to contain sufficient values, the whole farm will go for dredger land.

C. H. Hill, interested in the Blue Gravel, Deer Creek and Mooney Flat mines, says the complications surrounding the New Blue Point mine, owing to litigation by creditors, have been settled and the company is arranging to start work in part of the mine. The company owns and controls 690 acres of placer mining claims on what is known as Blue Gravel channel, near Smartsville, including an area for the deposit of debris in restraining dams. The principal place of business is Los Angeles, with a branch office in San Francisco. C. H. Hill is president, with A. G. Nason, J. H. Mullin, E. L. Hutchinson, W. M. Berry, C. Hyde and E. Tinsnerat

officers and directors. The deposits extend from near Smartsville to Mooney Flat, 1 mile. Hydraulic mining can only be conducted after a permit has been granted by the U. S. Debris Commission, and heretofore land for restraining dams could not be obtained by the companies. It has secured a large tract owned by the Excelsior Co., and there is every facility to care for the debris washed from the mines, and the manager says that when a dam is finished mining will begin.

#### COLORADO.

Colorado's gold statistics for the first six months of the current year are reported showing a total tonnage of 332,300, with a valuation of \$10,522,800.

#### Clear Creek County.

Operations have been resumed on the Tiger group of claims, up Grizzly gulch, near Georgetown. Wheeler & McCreedy, owners, will continue work on the tunnel. It is expected the Tiger vein will be out at a depth of 200 feet below the old workings. At present the tunnel is being driven on a crosscut lode which is showing mineral.

The United Light & Power Co. has completed a contract for equipping the Lamartine, near Georgetown, throughout with electric power. Since the contract was awarded by the Lamartine M. Co., the entire plant of machinery has been connected. The compressor is operated by an electric line furnishing 20 H. P., as is also the hoist. It was necessary to string the electric line 1000 additional feet in order to supply the mill with power.

Work is being resumed on the Saxon Extension group, on Saxon mountain. Operations will be centered on driving the upper tunnel, which is in 800 feet. The upper tunnel was started one year ago and during the work considerable ore was taken out. The mill dirt is oxidized. The principal values are in gold, while a small percentage of lead is also found.

The East Griffith mine, near Georgetown, owned by W. H. Hoover, is being equipped with electric power. A hoist has been set up at the 1200-foot station of the tunnel level, where sinking has been in progress. A streak of ore is being followed. The electric line has been extended to the tunnel entrance and the cable connections are being made. Manager Hoon of the United Light & Power Co. says 20 H. P. will be furnished for the operation of the hoist. Extensive development work has been planned. A. Ericson and C. Gileon, who are operating a block of ground at the 2000-foot station of the tunnel level, are making headway. It is expected additional leases will be issued. R. McClosky has been appointed resident superintendent.

#### La Plata County.

Construction of the hydro-electric plant of the Animas Co., R., W., P. & I. Co. at Rockwood station, midway between Durango and Silverton, is under way. Contracts have been awarded for the electric and hydraulic apparatus for building the flume line and dam and for preparing the reservoir site. It is expected everything will be completed and in working order by May 1, 1905. The completion of this plant will give to the San Juan district the same advantages of cheap power that Cripple Creek and other sections of Colorado have.—The initial plant of the Animas Co. will have a capacity of 6000 H. P. F. O. Blackwell of New York City is consulting engineer. H. T. Henderson of Durango is president and chief hydraulic engineer and has charge of all construction work. The other officers and directors of the company are of Indianapolis, Ind.—B. F. Schmid, manager; T. N. Hardin, J. R. Love, P. Grey, J. W. Adams, W. E. Bundy, F. O. Froeb and C. F. Woerner. Cascade creek, a stream that flows into the Animas river above Rockwood, will furnish power for first installation. At a point 6 miles above its mouth a diverting dam has been constructed and so arranged that the water is turned from its natural course into a box flume 6 feet deep and 8 feet wide, in which it is carried for 3½ miles. Then it is conveyed to the reservoir in a natural water course 2½ miles long. Practically all of the waters of Cascade creek will in this way be diverted from their natural course, giving a head of 1000 feet above the water wheels in the power house below. Grading for flume is completed and the stringers and mud sills laid. There is said to be a difference of 1450 feet in elevation between the points where the water is taken from Cascade creek and where it enters the Animas river. Four hundred and fifty feet of this is taken up by the flume, ditch and reservoir. Cascade reservoir is a natural basin 3½ miles long and 1 mile wide at its widest point. A temporary crib dam 55 feet high is being built. This storage is calculated as sufficient to operate the first plant of 6000 H. P. for a period of three months without any additional water supply. This



temporary dam is being constructed for two purposes. First, so that the company can deliver power sooner than if the dam were constructed of stone. Second, it will enable the company to use its own power in the construction of the second dam. The main dam will be 100 feet high and will store about 5,000,000 cubic feet of water. Power station No. 1, which is 2 miles above Rockwood, is designed for a capacity of 12,000 H. P. It is on west bank of Animas river. Below the penstock the water will be carried in steel pipes 44 inches in diameter at the top and 38 inches at the bottom. While all parts of the plant are designed for 12,000 H. P. capacity, only 6000 H. P. will be developed to begin with. Additional units will be put in as the demand for power increases. The first installation will consist of two General electric generators, each directly connected to a Pelton water wheel. These generators will be of the three-phase, sixty-cycle, revolving field type. These units will operate at 300 revolutions per minute. The power will be generated at 4000 volts, then passed through two banks of transformers, each bank having a capacity of 3000 H. P. and consisting of three transformers. In these transformers the voltage will be increased to 50,000 volts. Surveys have been completed for rights of way for transmission lines, which will reach all of the principal mining sections in the San Juan district. These lines will extend into San Juan, Ouray, Hinsdale, La Plata and Montezuma counties. In addition to mining purposes, the company expects to furnish current for lighting the principal towns in the district and also to the smelter of the American S. & R. Co. at Durango.

#### Ouray County.

(Special Correspondence).—The Genesee and Vanderbilt mines in Red Mountain district are being operated by the Red Mountain Railroad M. & S. Co. The mine has been equipped with a Leyner 12-drill compressor. The company is making preparations for building another compressor plant on the Joker tunnel, 4500 feet north from the Genesee tunnel. The Joker will be 3300 feet in length and will drain the Yankee Girl and Augusta mines. At present the company is doing development work in the Genesee. G. B. Croft is superintendent and G. Crawford manager.

W. J. Hammond, Jr., manager of the Treasury Tunnel M. Co., has been operating in this district the past seven years, and has driven the Treasury tunnel 5000 feet. He is breaking ground for a 20-stamp mill, which will be supplied with power for forty stamps. A switch will be put into the mill to connect with the Silverton & Red Mountain railway. They are also erecting bunk house and office buildings. The company is composed of Eastern men. The tunnel when completed will cut the Tom Boy, Smuggler and other veins. The Handicap vein is being developed, which was cut 4500 feet from the portal. The ore lead will average 5 feet in width. The ore is sulphide, carrying a percentage of copper, lead, gold and silver.

Red Mountain, Aug. 14.

(Special Correspondence).—Development work is being increased on the Barstow mine under management of J. Geisel. The new tunnel is in 1120 feet and is expected to strike the ore body within the next sixty days, when the new 40-stamp mill will be kept busy day and night. But ten of the stamps are dropping at present. The mill contains stamps, plates, sixteen tables and four slimmers.

Ironton, Aug. 14.

#### San Juan County.

(Special Correspondence).—The Cummaron M. P. & D. Co., above Animas Forks, on an extension of Engineer's mountain, is driving a tunnel on its property. They state the ore averages \$25 per ton. Calumet & Hecla people are said to be backing the project.

Animas Forks, Aug. 13.

(Special Correspondence).—The Silverton M. Co., T. R. Henaben superintendent, has its tunnel in 2800 feet and is driving to strike the Eunice-Sound and Democrat veins. There remains about 50 feet farther to drive before striking one of the veins, which will be 1150 feet below the surface. The property is on Sultan mountain. The ore is lead and gray copper. The company owns 500 acres of mineral land. Power drills are used for driving the tunnel. The mill on the property is not in use at present.

Silverton, Aug. 14.

(Special Correspondence).—A compressor plant is being put in at the Domingo group of mines. The Con. Eureka M. & T. Co. is owner of the Domingo group, and has started work driving a 7x7-foot tunnel and timbering with 10x10-inch timbers. Some development work has been done on the claims. With this tunnel they will cut the vein 2300 feet deep.

The property is on Niagara mountain, opposite the Sunnyside mill. N. Gregg, of the Gregg Investment Co. of Denver, is manager, and S. Davis is superintendent. The Eureka Exploration Co. is doing development work on its property in Maggie gulch, and assays show ore running from \$1.32 to \$10.80 in gold and 83 cents to \$7.24 in silver. The company is working the Ridgway group in Cascade basin at head of Maggie gulch. This company is also operating the Silver Wing and Fredrica mines. On the Wing there are 3000 feet of development work and also has a 100-ton mill on the property. It is equipping the mill with a steam plant.

The Astor M. Co. is driving tunnels to cut the Toltec and Mogul veins and both are reported nearing the veins. They are putting in a steam plant to supplement water power. They are able to run with water power seven months in the year. E. C. Condit is manager.

One hundred and twenty-five tons of ore daily are going through the Sunnyside mill. J. H. Terry is owner, W. L. Terry is superintendent of the mill and J. T. Terry is superintendent of the mine. They are shipping thirty-five tons of concentrates per day. The old 15-stamp mill of this company is run during the summer months and the new 40-stamp mill is operated the year around. The Sunnyside Co. has been doing extensive development work the past eighteen months and has a large amount of ore blocked out. A canvas plant is being put in below the mill, and if same proves successful will install slime tables. They are also contemplating putting in zinc separators.

Eureka, Aug. 15.

(Special Correspondence).—H. S. Born is working the Little Maude in Maggie gulch. He has six claims. His ore is said to run two ounces in gold and seventy ounces in silver per ton without sorting.

Howardsville, Aug. 13.

The Jenkins M. Co. has been incorporated by M. Smith, S. E. Hunter, T. R. McKee, B. G. Lester and C. W. Lothrop, to operate near Lime creek, and also in Maggie gulch, near Silverton. The Colorado I. W. Co. is overhauling its pipe line on the Animas river, above Eureka, and the construction of a power house is also under way. The plant is expected to furnish 600 H. P., and a direct transmission of electric current is expected to be made to Sunnyside mill and mine.

#### Teller County.

Cripple Creek reports say the flow of water from El Paso drainage tunnel is slowly receding from its original volume. It is recorded every week and the number of gallons flowing through the portal last week measured 5200 gallons per minute, or 1300 gallons less per minute than when the tunnel was opened. The benefit, however, has been achieved. The lower levels of a number of the largest mines in the district are dry, while in such mines as the Gold King, in Poverty gulch, the water has been lowered to the 900-foot level. In fact there is not a mine in the entire north end, says the Gazette, which has not received some benefit from the tunnel. While the water is receding, the tunnel is still doing work for several properties, as some of the mines whose lower levels were covered for several years are now able to sink another 100 feet, with the water still going down.

The Portland mine at Victor is mining 200 tons of ore per day. Attention has been given to the timbering of the property, so the production of ore has been lower. The company intends to erect an ore house adjoining the one built at No. 2 shaft. The grade of ore being mined is giving average returns of \$30 per ton.

It is reported that the Hull City placer and Golden Cycle companies will resume operations near Cripple Creek. The Hull City placer litigation is expected to be settled in September and the property will reopen with 50 to 100 men. The Golden Cycle property is expected to start operations either under the control of stockholders or a receiver. This will give employment to 200 men, and with the further opening up of the Independence mine another 100 men will find employment, all contributing to increase the monthly production and the camp's payroll.

Cripple Creek reports say Lessees Russell & Sharpe, operating under lease a block of the Colorado Boss No. 3, are putting in an air compressor at the surface in their new shaft. The compressor will have a capacity of fourteen drills. The lessees have opened up a shaft running from the north and south drift which gives them a direct outlet through which to hoist all their ore. The lessees have been working from the Peggy shaft.

J. A. Lippert and J. McFeeley, who are operating the Delmont claim on Beacon hill, Cripple Creek, have started sinking and intend going to the 200-foot point to cut the extension of the ore-breaking

ledge opened in the Lonaconing. A plant of machinery will be installed. Lessee Darnell, who has the lease on the south end of the El Paso, has started to sink a new working shaft. The first 50 feet has been completed and a plant of machinery will be set up over the shaft, which is near the south end line. J. O. A. Carter, who has the option on the Free Coinage on Bull hill, will sink the Pueblo shaft another 200 feet.

#### IDAHO.

##### Blaine County.

At Muldoon, J. Peterson of Hailey is putting in a water wheel, a crusher and a jig on the Blue Bird group. The jig will have a daily capacity of ten tons of ore and will test the ore in the mine, while at the same time partially paying expenses until a larger mill is deemed necessary.

##### Boise County.

Superintendent Hager of the South Africa mine, near Idaho City, expects to start a new shaft this week. It will be sunk on the bench east of the old works, and will cut the ledge on the dip at depth of 300 feet. The ledge has been opened in places both north and south of the cut and the ledge said to be exposed for a width of 200 feet carrying gold values. Hager will put up a 20-stamp mill when the shaft cuts the ledge.

##### Kootenai County.

The Jupiter G. M. Co., says Manager Winters of Spokane, Wash., has machinery on the ground for a 6-stamp mill which is to be put up at the Buckhorn mine, north of Bonner's Ferry. Development work will be increased.

##### Shoshone County.

The Golden Chest M. Co., near Murray, has resumed operations. They have taken out the old boilers and are putting in machinery from the Idaho mill. The engine from the Idaho is a Corliss of 150 H. P. This will furnish power until the rainy season sets in, when water power will replace steam. The Chest mill a year ago closed down for development work and repairs. They have done considerable development work and have blocked out ore for the twenty stamps. Water power will be used when possible during the wet season and steam power at other periods.

The silver-lead mines of the Cœur d'Alenes in the output of the first six months of 1904 exceeded that of the corresponding half year of 1903. The total tonnage of ore and concentrates shipped during the first half of 1904 is given as follows:

	Tons.
Federal Co. (four mines)	48,000
Bunker Hill & Sullivan, Wardner	27,485
Morning Star, Mullan	16,914
Hecla, Burke	6,842
Snowstorm, Mullan	7,500
Hercules, Burke	6,197
California Con.	562
Frisco leasers, Gem	350
Stewart	160
Hunter, Mullan	150
Wyoming	35
Total	114,195

The total shipments for the first six months of 1903 amounted to 99,031 tons. In the entire year of 1901 the mines produced 148,890 tons of ore and concentrates; 160,310 tons in 1902; 200,596 tons in 1903. The Cœur d'Alene mines are producing about 36% of the total lead output of the United States, to which are added 6,000,000 ounces of silver.

At the Elk City gold mine at Elk City, Superintendent Johnson says the drift from the shaft is showing 18 to 24 inches of ore carrying free gold. On the other side of the creek it shows a 3-foot ledge. Manager Swinerton of Wardner is preparing to put in a 2-stamp mill.

##### Washington County.

G. W. Dorsey of Boise says the Blue Jacket mine in Seven Devils district, near Landore, in which he is interested, is being developed. They are working in five stopes and sacking high-grade copper ore. The ore is principally bornite. The company has started the pump and will unwater the lowest level, 115 feet below the tunnel level. There has been little or no ore extracted from this level. In addition to the Blue Jacket, the company is working the Queen and Calumet mines of the same group, and is taking out ore from both. A contract has been made with the Ladd Metals Co. for the product of the mines. The smelter is expected to be blown in next month. The effect of creating that market has been to put other properties in operation. The White Monument, the Helena, the Peacock, the Alaska and several other mines in the same section are being worked and are sending ore to the smelter company's bins. Other districts in that part of the State are also active. At Black Lake and Iron Springs work is in progress and the roads are lined with freight teams carrying machinery and supplies.

#### MONTANA.

##### Deer Lodge County.

The Moose Lake M. Co. is operating the Dandy and Daisy mines at Moose Lake, 38 miles from Anaconda. Its mill is crushing twenty-five tons of ore daily. On the 300-foot level the crosscut tunnel is in 380 feet and will be driven 55 feet farther to cut the ore body. A gravity tram transports the ore from the upper levels. The vein is 25 feet wide, averaging \$8 per ton, and has a 3½-foot shoot going \$30 per ton.

##### Jefferson County.

It is expected the Golden Sunlight group of twenty-one patented claims, 4 miles from Whitehall, will be worked again. The property was formerly owned by the American Dev. & M. Co. E. Ring of Butte, with New York, N. Y., and Chicago, O. Ill., men, has organized a company to operate them. They are experimenting to ascertain the process by which the ore can be treated to best advantage. The ore is gold and silver-bearing. The American Dev. & M. Co. built a 100-ton mill at the mines and operated it for a time.

#### NEVADA.

##### Lincoln County.

R. Yansey and W. and R. Yoeman of Manvel, Cal., report making a strike on north side of Newberry mountain, near Needles, Cal. The ledge is 4 feet in width and shows value of \$26 per ton in gold, silver and lead. It is a smelting proposition, and it is expected arrangements will be made for the smelting of the ore at Needles, Cal.

##### Lyon County.

The Bluestone copper mine near Yerington has been sold to M. J. Heller of San Francisco, Cal., and a company of New York men for \$125,000, and first payment of \$10,000 made. Development work will begin by Sept. 1st. Heller says the ore will be worked by the electro-magnetic separating process.

##### Storey County.

Virginia City reports say an agreement has been made by R. F. Morrow, D. O. Mills et al. with the Alta M. Co., by which the Alta M. Co. of lower Gold Hill will give the use of its shaft, over 2200 feet in depth, to the other mines in the vicinity for drainage and general mining purposes. The electric pumping plant being put in at the Ward shaft for drainage of the middle mines, with the similar plant in the C. & C. shaft, and the one to be installed in the Alta shaft, will mean the unwatering of the entire Comstock lode. The first installation of electric pumps was made in the C. & C. shaft for draining the following mines: Best & Belcher, Con. Virginia & California, Ophir, Mexican, Union Con., Sierra Nevada and Utah Con. The pumping plant in the Ward shaft will drain the Chollar, Potosi, Savage, Hale & Norcross, Gould & Curry, Bullion, Exchequer, Alpha. The Alta shaft pumping plant, which will be the largest of the three, will drain the Belcher, Seg. Belcher, Crown Point, Yellow Jacket, Caledonia, Challenge Con., Confidence, Imperial Con., Alta, New York and Justice. The showing made by the Caledonia mine is said to be largely the cause of the plans for extended drainage of the Comstock lode. In that mine a body of medium grade ore from the 900 to the 1200 foot level is reported being developed. The water level of most of the Gold Hill mines will correspond to the 1200-foot level of the Caledonia, which mine is worked through the Overman. The pumping plant is to be installed in the Alta, and the water will be drawn through the Caledonia, which will be connected.

#### NEW MEXICO.

##### Lincoln County.

Manager Franklin of Chicago, Ill., is at Jicarilla to start building a mill for treatment of the ores of the camp. The mill will have a capacity of 100 tons a day, but at first will treat only 50 tons per day. There is said to be enough ore on the dump to keep the mill running a year. At present there are three producing mines in the district.

##### Sierra County.

The mines and other property of the Pelican M. Co. at Hermosa has been sold at sheriff's sale to H. C. Flower of Kansas City, Mo., for \$5436.40. On the same day the pipe line and other improvements of the Hillsboro G. M. & M. Co. were sold by sheriff under a mortgage for \$4500.

##### Socorro County.

The Dry Creek G. & S. M. Co. has been organized by Dayton, Ohio, people to operate near Mogollon.

##### Taos County.

One foot of ore is reported struck on the Jayhawk mine at Red River that runs \$39 per ton in gold. The balance of the lead—5 feet—averages \$10. In consequence, work has been resumed on the Jayhawk mill and teams are hauling the ore to the mill.



NEW YORK.  
Madison County.

Gold ore is reported found near Georgetown. Samples of the ore are said to give \$6 per ton.

OREGON.  
Grant County.

The Thornburg placers, near Granite, have been sold to W. L. Vinson of Baker City and Chicago, Ill., men, for \$40,000. The capacity of the ditches will be increased and a bedrock flume put in. To do this it is estimated that about 500,000 feet of lumber will be required. This can be cut on the ground, as there is abundance of timber with a sawmill ready to do the cutting. The hydraulic giants are still cutting away the gravel banks.

The May Queen 10-stamp mill, near Granite, will be put in operation this week. The management has miners stopping ore from one of the pay shoots in the mine. The ore bins at the mill are full. There is a body of milling ore blocked out in the mine.

SOUTH DAKOTA.  
Lawrence County.

Deadwood reports say the Rossiter cyanide plant in that city has been leased by local parties for treating the 40,000 tons of tailings that in the early history of the mill came from the plant. The bank of tailings averages \$4 a ton. It is said they can be run through the mill again and a saving of \$3 a ton made.—Broken Bow, Neb., men have started development of a tract of ground in Miller's gulch, 2 miles east of Garden City, having organized the Elliptic M. Co. A shaft has reached a depth of 130 feet and it will be put down to quartzite, which will be 300 feet from surface. The company has taken over the property of the Arcade M. Co., which give it a total acreage of 1100 acres.—The Penobscot Co. has resumed shipments of ore to Denver, Colo. The ore averages \$50 a ton. A heavier air compressor has been put in at the mine.—A night shift has been put on by the Hidden Treasure Co., which is developing a large property in Deadwood gulch 4 miles west of Deadwood. The company expects to build a mill this fall. S. T. Cochran, of Lincoln, Neb., is president.—Work on the Goldstake property near Maitland is being increased. Air drills will be put in and a tunnel is being driven 1800 feet. A raise is being made to the surface. Several vertical veins of free milling ore have been crosscut by the tunnel. O. N. Pryce, of Deadwood, is manager.

Garden City reports say machinery for the Dizzy M. Co. is on the ground and will be set up at the main shaft. Work was started at the Dizzy property in June. Deadwood reports say 4000 tons of ore are sent down from Bald mountain every thirty days for the Imperial cyanide plant at Deadwood. The McGovern property, carrying cyaniding ore, has also been bought by the company. W. S. Elder of Deadwood is president of the company, and J. W. Milliken has charge of the mill.—The first test run has been made by J. Conzett with his mill east of Deadwood, near Galena. With a few changes in the mill regular operations will be resumed with a capacity of 100 tons a day. The ore is free milling, and arrangements will be made to save the tailings and concentrates, which are to be cyanided.

H. H. Francis of Custer, manager of the Dizzy M. Co. and the Omaha G. M. & M. Co., is increasing work on the latter property and preparing for work on the former. A shaft is being sunk on the ground of the Omaha Co., under contract, and is down 80 feet. They are using a whim in raising the material. A steam hoist, pump and other machinery are being placed by the Dizzy Co. and it is expected that sinking will be started in the shaft this week. The Dizzy Co. did prospecting last year with a diamond drill and the shaft is following the drill holes and intends to explore quartzite. The properties of the Dizzy and Omaha Cos. are adjoining and on False Bottom creek, 2 miles north of the Penobscot mine in Garden City district, near Deadwood. There is a large acreage in each tract and both companies are well financed and prepared for work.

The management of the Globe G. M. Co. is preparing to build a mill on its property, near Lead. It has been decided to adopt the Chili mill for pulverizing the ore and afterwards to cyanide it, says Superintendent Wade.

The Alder Creek G. M. Co. is preparing to resume operations at its mines on Yellow creek, near Kirk, south of Lead. S. F. Balliet of Des Moines, Ia., is president. It is proposed to increase the capacity of the mill and cyanide plant. The company's property adjoins that of the Wasp No. 2.

The Clover Leaf M. Co. is putting in a 350 H. P. engine at its mine at Roubaix. The company is also putting a hoist in on

the 700-foot level for continuing the shaft to 1000 feet. That will avoid interference with operation of cage in main shaft. All sixty stamps in the company's mill are dropping. New cages having double decks have been put in the shaft.

W. E. Hahn, of Deadwood, secretary and manager of the Anaconda M. Co., says arrangements are being made to reopen the company's property next month. The Anaconda ground covers 600 acres along Elk creek and extending northerly to Bear Butte creek. The principal development work on the ground consists of a shaft, 200 feet in depth, equipped with steam hoist, pump, and air compressor. The ground is crossed by a series of parallel vertical quartz ledges containing free gold and sulphides. The main shaft has been put down on one of these. It is intended to continue the shaft to 500 feet. The company owns a water right on Elk creek that controls sufficient water to supply a mill. The location is advantageous.

The Tinton Tin Co. at Tinton is running its mill and saving the concentrates for shipment. The company has 80,000 pounds of tin concentrates ready to be sent to Wales for reduction. Development work continues in the mine and additional tin ore bodies are being opened. The ore is crushed, then passed through rolls and afterward concentrated. M. H. Lyon is manager and E. St. John superintendent.

UTAH.

Summit County.

The Marsac mill at Park City, one of the landmarks of the camp, is being torn down, says the Miner. The contract let last week is for wood work alone. The masonry is under the boilers, and the two engines together with the smokestack will be handled by the company.

Tooele County.

The output of gold from the Con. Mercur mines at Mercur during the month of July is reported at \$60,000, or an increase of about \$10,000 over the June production.

WASHINGTON.

Lincoln County.

Machinery for the Turk M. Co. smelter is at Davenport and teams are hauling it to the site in Cedar canyon. It will be blown in about October 1st. The ores of Cedar canyon have thus far been hauled by wagon to Davenport and Springdale, over 30 miles distant, and then shipped by rail for treatment. Ore in that camp must assay \$40 before a profit can be made under present conditions. Consequently much of the dumps can be smelted. Low-grade properties tributary to the plant will resume work and the prospectors will open new ground. The smelter will start with a capacity of 100 tons daily, but the machinery is so arranged that other furnaces can be added at any time. The excavating has been done and the framework of the building is completed. The foundation and floors are of stone. The Turk M. Co. owns 40 acres of ground as a site for its plant and ample water is held by location. The townsite is at the site of the old town of Cedarville and is called Turk City. Manager Davis of the Turk Co. says that there are 90,000 tons of ore in the Deer Trail camp awaiting treatment, and of this his company owns 30,000 tons. The Turk mine is a mile distant from the plant and eventually a tramway will be put in to transport the ores. The company owns eight claims on which are ledges of copper, gold and silver ores. A. W. Turner of Davenport is president.

Snohomish County.

Machinery for the compressor plant of the Wilman Bros.' mine at Monte Cristo is in place, and it is expected the drill will be in operation at the Golden Chord mine this week. About 200 feet of the crosscut tunnel remains to be driven. The pack train of eight horses makes one round trip a day to the Lucky Day mine, west of Silver lake, taking down one-half a ton of high-grade ore each trip. The first shipment will be ready to go to the smelter next week.

Whatcom County.

Bellingham reports say the equipment for treating the ores of the Great Excelsior mine, near Mount Baker, is being increased so as to double the output of the mine and also increase the saving of values. The new machinery is being set up by T. Cox, superintendent at the Excelsior. Besides the fifteen stamps now in operation, which have been treating fifty tons of ore a day and saving only about 40% of the values, two new Sturtevant crushers and a Bryan roller mill are being put in. It is expected to have these in operation this week, when the mine will turn out 100 tons daily. Instead of two carloads of concentrates monthly it is expected the property will hereafter turn out five. Forty-two men are employed. A main working tunnel has been driven into the ledge.

WYOMING.

Big Horn County.

T. J. Grier, J. Blatchford, H. Schnitzel et al. of Lead, S. D., compose the Galena Ridge C. M. Co. at Kirwin. The company has obtained United States patent to 1000 acres of ground, and machinery for sinking is on the ground and work will start setting up this week. There are said to be on the company's ground five parallel veins of copper ore. They are all opened more or less at the surface, where they show promising values in copper. A tunnel has been started on the easterly side of the vein series and is being driven west, crosscutting the veins at a depth of 900 feet. On the west side of the series a shaft is being put down, and the machinery will be used there. There is said to be on the ground sufficient water to generate 10,000 H. P., which the company intends to use.

Carbon County.

The Dillon Con. M. & T. Co. has been incorporated and proposes to drive a 3500-foot tunnel, starting north of the Dillon townsite, crosscutting the formation from south to north. Such a tunnel is expected to cut at depth at least eight veins which have been opened to some extent in places, affording opportunity to prospect and develop those veins from one adit tunnel and give ample drainage to Dillon mountain. The company is stated to have bought the ground between the Ferris-Haggerty and Batchelder mines, east and west, a distance of 1 mile, the company's holdings being bounded on the north by the Pluto and on the south by the Bohemian. The tract comprises twenty-eight lode claims and 320 acres of placer and timber lands. Fifteen of the claims are patented.

FOREIGN.

AFRICA.

Transvaal.

The Transvaal Chamber of Mines at Johannesburg reports the gold output for June, 1904, of the mines which have so far restarted working amounted to 299,913 fine ounces for the Witwatersrand, being a decrease of 6673 ounces as compared with the previous month. The return for the outside districts is 8306 ounces, an increase of 412 ounces. The total for the Transvaal for the month of June is, therefore, 308,219 ounces fine gold. The following table gives the output in fine ounces for the first six months of 1904 compared with 1903:

	1904		Total.
	Rand. Ozs.	Outside. Ozs.	
January.....	278,867	9,957	288,824
February.....	282,450	7,061	289,512
March.....	299,425	8,617	308,042
April.....	297,470	8,476	305,946
May.....	306,586	7,894	314,480
June.....	299,913	8,306	308,219
Totals.....	1,764,897	50,316	1,815,213

	1903		Total.
	Rand. Ozs.	Outside. Ozs.	
January.....	192,955	6,345	199,280
February.....	187,977	8,536	196,513
March.....	208,456	9,009	217,465
April.....	218,900	8,971	227,871
May.....	224,409	9,716	234,125
June.....	228,167	10,153	238,320
July.....	242,070	9,573	251,643
August.....	262,569	9,349	271,918
September.....	267,513	8,584	276,097
October.....	275,664	8,880	284,544
November.....	272,107	7,706	279,813
December.....	278,710	7,351	286,061
Totals.....	2,859,477	104,273	2,963,750

AUSTRALIA.

New South Wales.

Sydney reports say the following minerals were exported from New South Wales during the half year ending June 30: Silver, 594,267 ounces, valued at £62,369; silver-lead bullion, 182,556 tons, valued at £885,880; copper, 5123 tons, valued at £243,392; tin, 1344 tons, valued at £156,895; coal, 1,562,168 tons, valued at £690,236. These figures show a net increased value of £141,064, as compared with the corresponding period of 1903.

A heavier winding plant is being put in by the Broken Hill South S. M. Co. at Broken Hill.

After being idle several months, the Tingha Tin Dredge Co. plant at Tingha has resumed operations. Alterations have been made increasing its capacity.

The experimental saltcake plant put up in the Broken Hill Proprietary's old leaching works at Broken Hill is reported making satisfactory runs. It is treating daily sixty tons of tailings. The recovery being made is over 90% zinc, the product ranging from 40% to 45%, while the waste, which is said to go as low as 1.7%, is worthless, except for refilling purposes. During one week 600 tons of zinc product were sent out from the Proprietary, resulting from the saltcake process of treatment.—G. D. Delprat, manager of the Broken Hill Proprietary Co. at Broken Hill, says the yearly output of the Broken

Hill Proprietary Co. is 600,000 tons of ore, averaging 16% zinc. Taking the output of the other mines along the line of lode as being about the same quantity, it appears that 200,000 tons of zinc are taken out of the Broken Hill mines yearly.

Queensland.

C. Graham, manager of the All Nations Sluicing Co. of Palmerville, is putting hydraulic equipment on the company's holdings and expects to be ready for operations by Sept. 1. The company owns 300 acres on the Palmer river, 30 miles below Maytown.

The Kangaroo Hills M. & S. Co., at Townsville, is increasing operations at the mine and the smelters have been blown in. The management expects to turn out 50% copper matte. The smelters will keep forty men at work.

Activity is reported in wolfram mining near California creek and Coolgarra, in Herberton district. Several camps, comprising from twenty to forty men each, have been formed.

Victoria.

The gold output from the mines at Bendigo during the first six months of 1904 has been 120,029 ounces.—The South New Moon Co., at Bendigo, for the half year crushed 13,199 loads for 13,606 ounces gold and paid £40,000 in dividends. To date the company has returned to shareholders £234,000. The total cost of mining the gold was £10,389, or 15s 9d per load, made up as follows: Wages, 9s 2d; mining charges, 2s 3d; firewood, 8d; pyrites treatment, 6d; management, 11d; battery treatment, 2s 2d.

Western Australia.

The gold yield of Western Australia for month of June was 200,356 ounces, showing a decrease of 7703 ounces compared with June, 1903. The yield for the first six months of 1904 was 1,178,132 ounces, a decrease of 43,626 ounces compared with 1903.

BRAZIL.

The Camaquã C. M. Co. is operating copper mines at Camaquã, 50 miles from Rio Negro station, on the Southern Brazilian Railway, and 2 miles from the Camaquã river, in the State of Rio Grande. The company is building a plant for handling 80 tons of ore daily. The concentrates will be smelted to a 50% copper matte. Water power will run the plant. The present monthly output of the mine is 100 tons of ore assaying 28% copper. This is sacked and shipped to England. The ore is said to contain no lead, arsenic or zinc. As it comes from the mine the ore is dumped onto a grizzly and then a 1-inch mesh perforated plate. Water is sprayed on the mineral and it is hand sorted. The picked rich ore assays 30% copper. The barren rock goes to the waste dump, while the remainder—averaging 7% copper—is put through a small mill equipped with breaker, rolls, trommels, hand jigs and round buddles. The concentrated product assays 28% copper. The ledges are intruded into sandstone and conglomerate beds, but the best values are obtained where the lodes occur in the hard conglomerate, as in the softer rock they lack regularity and continuity. An upper adit driven 520 feet northeasterly cuts a gabro dike which is not seen on the surface. The veins are said to diverge from this dike. Of the four veins being worked, three are cut by two tunnels 200 and 380 feet, respectively, below the summit of the hill. The fourth is opened by a drift just below the outcrop, and carries chalcopryite in a quartz and heavy spar gangue. The other three carry copper glance near the surface and bornite, chalcopryite and pyrite lower down. The lower adit has been driven 780 feet and has cut three veins showing only copper glance. It will be continued to 3300 feet to open other lodes which outcrop at the surface.

BRITISH COLUMBIA.

East Kootenay District.

It is reported that the run at the St. Eugene concentrator at Moyie for the month ending July 31st handled 3000 tons, or an average of 100 tons a day. Several days were lost in putting the new rope on the aerial tram. The body of ore opened up in No. 1 tunnel is showing well in size and values. The ore runs 50% lead and 40 ounces silver. Work is progressing in the shaft. The tunnel at the 125-foot level is in 900 feet and they are drifting on the ore body, which is 7 feet in width. Drifting is being done on other cross veins. There are 300 men employed.

The Grace Dore group of mines on Wild Horse creek, 3 miles from Fort Steele, is owned by R. Dore. Development work consists of a tunnel, which is showing a ledge 5 feet in width and carries values in nickel. A shaft is down 30 feet in ore. The vein is a contact. Assay returns are said to give 9% to 14% nickel, with values in cobalt. Another ledge, 10 feet in



width, parallels the nickel lead, and is said to carry values in silver.

#### Nelson District.

The Chapleau group on Lemon creek, near Nelson, together with a 10-stamp mill, aerial tramway and a mining plant, will be taken over by F. Stock et al. of Nelson, who have a lease on the property from the Chapleau M. Co., Ltd., subject to an option to buy for \$50,000. The 10-stamp mill has concentrating tables, electric lights and is operated by water power. Considerable development work has been done on the mine.

The monthly production of ore from the mines around Ymir is estimated, says the Rossland Miner, as follows:

	Tons.
Ymir (50 stamps).....	4,500
Hunter V.....	1,500
Wilcox.....	500
Queen.....	500
Second Relief.....	500
Arlington.....	100
Total.....	7,600

Work is being resumed on the Copper Farm mine, near Green City, on the North Fork of the Salmon river. G. Green, owner, says he intends putting in a small stamp mill near the townsite.

Operations at the Hunter V. mine at Ymir are proceeding smoothly and the output is being increased. The output is being drawn entirely from the Hunter V. itself, and is first handled by the auxiliary tram from the upper workings to the terminal at the main tram. This tram was built by the company and was intended to handle fifty tons per day. It has, however, already handled sixty-five tons per day without being overtaxed. The system of mining being used in the glory hole on the Hunter V. is economical, and satisfactory results are obtained with a small amount of drilling. One 13-foot hole (driven by hand) after being sprung five times was finally loaded with 100 sticks of powder. The result was over 300 tons of rock broken down.

Ten stamps are dropping steadily at the Second Relief mine, near Ymir. Twenty men are working at mine and mill.—The B. C. Standard Co. has acquired 500 inches of water on Porcupine creek for supplying power to the Hunter V. mine at Ymir.

#### Rossland District.

Shipments of concentrates are being made from the War Eagle-Center Star mill at Rossland to the Trail smelter. As yet the shipments have been small and intended, in a sense, as experiments. The cyanide section will also be in operation this week.—The White Bear works will be in operation before September 1st so far as straight water concentration is concerned. The Elmore process machinery is not yet delivered. All the plant required for water concentration is on hand.

#### West Kootenay District.

In the Lardau, development on Rapid creek is proving values in the ground. The Broken Hill Co., Ltd., of Spokane, Wash., which bought the Broken Hill and Combine claims last spring, has been prospecting the surface of the claims and has uncovered veins cutting the formation with values in gold, says Manager Potter. Assays from the arsenical iron run high. The company intends to put in machinery.—C. T. Potter has an option on the Bow Bells and Albion mines, near Ferguson, both of which show free gold.

Butte, Mont., men, including W. Scallion, J. Gillie, C. W. Goodale, C. F. Booth et al., have organized the Bayonne G. M. Co., Ltd., and have bought the Bayonne group of mines in the Goat river mining division, 20 miles north of the international boundary line and 25 miles west of Kootenay river. They are reached by a rough mountain trail from the river. The company will build a wagon road from the river to the mines. The working force at the mines is in charge of H. W. Heague. The upper tunnel is in 600 feet, showing 31 feet of ore with gold and silver values. A second tunnel 500 feet lower is in 850 feet, showing 4 feet of sulphide ore. A stamp mill will be built.

The district from Howser lake to the headwaters of the Duncan, in the Lardau, is being developed. Manager Miller of Vancouver has gone to Trout lake to carry out the plans of the Con. M. & S. Co. of B. C. The company has control of the Primrose, Old Gold and Mountain Lion groups, near Trout lake, shipments from which have given returns of \$80 a ton. An electric railway is to be put in to take out the ores of the Old Gold basin and the company proposes to put in reduction works if necessary.

#### Yale District.

The Mount Baker & Yale M. Co. of Whatcom, Wash., expects to have its 10-stamp mill in operation by September 15. The framework for the stamps is up and ready for installation of the machinery, which is on the ground. Men have been kept developing the property and ore is being uncovered. It is near Yale.—The

International G. M. Co., whose lead is a continuation of the Mount Baker & Yale's, is putting in machinery. The saw mill is completed and is cutting lumber. The International is also opening up ore.

### CANADA.

#### Yukon Territory.

White Horse reports say J. Irving, owner of the Arctic Chief copper mine, has put men to work on a drift to determine the extent of the copper-bearing ore body. If satisfactory, he will put in machinery this fall.

The report of the Geological Survey of Canada for the past year shows that since 1896 over \$97,000,000 of gold has been shipped out of the Canadian Yukon. The production of precious metals in that district amounted to only a few hundred thousand dollars' worth eight years ago. In 1900 it went to \$22,000,000, but since that year it has steadily declined until last year the production amounted to \$12,250,000. It is stated that practically all this gold has been taken out of claims in about half a dozen creeks in the Klondike district, and the decreasing production is largely attributed to the exhaustion of the best deposits. Although the production is apparently decreasing, it is shown, on the other hand, that mining activity in the Yukon is increasing. Machinery is being introduced for mining operations, with the result that many abandoned claims and low-grade gravels are being worked.

### MEXICO.

#### Chihuahua.

N. O. Bagge of Los Angeles, Cal., has bought the Central y Annexas and the Ampliación (increase of claims) of the Little Emma mine in the Sierra Almoleya district, between Jimenez and Parral, for \$100,000. D. W. Shanks is manager and will start work this week. The properties are in northeast end of the Cerro Almoleya. The surface indications show carbonates of lead. Bagge is developing properties in the same camp for the Almoleya M. Co. of Los Angeles, Cal., in which he is principal owner. The work of the company will be increased and an electric power plant is to be built at Dorado station, on the Parral branch of the Mexican Central, and from this the power will be transmitted to the workings in the mines on the mountains, 5 miles away.

J. W. Malcolmson says the main producers in Santa Eulalia camp, 15 miles from Chihuahua, are the Potosi mine, and the Santo Domingo mine of the Chihuahua M. Co. These two mines produce 8000 tons monthly of low-grade lead ore, which are tied up on a large tonnage contract for at least four years more. The Santa Eulalia M. Co. has ceased production. The mines leased by the American S. & R. Co. for a term of years are the Mina Vieja, Dolores and Old Santo Domingo, producing 4500 tons of ore monthly. The Buena Tierra mine is producing 1000 to 1500 tons of ore monthly, shipped under contract to the American S. & R. Co., through the latter company's shaft. The San Antonio mine carries reserves of ore assaying 350 grams silver, 15% lead, 20% silica, 18% iron and 10% lime. It belongs to the American S. & R. Co. and is at present shut down. The monthly output of the camp is summarized as follows:

	Tons.
Potosi.....	6,500
Chihuahua M. Co.....	1,500
American S. & R. Co.....	4,500
Buena Tierra.....	1,500
Parionera.....	900
Prieto Estate.....	500
Other shippers.....	300
Total.....	15,700

F. Collinson, of Clarendon, Tex., owner of the Kansas Boy mine in Santa Eulalia camp, says he has arranged for resuming work on that property. The work is to be done in two places on the mine. The new shaft, down 130 feet, will be continued and the old Mexican workings will be cleaned out and continued.

#### Coahuila.

Sierra Mojada camp is reported producing about 8500 tons per month, divided among the companies as follows: American S. & R. Co., 6050 tons; Cia Metalurgica, 1350 tons; Esperanza M. Co., 50 tons; other shippers, 500 tons. The American S. & R. Co. owns the Volcan, Dolores and San Jose mines and operates the Fronteriza mine under lease. The Cia. Metalurgica Mexicana operates the Veta Rica and Esmeralda mines. The Constancia Co. operates the Tiro Once and receives royalties from several other mines. The Esperanza Co. operates the Fortuna mine. The Fronteriza Co. owns the Fronteriza and receives 250 tons monthly as a royalty.

#### Jalisco.

The Keystone C. S. Co., owning nine mines in La Palma district, west of Tlalpa, has centered its operations on La Mexicana, and has opened it up by a

crosscut tunnel 140 meters long. The concentrating mill consists of a Dodge rock breaker, one 14x27 and one 12x20 crushing rolls, three concentrating tables, etc. Reduction is accomplished in a reverberatory matting furnace burning wood. A. L. Walters is manager.

#### Lower California.

El Boleo C. Co., operating El Boleo copper mines near Santa Rosalia, owned by the Rothschilds of Paris, in its report for the calendar year 1903 shows a production of 10,480 metric tons of copper, a decrease of 473 tons from 1902. The decrease is attributed to shortage of labor. Average recovery from all ore treated is given as 4.56% copper, an improvement over 1902. The stock of matte and black copper on hand at end of year was valued at \$649,786. The water-carrying system was completed from Santa Agueda to Santa Rosalia, being 16,074 meters long. An average of about 1500 men were on the payroll.

Guaymas reports say that of the 500 Japanese lately arrived at El Boleo copper mines at Santa Rosalia, opposite Guaymas, only sixty have gone to work in accordance with the terms of the contract under which they were engaged. The others have refused to work on those conditions. El Boleo copper mines are owned by a French company in which the Paris Rothschilds are principal owners. The company is said to have spent a large amount of money in the advance made to laborers and for payment of transportation from Japan to Mexico.

#### Oaxaca.

The New Orleans M., M. & D. Co. has been organized to operate on the New Orleans, Louisiana, Emilda and other mines, in El Pairian and Nochistlan mining districts. T. W. Carey, Jr., is president and G. W. Sumner, of Oaxaca, manager and director.

C. Cadmus et al. have organized in New Orleans, La., the New Orleans M., M. & D. Co. to erect a mill to work ores in Oaxaca. The incorporators are J. A. Abshire, T. W. Carey Jr., K. V. Richard and O. C. Snell of New Orleans, La., G. W. Sumner of Oaxaca and C. Cadmus of Mexico City.

#### San Luis Potosi.

At his El Mesquit mine, near San Luis Potosi, O. B. Hardy proposes putting up a 50-ton smelting furnace.

#### Sinaloa.

At La Dura mine, near Casala, F. Aragon, owner, says he is preparing to put in a plant of mining machinery.

#### Sonora.

At Campo Hays in the Pinito mountains, the Hays Con. M., M. & L. Co.'s 20-stamp mill will be put in operation by Sept. 1st, under supervision of G. Watts of Nogales, Ariz., and a larger number of men will be employed by Manager Henley.

#### Zacatecas.

B. C. Wheeler will put in a cyanide plant at Sombereite, where he is operating La Noria and San Bartolo mines under lease and bond. He has been treating the ores by amalgamation process, but recent test runs under the cyanide process are reported having been successful.

### VENEZUELA.

According to a contract published at Maracaibo, writes U. S. Consul E. H. Plumacher, the government of Venezuela grants to A. Espina the right to exploit four asphalt mines, three in the district of Perija and one in district of Maracaibo. The government is to receive 25% of the net proceeds. The contract is to run for twenty-five years from the day that a railroad is built.

## Personal.

J. H. MACKENZIE is in Rossland, B. C., from San Francisco, Cal.

T. H. SCHIEMAN has taken charge of the Summit View mine, Felix, Cal.

J. W. BROCK, a mine owner of Tonopah, Nev., is in San Francisco, Cal.

C. E. JOHNSON, a mine manager of Yreka, Cal., is in San Francisco, Cal.

J. S. MCBRIDE, a mine owner of North San Juan, Cal., is in San Francisco, Cal.

W. S. HUPP, JR., of Weaverville, Cal., is in San Francisco, Cal., on mining business.

J. F. KELLEY now has charge of the West Gold Hill M. & M. Co., Gunnison, Colo.

R. MCCLOSKEY is superintendent of the East Griffith mine, near Georgetown, Colo.

E. ST. JOHN, superintendent of the Tin-

ton Tin Co., at Tinton, S. D., is in the East.

ROBERT HARRISON of Peterborough, Canada, has returned there from Silverton, Colo.

J. GEO. LEYNER has returned to Denver, Colo., from a business visit to Georgetown, Colo.

E. J. LANDERS, a mine owner of Sonora, Tuolumne county, Cal., is in San Francisco, Cal.

F. L. RANSOME, in charge of the U. S. Geological Survey party in Idaho, is in Wallace, Idaho.

F. L. MINER is mine superintendent of the St. Paul M. Co., operating near Georgetown, Colo.

S. A. MOSS of Montpelier, Vt., interested in northern California mines, is in San Francisco, Cal.

A. J. McMILLAN, managing director of Le Roi mine, Rossland, B. C., has returned from London.

ALBERT L. WATERS has left Mexico on vacation and will be at Spring Lake, Mich., until October.

S. I. HALLET, formerly identified with the Smuggler mines at Aspen, Colo., is in Salt Lake City, Utah.

LOUIS RUHL is now assistant secretary of the Roessler & Hasslacher Chemical Co. of New York City.

N. O. BAGGE, of Los Angeles, Cal., is examining mining interests at Sierra Almoleya, Chihuahua, Mex.

S. V. TRENT has returned to Salt Lake City, Utah, from Silverton, Colo., where he arranged to build a mill.

J. M. SHERRERD of the Taylor Iron & Steel Co., Hightbridge, N. J., is visiting the Lake Superior country.

F. L. BOSQUI of San Francisco, Cal., is at the Gold Roads mine at Acme, Ariz., on a short professional trip.

MARK MANLEY, manager of the Enterprise and Yellowstone mines, Trinity county, Cal., is in Boston, Mass.

H. K. WHEELER of Los Angeles, Cal., and V. C. Osment of San Francisco, Cal., have returned from Dayton, Nev.

G. WATTS of Nogales, Ariz., is mill superintendent of the Hays Con. M. & M. Co. at Campo Hays, Sonora, Mex.

E. HEARTT has resigned as superintendent of the National G. & S. M. Co. at Stein's Pass, Grant county, N. Mex.

F. W. HOAR, former superintendent of the Old Dominion mine, Globe, Ariz., will open a mining office in El Paso, Tex.

W. H. BREVORT of New York City, N. Y., interested in California gold and silver mines, is in San Francisco, Cal.

ROSCOE CORNELL has been appointed manager of the branch office which the Allis-Chalmers Co. has opened in El Paso, Texas.

R. GUENTHER is superintendent of the National G. & S. M. Co. at Stein's Pass, Grant county, N. Mex., vice E. Heartt, resigned.

R. C. REESE, manager and part owner of the Dixie Meadows mine, near Prairie City, Or., returned there last week after a visit East.

D. W. SHANKS, manager of the Almoleya M. Co., at Sierra Almoleya, Chihuahua, Mex., has returned there from Los Angeles, Cal.

RALPH NICHOLS, manager of the Great Boulder Perseverance G. M. Co., Ltd., is in London, Eng., from Kalgoolie, Western Australia.

F. COLLINSON, owner of the Kansas Boy mine at Santa Eulalia, Chihuahua, Mex., returned to Clarendon, Tex., last week from the mine.

SUPERINTENDENT ALEXANDER, of the Cochise Con., is about to transfer his headquarters from El Paso, Tex., to Douglas, Ariz.

G. A. DUNCAN, manager of the Gilt Edge-Maid G. M. Co., near Galena, S. D., has returned from a business trip to Denver, Colo.

W. H. BRULE is superintendent of the concentrator of the North American C. Co. at Grand Encampment, Wyo., vice R. B. Lamb, resigned.

T. H. TULLOCH of Washington, D. C., is inspecting the Sevier Co.'s mines on Gold Mountain, Piute county, Utah, in which he is interested.

W. H. WOODHEAD has returned from London to resume his former position as manager at the British Broken Hill mine at Broken Hill, N. S. W.

G. W. WILKENS, mine superintendent



of the Goldstake, returned to the mine near Maitland, near Deadwood, S. D., last week from Denver, Colo.

M. L. MACDONALD, W. W. AND C. P. MORRIS of Butte, Mont., are visiting the Montana-Tonopah mines at Tonopah, Nev., in which they are interested.

W. G. PHIPPS has resigned as superintendent of the Shady Run M. Co. and has taken charge of the John Royal gold mine near Columbia, Tuolumne county, Cal.

THOMAS GRAHAM, for a number of years connected with the Helen M. Co., Graham, N. M., is manager of the Highland Mary mine, at Howardsville, near Silverton, Colo.

F. M. SKIFF has resigned as superintendent of the Bon Air mine, near Leadville, Colo., to become manager of the Grand Trunk group at Holy Cross, near Red Cliff, Eagle county, Colo.

R. B. LAMB has resigned as superintendent of the concentrator of the North American C. Co. at Grand Encampment, Wyo., and has gone to Ballarat, Victoria, Australia, on mining business.

WM. H. ARMSTRONG, formerly manager of the Chicago Pneumatic Tool Co., now has charge of the pneumatic tool department of the Ingersoll-Sergeant Drill Co., 26 Cortlandt St., New York.

L. D. SIVYER of Los Angeles, Cal., having recently been in the Ures mining district of Sonora, Mex., and the Oak Flat district, Tuolumne county, Cal., is in San Francisco, Cal., on professional business. Mr. Sivyver will visit Virginia City and Aurora, Nev., before returning to Los Angeles, Cal.

PROFESSOR H. S. MONROE of Columbia University at New York City, has returned to the joint summer school of mining of which he was in charge at Georgetown, Clear Creek county, Colo. The students were from Harvard, Yale, the Massachusetts Institute of Technology and Colorado School of Mines.

Obituary.

P. C. WEBER, a mine owner and manager of Ely, Nev., died at Ely on the 1st inst., aged 58 years. Deceased was born in Brooklyn, N. Y., going from there to Nevada in 1875.

C. A. SCHENK, a civil engineer of Berkeley, Cal., died on the 4th inst. Deceased was 68 years of age and a native of Germany. He graduated from Freiburg University, in Saxony, and was formerly Professor of Mineralogy of the Imperial College of Japan.

D. E. COUGHANOUR, a pioneer of Boise basin, Idaho, died on the 2nd inst. at Quartzburg, Idaho. Deceased was born in Fayette county, Pennsylvania, in 1824. He went to California in 1852, where he engaged in placer mining, and then to Centerville, Idaho, in 1863. He bought the Gold Hill mine at Quartzburg in 1869. He also owned and worked other mines in that section—the Iowa group and mines on Canyon creek.

Commercial Paragraphs.

THE Stromberg-Carlson Telephone Manufacturing Co., manufacturers of mine telephone apparatus, Chicago, have recently sold nine apparatus and other supplies to the Cambria Fuel Co., Cambria, Wyo., who are successors to the Cambria M. Co.

E. A. RIX, of the Rix Compressed Air & Drill Co. of San Francisco, Cal., has arranged for the manufacture and sale of the Torpedo rock drill. The company owning this drill will introduce it in Europe and America, with the exception of the Pacific coast, which territory will still be retained by the Rix Compressed Air & Drill Co.

THE C. O. Bartlett & Snow Co., Cleveland, Ohio, report orders from the city of Winnipeg, Manitoba, for one four-compartment, direct-heat rotary dryer, capacity 100 tons of sand per day; the Silver Cup Mines, Ltd., Ferguson, B. C., one single-cylinder, direct-heat rotary dryer, using waste heat from ore roasters, capacity fifty tons of slimes a day; James Kirk & Co., Chicago, Ill., one steam dryer; Washington Carbon Co., for a complete outfit, conveying and elevating machinery for their new plant at Wellsville, W. Va.; the Semi-Steel Co., Cleveland, Ohio, elevating and conveying machinery for large brick plant to be erected at St. Paul, Minn.

Books Received.

"Types and Details of Bridge Construction," is the title of a handsomely illustrated volume of 294 pages, by Frank W. Skinner, M. Am. Soc. C. E. The work treats of the most modern practice of bridge and truss construction, showing what types are best suited for particular purposes. It deals with structures of wood, iron and steel, spandrel-braced arches, arch trusses and plate-girder arches, giving numerous illustrated examples of successful construction. It is a book valuable to the civil engineer. Price, \$3. The McGraw Publishing Co., 114 Liberty street, New York City.

"The Baraboo Iron-Bearing District of Wisconsin," being bulletin No. XIII of the Wisconsin geological survey, by S. Weidman, geologist. This volume describes in an interesting manner the occurrence of important iron deposits in that State, dealing largely with the geology and economic aspect of these deposits. The ore bodies are of pre-Cambrian age, the deposits being discovered by means of churn and diamond drilling through sandstone and drift. The work is profusely illustrated. It will be sent to those interested on application to the director of the geological survey, Madison, Wis.; 10 cents paper cover, 20 cents cloth.

Trade Treatises.

"Gas for Power and Fuel" is the subject of a monograph from R. D. Wood & Co., Philadelphia, Pa.

An excellent description of the Kimpen crusher, finely illustrated, is sent by the Kimpen Crusher & Pulverizer Co., suite 1102, 100 Washington St., Chicago, Ill.

"Concrete Construction," published by Bruce & Johnston, 42 Broadway, New York, furnishes further convincing argument for the use by engineers of that artificial stone in many forms of structural work.

"High Grade Pumping Machinery" is the subject of the latest catalogue issued by the Krogh Manufacturing Co. of San Francisco, Cal., and is fully illustrated with cuts of direct-driven by both steam and electricity and belt-driven centrifugal pumps; also sand, gravel and hydraulic dredging pumps. The Krogh gravel mill for disintegrating gold-bearing cement gravels is also the subject of a separate illustrated treatise from the Krogh Manufacturing Co.

Latest Market Reports.

SAN FRANCISCO, August 19, 1904.

METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 57½c, refined (1000 fine); San Francisco, 57½c; Mexican dollars, 47½c San Francisco, 45½c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.62½; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £57 2s 6d spot per ton.

LEAD.—New York, \$4.20; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 16s 3d long ton.

SPELTER.—New York, \$4.85; St. Louis, \$4.75; London, £22 10s per ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$26.75@27.00; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, \$30@32½c. London, £121 10s spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 17s 6d San Francisco, local, \$41.50@43.00 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.00@42.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic; chemically pure, \$3.10, 50c; dust, \$3.10; sulphate, \$3.10, .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.85 @13.20; gray forge, \$12.00; San Fran-

cisco, bar, 3c per lb., 3½c in small quantities. STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer .....	\$14 75@15 00
Foundry Northern 1.....	13 75@14 00
Northern 2.....	13 25@13 50
Northern 3.....	12 75@13 00
Southern 1.....	13 40@13 65
Southern 2.....	12 90@13 15
Southern 3.....	12 40@12 65
Forge .....	11 65@11 90
Charcoal .....	14 50@15 00
Billets, Bessemer.....	23 00@24 00
Bars, iron .....	1 35@1 40
Bars, steel.....	1 51@1 51
Bars, standard.....	28 00@28 00
Rails, light .....	23 00@25 00
Plates, boiler .....	1 91@2 01
Tank .....	1 76@1 81
Sheets, 27 store .....	2 26@2 31
Angles .....	1 76@
Beams .....	1 76@
Tees .....	1 81@
Zees .....	1 81@
Channels .....	1 76@
No. 1 railroad wrought.....	10 75@11 25
No. 1 cast, net ton.....	10 00@10 50
Iron rails.....	14 50@15 00
Car wheels.....	11 00@11 50
Cast borings.....	3 75@4 00
Turnings .....	6 50@7 00

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, 4c per lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, 4c, per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for car-load lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 22@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, \$2.00@2.25; California refined, 1¼@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66° B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

OILS.—Linseed, boiled, bbl, 57c; cs., 62c; raw, bbl, 55c; cs., 60c; Lucol oil boiled, bbl, 50c; cs., 55c; raw, bbl, 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c;

Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

CHROMIUM.—Best, \$2.00 per lb.

CHROMIUM.—90% and over, per lb., 80c.

PHOSPHORUS.—American, per lb., 70c.

SILVER.—Chloride, per oz., 90c@91.00; nitrate, 55c.

MERCURY.—Bichloride, per lb., 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—per lb., \$2.75.

SODIUM.—Metal, per lb., 50c.

BISMUTH.—Subnitrate, per lb., \$2.10.

URANIUM.—Oxide, per lb., \$3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 380 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING AUGUST 9, 1904.

- 767,130.—SAW SET—R. Addison, Pasadena, Cal.
- 767,257.—STEP LADDER—G. L. Banks, Santa Ana, Cal.
- 766,926.—VEHICLE WHEEL—C. N. Beal, S. F.
- 766,936.—HAIR RESTORATIVE—V. F. Beede, Stockton, Cal.
- 767,086.—TOOL HOLDER—H. W. Borchers, Portland, Or.
- 767,139.—BOOK SUPPORTER—L. C. De Carl, San Jose, Cal.
- 767,211.—PRESERVING EGGS—N. J. Dobbins, Los Angeles, Cal.
- 767,331.—CIGAR MACHINE—C. L. Driever, S. F.
- 766,994.—REFRIGERATOR—B. S. Fryar, Sumner, Wash.
- 767,054.—BRICKS—H. M. Hanmore, Los Angeles, Cal.
- 766,945.—TELEPHONE—H. I. Hauxhurst, East Oakland, Cal.
- 767,151.—BED OR COUCH—J. Hoey, S. F.
- 767,276.—AMALGAMATOR—F. J. Hoyt, Redlands, Cal.
- 767,341.—WINDOW GLASS—C. J. Hurrie, Stockton, Cal.
- 767,344.—PARING HOOPS—W. G. Jackson, S. F.
- 767,155.—DISPLAY CARD—L. Lemos, S. F.
- 767,364.—BEER DRAWING MACHINE—A. L. Malone, S. F.
- 766,889.—WATER HEATER—J. M. McCartney, S. F.
- 766,964.—WATER HEATER—J. M. McCartney, Glen Ellen, Cal.
- 767,005.—SHOE LACING—J. A. McCoy, Sissons, Cal.
- 767,162.—TRANSPORTING APPARATUS—G. W. McNear, Jr., Oakland, Cal.
- 767,305.—HONEY EXTRACTOR—C. W. Metcalf, San Diego, Cal.
- 767,009.—GOLD DREDGER—O. B. Perry, S. F.
- 767,010.—VEHICLE AXLE—P. C. Peterson, Geyserville, Cal.
- 767,121.—VENDING MACHINE—T. R. Priebe, Reno, Wash.
- 767,124.—HYGIENIC BATH—C. P. Randolph, Los Angeles, Cal.
- 767,247.—PEDAL—H. C. Ross, Piru, Cal.
- 767,015.—THERAPEUTIC MACHINE—H. A. Slaughter, Los Angeles, Cal.
- 767,127.—AUTOMOBILE—A. C. Stewart, Los Angeles, Cal.
- 767,021.—CAMERA—Swartz & Martin, Junction City, Or.
- 767,255.—DRAG SAW—J. T. Tuisku, Everett, Wash.
- 767,092.—PUMP—Walker, Mottern & Gould, Rockford, Wash.
- 767,057.—AIR COMPRESSOR—M. C. Wilkinson, Los Angeles, Cal.
- 767,023.—MOTOR—P. K. Wood, Los Angeles, Cal.
- 766,861.—HAMMER—W. W. Word, Soulsbyville, Cal.
- 766,862.—OIL BURNER—J. A. Young, Los Angeles, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

BEDS OR COUCHS.—No. 767,151. Aug. 9, 1904. John Hoey, San Francisco, Cal. This invention relates to improvements in bed and couch construction. It consists in a novel construction of the mattress frame with a means for counteracting and resisting the tension of the mattress upon the upper part of the frame, to which it is attached, and compensation is provided by means of end frames fulcrumed to the side bars so that while the mattress is stretched from the upper part of said frames suitable tie rods connect the lower parts, and these rods may be tightened from time to time so as to maintain the mattress in the proper state of tension. The construction of these frames also enables the mattress to be made as high as may be desired with relation to the bedstead and its frame.

VEHICLE AXLE.—No. 767,010. Aug. 9, 1904. Peter C. Peterson, Geyserville, Cal. This invention relates to improvements in vehicle axles, and it consists in devices by which the axle is made resilient independent of its connections with the vehicle body.

BOOK SUPPORTER.—No. 767,139. Aug. 9, 1904. L. C. De Carl, San Jose, Cal. This invention consists of a device fitted to and slidable upon a track which is attached to the shelf in proper relation to the books, said device being mounted and projecting so that it may be slidable lengthwise of the shelf and brought to such position that the projecting portion will serve as a support for the books contiguous to it, so that in case of considerable vacant spaces the books would be prevented from falling.



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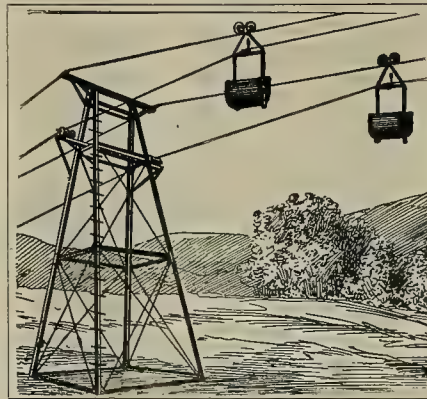
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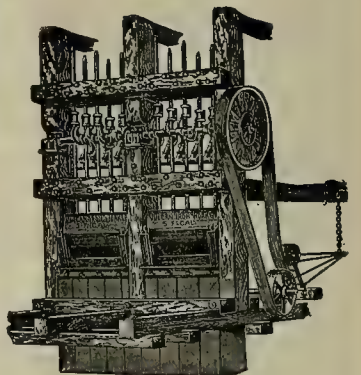
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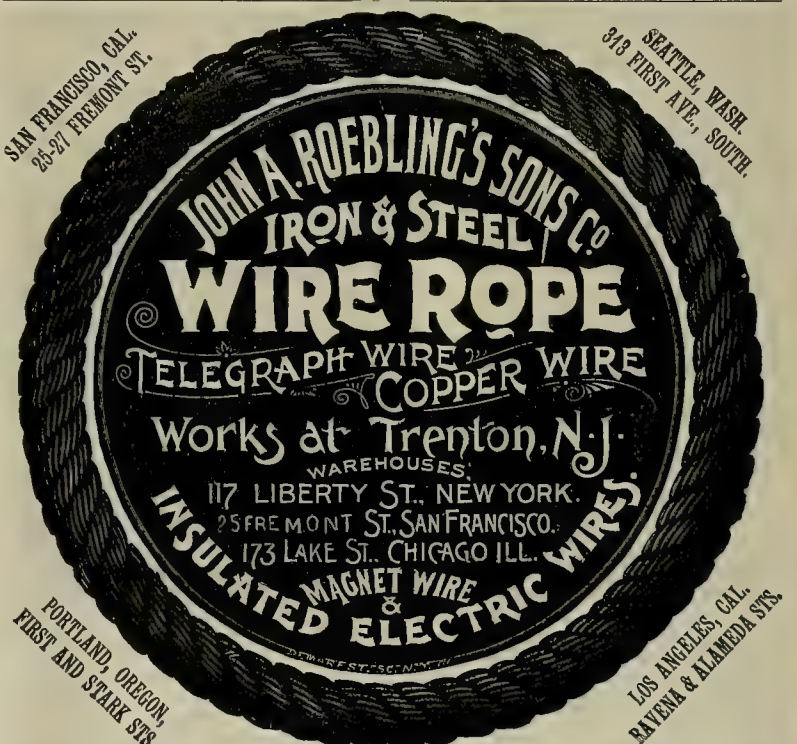
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## Practical Geology.

Some important discoveries of iron ore have recently been made near Kimberly, Minnesota, through the result of correlating the geological formations of the district with those of the Mesabi range. Something similar had been attempted in connection with the Baraboo (Wisconsin) district with success. This indicates the value of careful geological exploration. When geological conditions exist which are recognized as favorable to the occurrence of mineral deposits or veins, the district should be thoroughly explored. What conditions may be considered as "favorable indications" may be answered in a general way by saying any conditions similar to those known elsewhere as accompanying valuable mineral deposits may be considered as favorable for a like occurrence at any other place. The occurrence of quartz veins in a schistose or slaty formation may be looked upon as favorable to the occurrence of payable veins of gold, silver, lead, etc. Any region in which sedimentary rocks—limestones, sandstones, shales and quartzites—are uplifted by intrusive rocks and intersected by dikes, is a good region to prospect for beds of ore, contact veins and irregular deposits. Leadville, Colo., is such a district; so also is Aspen, Colo., the Terry's Peak region of the Black Hills and at Eureka, Nev. The copper deposits of Bisbee and Globe, Ariz., and those of Cananea, Mexico, occur under these conditions, and many other similar instances might be mentioned. Any country in which the rocks are much disturbed, fissured, broken and folded and intruded by dikes should be searched for mineral; so also should places where there is evidence of much mineralization—the occurrence of iron-stained dikes, veins and masses. These usually denote the presence of ore in greater or less amount. However, mineral regions are not always greatly disturbed, for ore is often found in sedimentary beds, like limestones and quartzites, shales, etc., which are lying apparently in almost normal position. The sandstones and shales of Silver Reef, Utah, are good



Silver Ledge Mine and Mill of the San Juan Mining & Leasing Co., Near Silverton, Colo.—(See Page 146.)

examples of this fact. There the rocks were found to contain payable values in silver—chloride and native silver principally—while little disturbed or fractured. Many of the telluride gold deposits of the Terry Peak region of South Dakota lie almost horizontal, apparently little disturbed; still, in the latter instance, the intrusive dikes and the injected sheets of a laccolith are also present.

There are some regions where the amount of quartz is small, but still the rocks are fissured and the veins

are gold bearing. Examples of this sort are found in the Western Australia gold fields. In some instances the zone of mineral bearing ground is so wide as to at first escape identification as a vein. The miner is usually in search of a defined deposit or a vein with walls, but in these large masses the absence of clearly defined walls, within, what seems to him reasonable proximity, may lead him to overlook a great mine. The Treadwell mines\* of Alaska are something of this sort. In the northern end of the Cargo Muchacho mountains of San Diego county, Cal., large masses of siliceous hornblende schist carry payable gold values. These deposits do not show well defined walls, and can scarcely be detected from the normal country rock, excepting for a faint copper stain (malachite) occasionally seen, though this indication is more in evidence below than at the surface. There is a remarkable lack of "mineralization" of the sort the miner searches for in these deposits.

Dikes are sometimes gold bearing, though occasionally showing no evidence of it in stains of iron. It is not uncommon to find a vein much mineralized and oxidized by weathering, carrying a good grade of silver at the surface, but in depth becoming comparatively low grade, and developing values in copper which do not appear at the surface at all. Of this character are some of the veins of the Lava Beds district in San Bernardino county, Cal. There are regions in which large portions of the formation are essentially the same—a fine grained mica schist, for instance, stained red from finely disseminated hematite. In this broad zone occur certain smaller, though large, zones of pay rock. There are instances of this kind where iron stained schists run in belts a mile or two broad in which may occur a dozen or more comparatively small zones of pay rock with more or less massive quartz. The Homestake mines of South Dakota are something of this character.

Beside these might be mentioned many other interesting occurrences, but enough have been cited to indicate the great variety of geological conditions under which mineral veins occur, and whenever conditions are found resembling those of another district, whether near or far, then prospecting should be carefully done.



Cunningham Gulch and Green Mountain Mine, near Howardsville, Colo.—(See Page 145.)



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## Discovery the Stimulus of Mining.

Within the past four years unusual activity has characterized the mining industry in southern Nevada, and it is extending over into California and Arizona, the circle of discovery and achievement constantly widening. The beginning of this reawakening in southern Nevada—for that section had experienced mining booms prior to this—dates back to the discovery of Tonopah. The development of the rich ores of that camp soon resulted in building a good-sized town on the gentle slopes at the foot of Mount Oddie. A new center of industry was established from which the prospector could carry on his search. Other veins and districts were discovered—Klondyke, Gold Mountain and Goldfields, Hanapah and others, around each of which a village has quickly sprung up in the sagebrush covered, sandy valleys. Each newly established camp renders the work of the prospector, that of extension of the known mineral field, easier. Eldorado canyon, Hiko, Logan and Good Springs were lively camps years before the discovery of Tonopah, so long since that they have been nearly forgotten by the old timers, and are almost unknown to the new ones in the field. Resting Springs in California, just over the line from Nevada, in this same desert region, was also an active camp forty years ago. Throughout the vast desert region of the Southwest, covering over 60,000 square miles, a renewed activity in mining is noticeable, which is being stimulated by the almost daily reports of new discoveries, and by the construction of railroads, which will solve to a great extent the two vexed problems of that arid region—transportation and water. The railroads usually supply the prospector with water without charge, that he may the more readily carry on his

work of pioneering, and thus develop the mineral resources of the country which otherwise would remain for many years untouched, as they have in the past. The wisdom of this policy on the part of the railroads is at once apparent, for the discovery and development of a single good mine, to say nothing of the opening of a new district, will be a source of profitable revenue to them far exceeding the expense of supplying these searchers of the desert with a few hundred gallons of water. The railroads will aid the development of the country in a way that can be accomplished in no other manner. It has been the history of other mining regions, and it can not fail to be true of the great deserts of the Southwest.

## Actual Discovery Necessary.

The mining law of the United States requires an actual discovery of ore or mineral-bearing rock in place as a prerequisite to the making and filing of a location on the public lands. In some instances this works a great hardship upon the prospector, and it seems desirable that a change be made in this law. Among the instances where a bona fide discovery is impossible without months of time and the expenditure of much money is the finding of mineral under such conditions, for instance, as obtain under the lower portion of the city of Leadville, Colo., where the "first contact" is buried beneath several hundred feet of glacial lake beds, composed of sand, gravel and cobbles, and several hundred additional feet of porphyry. Another type is found in some of the ancient river channels of California, which, in some instances, are hidden beneath 500 to 3000 feet of volcanic debris, and can only be reached by means of a deep shaft or a lengthy tunnel run usually through the hard rim rocks—with more or less uncertainty in either case as to the result, owing to lack of knowledge of the exact level of the channel. In Mexico this condition is appreciated, and the laws allow one year on deep placers for prospecting purposes, during which time the locator may have exclusive possession of the ground claimed, for the purpose of investigating and making a possible discovery. If the strict letter of the law be enforced in the United States, one of limited means might commence the work of investigation by beginning the sinking of a shaft, and continuing for several weeks or even months, when a wealthy individual or company could start a shaft on the same claim and by use of superior equipment and abundant means sink so much more rapidly than the first party on the ground as to reach the ore or channel before him, when, having made the first actual discovery, the second party could oust the first—which is manifestly unfair, though in strict accordance with the law. The proof of recording and marking a claim will not authorize the court to presume a discovery, and if no discovery be made until after the act of location, the location must date from the time of actual discovery. Under our laws priority of discovery gives priority of right against naked location and possession without discovery. The case of Crossman v. Pendery, 8 Fed., 693, is one in point. There are many places where the geological conditions are such that a bona fide discovery is impossible without the expenditure of much time and money. These include places where existing veins have been covered by later flows of lava or the deposition of later sedimentary formations.

THE removal of a number of men from the Cripple Creek district whose presence was undesirable is evidence that fires of the peculiar class of unionism prevailing there still smoulder, and, fearing a renewal of labor difficulties, or, possibly, additional assassinations, the property owners—they who have something to lose—have anticipated trouble by removing the disturbing element. At present the mining industry in that district is again prosperous, having assumed a normal condition after the strenuous contentions of the past few months.

THE American Mining Congress has been in session during the past week at Portland, Or. A number of resolutions were passed, among them those having a bearing on forest reserves and the misuse of the mails for the promotion of fraudulent mining schemes. At this writing no city has been selected as the next place of meeting.

## The Evolution of Metallurgical Invention.

The efforts of metallurgical engineers and chemists is constantly in the direction of cheapening known processes, rather than toward the invention of new ones to replace the old, though there is an army of technically educated experimenters engaged in the latter effort. The practical workers have less time usually to devote to the working out of new processes, the details of which are unfamiliar. This work is left to the scientific experimenter whose time is not so fully occupied with other matters. Between these two classes of workers much that is good is evolved. Each is entitled to credit for the work he performs, and each has a place in the field of metallurgy. The experimenter designs a new type of furnace, and the practical worker gives it a trial. If it meets the requirements it is retained, and in time the practical metallurgist corrects its faults and improves upon its virtues until the best work obtainable is achieved. If it fails to give satisfactory results it is "turned down," no matter how vigorously the inventor may plead its utility and excellence. Twenty years ago the manufacturer of a certain pulverizer in which the crushing was accomplished by two sets of rolls, stood and watched his machine in operation on extremely hard quartz rock. The pieces fed to the machine were much too large—2 to 3 inches in diameter. The gears began to cut and in a few minutes they were so worn that the cogs no longer engaged. Steel gears were ordered and the trial again made, but the results were so unsatisfactory that the machine was condemned by the mill superintendent, who wanted prompt and definite results. The maker of the pulverizer said: "When the ore is crushed to the size of hazel nuts and beans, my machine will be all right." In this he was correct, for machines of similar type operate with entire satisfaction to-day and have been in use for years; but the rock fed to them is crushed in breakers to a suitable size. The maker and inventor of the machine had the correct idea; but he was not a thoroughly practical man, or he would have made the necessary arrangements to crush the rock finer before sending it to his pulverizer. On the other hand, the superintendent of the mine had no time to build pulverizers or to experiment to great length with those offered. He had tried several varieties, including stamps and grinding pans, but all proved unsatisfactory. This last pulverizer, proving no better than the others, was thrown out and the stamps replaced. This illustrates the history of many machines designed to perform some important function in metallurgy or mining. The maker is experienced and practical up to a certain point, and the metallurgist is often devoid of mechanical ability and destitute of suggestions. These two meet and the result is failure for the time being; but ultimately, if the machine has merit, out of disappointment and inexperience a machine is evolved which meets every requirement, and success results to both the inventor and the operator.

## Mining in the Orient.

The recently issued report of the Oriental Con. M. Co. of New York City, operating in Korea, contains considerable that is of interest to the mining world. The operating profit for the year 1903, which is the period covered by the report, was over \$762,000 gold coin of the United States, the total value of the ore being \$1,478,956, and the amount treated 203,567 tons, or an average value of \$7.27 per ton—thus showing that a comparatively low-grade mine can be successfully operated in the Far East, though occupying an isolated position where transportation is attended with many difficulties. The cost of mining, including all development work, was about \$1 per ton. The cost of milling was 50 cents per ton, the total cost of mining, milling and general expenses bringing the total cost per ton to \$2.225. The mills and machinery are run by water power, and during the year 40% of the values of the ore were saved in the concentrates. These are cyanided, the extraction being about 77%, at an average cost of about \$1.22 per ton. The company operates a total of 200 stamps, which, owing to certain extraordinary local conditions, were only run 278 days out of the 365 of the year. This increased somewhat the operating cost, though it was lowered during 1903 over the figures of 1902.



# CONCENTRATES.

THE value of assessment work performed on an unpatented mine is usually fixed by the value of a day's work in the camp where the mine may be situated. If buildings or machinery are substituted for labor, the cost should be readily arrived at.

IT has been suggested that where gold ores are difficult of amalgamation, owing to the presence of graphite and molybdenite, that the ore be crushed and concentrated before amalgamation. The water will carry away most of the undesirable element.

IN Illinois lead ore has been found in the southern part of the State, including Hardin, Pope, Union and Saline counties, and has been mined with more or less regularity since 1842. Large amounts of fluor spar is also obtained in these districts from the lead mines.

IN many instances where the water flows from copper mines it pays to run the water through a line of boxes containing tin scrap, which precipitates any copper present. These boxes must have a very low fall, or the current will carry away any cement copper precipitated.

IF amalgamating is to be done in the battery it is usually good practice to use as little water in the mortar as possible, adding it outside if necessary. This promotes amalgamation. An increase of water in the battery increases the discharge of pulp from the mortar.

TO TEST for heavy spar, fuse the mineral with sodium carbonate, place the fused mineral on a clean silver coin and add a drop of water. The presence of sulphur in the mineral will be shown by the formation on the metal surface of a yellowish or brown stain of silver sulphide.

THE law that the proportions by mass of the constituents of a chemical compound are invariable is known as the law of definite proportions. The law is based on a large number of analyses and syntheses of well known compounds, the composition of which has been found to be constant within the limits of errors of experiment.

THE Mexican law passed December 25, 1901, permits concessions to be acquired for the exploration of petroleum. In Mexico whenever an expert report indicates the probability of the existence of deep placers of gold or precious stones, one year may be conceded for prospecting work. The depth of shaft for such work may be whatever is necessary.

A LAUNDER or flume designed to carry mill pulp in a cold country, and where it is not intended to cover it, must be given a heavy grade or the pulp will freeze, quickly causing the box to overflow. A 5% grade is not too much for this purpose, and if the temperature falls very low, even more than this may be necessary, if it is not found desirable to cover it.

THE cost of building a reverberatory furnace varies greatly with the size of the furnace, the kind of materials employed, cost of labor, etc. These costs vary in different parts of the United States and in other parts of the world. A desulphurizing furnace for roasting is usually longer than a smelting or matting furnace. Reverberatories cost usually from \$3500 to \$7000, according to size and location.

MISSED HOLES should always be reported to the foreman or superintendent of the mine, and the fact conspicuously posted on a bulletin board for this purpose. There is no element of danger greater in mining than that of a missed hole. The failure of an employee to report a missed hole should have attached the penalty of discharge, as a man who thus carelessly endangers the lives of his fellow workmen is too dangerous a person to encourage him to remain.

THE assayer must necessarily have a knowledge of mineralogy in order that he may intelligently mix the charges for assaying, for all ores cannot be fluxed with the same charge and get equally accurate results. Some ores require a preliminary roasting before placing in the crucible. One may "pick up" a smattering of knowledge of assaying the more simple ores in a short time, but to become thoroughly competent in the profession requires much careful study and preparation, and after that an extended and varied experience.

IT has been suggested that the probable source of the extensive colemanite veins found at Borate, in the eastern end of the Calico mountains, San Bernardino county, Cal., are the result of emanations of boric acid from hot springs and vents, which existed in the floor of the Tertiary lake bed at that time. The occurrence of borate springs in Tuscany, Italy, gives color to this theory. The existence of hot springs in the Calico region, both before and after the eruption of the rhyolites, andesites and other lavas, is in evidence in several places.

THE rock generally recognized as the footwall of the Comstock lode at Virginia City, Nev., is diorite, and it has no immediate connection with the bonanza ore bodies, these occurring some distance to the eastward

and usually standing at a high angle. While the pitch of the footwall is about 45° to the eastward, some of the bonanzas were vertical or even had a slight westerly dip. The bonanzas usually occurred as segregated masses of rich ore in very large veins or deposits of low-grade quartz which dipped, in a general way, with the formation. Much of the so-called low-grade quartz remains in the mines and contains from \$2 to \$10 per ton in gold and silver.

DREDGING OPERATIONS may be carried on at any altitude where men may work, and where the conditions make this kind of mining permissible. The dredgers of California and New Zealand are operating at only a few feet above sea level—those in California, for the most part, in broad, flat valleys, and those of New Zealand in some instances in comparatively narrow gulches or canyons. At Breckenridge, Colo., the dredgers are working at an altitude of about 9500 feet above sea level. Steam shovels have also been operated on dry gravel in San Bernardino county, Cal., but work was suspended owing to small gold content of the material handled and scarcity of water to wash the gravel.

WHEN A. hires B. to work for him and B. discovers a mineral deposit, or vein of value, on the public domain, B. may claim and hold such discovery, and in it A. has no interest whatever unless it had been distinctly understood and agreed that B. was to prospect in their common interest. This would be similar to the grubstake partnership. Recently a case was decided wherein a mine superintendent located a claim adjoining the one he was working for his company, in the belief that the ore shoot he was developing extended into the adjoining ground. He developed the new claim and found the extension of the new ore body as he had expected. The company claimed the discovery on the ground that the discoverer was in the employ of the company at the time of making the discovery and that this was predicated upon knowledge obtained in the company's mine and at the expense of the company. The court held that the relations between the company and the superintendent were not of a fiduciary nature and therefore the company was not entitled to any interest in the discovery made by the superintendent.

REDUCTION FURNACES are of three general types: The stack, or cupola furnace, in which the ores, fluxes and fuel are mixed in certain proportions; the reverberatory furnaces (and the rotary type), in which the ore is calcined or roasted by flames, but in which they do not come in direct contact with the fuel, and the retort in which the material is to be treated by a process of distillation. The first kind are found represented in the iron, copper and lead water-jacketed stacks. The reverberatories are employed for roasting, matting, etc. In addition to the reverberatory, of which there are numerous types, having single, double and multiple hearths, may be included the various rotary furnaces of the White-Howell and Bruckner type, and also the Stetefeldt. In each of these furnaces the ore, usually pulverized, comes in contact with the flames, but not with the fuel. Retort furnaces are employed in the reduction of high-grade quicksilver ores, zinc ores, etc., the latter of several special designs. Each of the above are built in a great variety of size and form. Some are better adapted to certain purposes than others. Those of the larger sizes are usually more economical than the smaller ones, but in the matter of size alone can be carried to a point beyond the economic limit of successful operation.

UPON the relocation of a mine when the former proprietor has failed to perform the assessment work required by law, it has been held by various courts that machinery such as engines, boilers, compressors, hoisting works, mills, pumps and other things of like character "annexed to the soil" for mining become part of the freehold (Meritt vs. Judd, 14 Cal., 60. Treadway vs. Sharon, 7 Nev., 37), and as such they pass to the relocater. But says Lindley on Mines, "while this is undoubtedly true, upon application for a patent the relocater will not be permitted to include in his estimate of the value of improvements required by law to be made as a condition precedent to patent any of the labor done or improvements made by the original locator. A grant from the original locator to one who has already effected a valid relocation is ineffective for this purpose. Expenditures for such purpose must have been made by the relocater or his grantees (Rev. Stat., Sec. 2322)." An original locator may not locate a mining claim basing his act upon his own failure to perform the necessary assessment work. One may locate a claim, say in 1895, and perform the assessment work (\$100 worth) annually each year up to 1902. During 1903 he does no work, but on Jan. 6, 1904, he relocates the claim and in April has the claim surveyed for patent. The locator has already performed \$500 worth of work on the claim, and the query is, will this work apply as the work necessary to be performed in securing a patent. "Concentrates" is of the opinion that it will, for, although as stated above, "an original locator may not relocate his own claim, etc.," he has a right to enter and resume work on his own claim prior to relocation by another, his estate in the claim under the first location not being wholly lost by failure to do the work. The Supreme Court of Colorado in this connection has said: "As between the locator and the Government the failure to do the annual assessment work does not result in a forfeiture. In other

words, it is not necessary to perform the annual labor except to protect the rights of the locator against parties seeking to initiate a title to the same premises. \* \* \* To otherwise express our views, it might be said that after a valid location the title thus acquired remains so, whether the annual assessment work is performed or not, until forfeited or abandoned (Beals vs. Cone (on rehearing), 27 Colo., 473—82 Pac., 948-958). Forfeiture is not complete until some one else has appropriated the property (McCarthy vs. Speed, 11 S. Dak., 362—77 N. W., 590-593)." In view of the above the relocation made under the circumstances would be invalid and may be set aside, the claim holder proceeding to patent under the original location of 1895.

THE amount of coke to be used in pyritic or partial pyritic smelting cannot be predetermined, as it varies with the condition of the furnace—which cannot be kept constant even with a constant grade of ore and the same fluxes. It is easy to use too much coke. The result of heavy overcharges of coke is generally the driving of the fire upward, and the accumulation of a small amount of slag with no metal at all. Peters mentions an instance in Arizona where the furnace was in bad condition; the slag only red hot, and scanty, and apparently very siliceous. All of the ten tuyeres had long noses that united in the center of the shaft, and through which not the feeblest glow of heat could be seen. The charge sank very slowly and irregularly, and the water in the jacket was almost boiling, though a full supply was flowing through the feed pipe. He further says: "If the furnace had been a small one it could scarcely have been saved, but it requires a considerable amount of time, as well as metallurgical skill, to freeze up one of the long, rectangular shafts now in such common use." Every alternate tuyere was plugged, the blast reduced, the coke charge was maintained at 300 pounds, but instead of small charges of ore such as had previously been fed, they charged 3000 pounds of old ferruginous slags. These were continued for five charges, when one-half of the slag was replaced by ore, and later ore was gradually substituted for the remaining slag, at the rate of 40 pounds of ore for 100 pounds of slag, so that the normal charge became 2100 pounds of ore to 300 pounds of coke, with the addition of a small amount of foul slag made by the furnace. After several hours, the tuyeres began to brighten, one by one, and after a time the running of furnace became normal. The ores were oxidized. With sulphide ores the amount of coke used is much less than with oxidized ores, as the sulphur of the ore supplies a large amount of the necessary fuel.

UNDER the general name, mica, is included a number of minerals which have a highly developed basal cleavage. On the basal section, all of them show plane angles of 60° or 120° marking the relative position of the principal zones of forms present and giving them the appearance of hexagonal or rhombohedral symmetry. Muscovite, the common mica, or "islinglass" of commerce, is an essential constituent of mica schist, and certain varieties of granite and gneiss, but its largest and best developed crystals are found in pegmatite dikes. In such cases it sometimes occurs in plates up to 12 to 15 inches across. It is used in stoves, and other work, and is largely used in electrical work for insulating purposes. Muscovite is usually light colored or colorless, and the thin laminae are tough, flexible and elastic. It is difficultly fusible, not decomposed by acids, and in composition is a potassium, aluminum silicate. Sericite is a fine, scaly muscovite united in fibrous aggregates and having a silky luster. Biotite is a green to dense black mica, sometimes opaque, even in thin laminae. It occurs commonly in certain varieties of granite, syenite and diorite, of massive granular type, but not developed to as large plates as muscovite. Phlogopite is a magnesium mica, usually brown in color, containing little iron, while biotite has a large percentage of iron, as well as magnesium. Lepidolite is a lithium mica, color rose-red, violet-gray or lilac. It is used as a source of "lithia," which is employed in certain medicines. Under the head of the true micas are also included damourite, margarodite, gilbertite, paragonite, zinnwaldite, caswellite, lepidomelane, alurgite (of manganese), roscoelite (of vanadium). The mica division of minerals is divided into three groups—the micas proper, the clintonite or brittle micas and the chlorite group. The members of the clintonite group are considered in composition a transition from the micas proper to the chlorite group, and includes margarite (calcium mica), seyberite (or clintonite), xanthophyllite, and chloritoid (of iron and magnesium). In color, margarite is grayish to yellowish; seyberite is reddish brown to copper red; chloritoid is dark gray to greenish black. This group is marked physically by brittleness of the cleavage plates and chemically by basic character. The chlorite group includes clinocllore, penninite, prochlorite, thuringite and minor varieties. The color is commonly green, due to ferrous iron and the laminae tough and comparatively inelastic. The chlorites occur largely as secondary rock-forming minerals resulting from alteration of ferro-magnesian silicates, as hornblende, biotite and pyroxene. The vermiculites include several micaceous minerals, alteration products of the micas, biotite, phlogopite, etc., having soft, pliable and inelastic laminae, and color white to yellow and brown. If a blow be struck with a dull pointed instrument on a cleavage face of one of the micas, a six-rayed star, called the "percussion figure," results. Mariposite is a green mica of complex chemical composition, the color being due to chromium.



## The Father Lode of California.

[FROM A STAFF CORRESPONDENT.]

The importance of the effects of physiography in mining has long been understood, but the absolute dependence, not only of the methods of working, but also of the very discovery of the mines, upon the physiographic condition of the country is seldom better exemplified than in the northeastern mining counties of California.

The geological history of the region has been complex, and represents a long period of marine sedimentation succeeded by uplift and intrusion by various plutonic rock masses. Then ensued periods of erosion, the effects of which were mantled by various volcanic flows. Further lapse of time reduced the country to a peneplain, which, being upraised, forms the present Sierra Nevada mountains. In recent times this peneplain has been dissected by erosion into deep canyons with high ridges between.

The importance of this stream erosion in revealing the ancient gold-bearing river channels has long been appreciated and commented upon, but the almost equal importance of disclosing numerous quartz veins, the possible source of the placer deposits, has received less attention.

The region under special discussion embraces eastern Nevada county, northeastern Placer county and southern Sierra county. The eastern portion of these counties consists largely of intrusive granite. West of this lies an area of schists and slates of 6 miles average width. This in turn is bordered on the west by a continuous ledge of serpentine, probably metamorphosed from the old basic plutonics on the west. While the granite and serpentine on either side of this slate belt contain gold, yet special attention is here to be called to the economic value of the deposits in this belt of slates.

This belt consists largely of clay slates; black and fissile, and of a fine-grained, dark green sandstone containing abundant quartz grains. The strike is north-south, and the dip is characteristically to the east, but is reversed in many instances, giving evidence of much movement. The angle of dip is very high, being seldom less than 75° and is often vertical. These slates are probably of Carboniferous age.

The broad belt of serpentine, already mentioned as lying west of the slates, extends almost continuously from northern El Dorado county, through Placer and

In the first place no elaborate and expensive hoisting works are necessary. The veins may be worked rapidly and economically by crosscutting and drifting. The ore can be readily trammed to the mouth of the tunnel and run to the mill by gravity. There is no difficulty in finding suitable millsites on the canyon sides with good foundations and ample fall. There is an abundance of dump room. The ridges and slopes are covered with a luxuriant growth of timber, chiefly yellow and sugar pine, together with spruce and fir, which insures an ample supply for underground timbering. Water power is cheap and abundant, and converted to compressed air or electricity, forms a convenient agent for milling and mining. The application and utilization of these advan-



Power House of the Southern Cross mine, Placer County, Cal.



Mill of Gray Eagle Mine, Maybert, Nevada County, Cal.



Mill and Compressor House of Bonnie Bee Mine, Placer County, Cal.



Dam of Southern Cross Mine, North Fork American River, Placer County, Cal.

Nevada counties into Sierra county. It occurs with old basic rocks, probably intrusive, in the Carboniferous slates, and is possibly derived from peridotite. The slates are also intruded by small dikes of amphibolitic and chloritic schists, probably derived from dioritic rocks.

This altered diorite, or "greenstone," carries innumerable quartz stringers and veins. Free gold and sulphurets are found, not only in the quartz, but also throughout the greenstone. The foot and hanging walls are also slightly mineralized. The veins vary from mere stringers to broad zones 16 feet or more in width. In addition to these mineralized schists or greenstones, which are being profitably worked in a number of cases, notably the Bonnie Bee mine in Bear valley, Placer county, there are quartz veins in fissures in the slates, carrying free gold and sulphurets. The ore is usually found in elongated "kidneys," or ore shoots of steep dip, several such shoots occurring in a single vein.

As previously stated the relief of the country is strongly marked. The streams are torrential and have cut their way in abrupt rocky canyons, 1500 to 2500 feet deep. These streams, the various branches and tributaries of the American and Yuba rivers, are separated by narrow ridges. The caps of these ridges consist chiefly of fragmental andesite, and massive and fragmental rhyolite, which have preserved the underlying slates from denudation. The veins cannot be traced continuously because of this lava cap, yet the occurrence of similar ore bodies on either side of successive canyons suggests the continuity of the veins.

The mines located on these belts will be briefly described, the main object being to show the methods employed due to the great relief in the topography.

tages is well illustrated in the installations of a number of mines.

Starting at the southern end of the belt is the Pioneer, on the south bank of the North Fork of the American river. This mine is not worked at present, but consists of well defined normal quartz veins carrying free gold with a small proportion of sulphurets. The mine has been opened by three cross-cut tunnels. The lower one is 1400 feet long, the vein having been followed 2500 feet along this level. The Dorer crops on the canyon side north of Humburg Bar. The vein has a clay slate hanging and a quartzitic sandstone footwall.

The Southern Cross mine is on the North Fork of the American river in Placer county. The main tunnel is in 800 feet on the vein and is connected by a raise with the upper tunnel, which is in 600 feet. The mine is equipped with a 10-stamp mill, containing the latest improvements and one of the best built in the county. Mortar blocks are in place and everything is ready for the installation of an additional ten stamps. The foundations are especially noteworthy, excavation having been made in the schist bedrock, and concrete walls and bases put in. Wooden mortar blocks are used, each 18 feet long, and 5x2½ feet cross section, two for each battery. While but 6 miles by trail from the Southern Pacific station of Towle, yet the country is such that it was found cheaper to haul all material 35 miles from Colfax over a wagon road, and then drag it down a 2½-mile slide to the mine. Eight horses were required to drag each of the 2½-ton mortar blocks.

The river is dammed 2600 feet above the mouth of the tunnel by a timber and stone dam 35 feet high. Its location and construction is shown in the accompanying engraving. This furnishes an ample water

supply throughout the year for a 350 H. P. Rodney-Hunt turbine wheel belted to a 350 H. P. Westinghouse alternating current generator, 2000 volts, three-phase, 7200 alternations. This furnishes power to run a 15 H. P. induction motor belted to a 10x14 Blake crusher, a 50 H. P. induction motor running the stamps and concentrators, and a 50 H. P. Rix air compressor. It also furnishes power for lighting and is intended to furnish power for heating, as electric heaters are to be put in. The mill was installed by the Risdon Iron Works, of San Francisco, Cal., and has four 6-foot Johnson concentrators. It is intended to put in additional compressor capacity. This property has been running nearly continuously since Nov. 19, 1903. It is owned by the International Mining & Securities Co. R. J. Trimble is president and acting superintendent, Towle P. O.

The Soldan, or Rawhide mine, lies over the next ridge on the North Fork of the North Fork of the American river. The tunnel mouth is located several hundred feet above the river bed, and the ore is conveyed to the 10-stamp mill by a Hallidie tramway 2400 feet long with 900 feet difference in elevation between terminals. The lower tunnel has been driven 610 feet. A 95-foot head of water is available the year round. At present the dam is being built higher, being 20 feet high, 10 feet through at the top and 50 feet across. A 15-inch Rix air compressor run by a Pelton wheel has just been installed; 3000 feet of 3-inch pipe carries ore to the mine. H. W. Morris is superintendent at the mine.

Blue canyon gives the next exposure of the slates. A number of mines and prospects throughout its length attest the continuity of mineral bearing veins, but these were not visited or examined by the writer.

The slate belt is next exposed by the canyon of Bear river. Numerous quartz ledges occur below Bear valley, but the Bonnie Bee and Ziebright mines on either side of the river are the only ones being worked at present. At the Bonnie Bee mine water under 422 feet head is used as power. A 5-stamp prospecting mill with a 6-foot Frue vanner and a Blake crusher handles all the ore. A 5-foot Pelton wheel runs the 14x20 double cylinder, compound, Giant air compressor.

J. L. Waggoner, the superintendent, has displayed great ingenuity and originality in meeting certain problems connected with this property. The main tunnel had originally been driven near the bottom of the canyon without regard to obtaining a sufficient fall for a subsequent mill. In order to get the necessary height and drop, the rock breaker and ore bin

had to be placed 60 feet above the tunnel mouth. In order to raise the ore to the breaker, a three-rail track with a turnout in the middle was built from the tunnel to the top of the mill. Two platform tanks, mounted on trucks, are run on the tracks. A loaded car is run onto the lower platform, and the upper one filled with water. When full the weight is greater than that of the lower one, consequently the upper one descends and pulls the loaded car to the top, the two being attached by a cable controlled by a brake. The water is run on out the lower one, and the operation repeated. The arrangement can best be understood from the accompanying picture. As water is very cheap, this forms a simple, rapid and convenient hoist.

Considerable difficulty has been experienced in the past in saving all the free gold in the ore. Superintendent Waggoner spent the entire winter in experimenting and finally succeeded in rearranging the mortar and stamps so as to obtain almost perfect battery amalgamation. The gold occurs in silica grains, and formerly would not amalgamate. By removing the 1½-inch cast liners from the mortar, and replacing them by ½-inch boiler plate, he enlarged the interior of the mortars. The 1000-pound stamps were given an 8-inch drop at about eighty per minute, with a 7-inch discharge. The scouring action is avoided by a trough placed at the lower end of the back plate and by a front riddle formed by the inside liner placed ¼ inch above the lower chuck block plate. The interesting feature of this arrangement is that it works. Most of the gold is caught inside the mortar, the plates catching but little. Formerly much of the gold was lost.

Water under pressure is carried all through the mine for drilling. The company expects to install an



additional fifteen stamps at their earliest convenience, and a new water wheel is to be added to run the rock breaker separately, and four new machine drills are to be put in. Use of the present 700-foot main drift is to be discontinued and a new one driven 60 feet above so that the ore can be handled by gravity. J. L. Waggoner, Dutch Flat, Cal., is superintendent.

The Ziebright mine is similar in most respects to the Bonnie Bee. A new 10-stamp mill has been completed and is running. It is equipped with W. H. Martin's new wedge-stem guide, which does away with many bolts in the frame. The tramway from the mouth of the tunnel to the mill is covered to keep off the snow. The drift is in 260 feet. Henry Fuller is superintendent at the mine.

On the South Fork of the Yuba the Washington and Cooley mines form a probable continuation of the belt. Farther north the National and Culbertson, with the mines at Minnesota and Alleghany, mark the probable limit of the belt.

Much remains to be done in tracing the continuity of this great belt. But enough has been done to show that there is a section of country offering great opportunity to the prospector and capitalist. While it is not claimed that this is a part of the Mother Lode of California, yet there is undoubtedly a great mineralized zone running nearly parallel with the range. One prominent Nevada county miner has named this the "Father Lode of California." So far but little attention has been paid to the sulphurets, most of the miners being satisfied with the returns from the free gold. Experiments with regard to the adaptability of the cyanide process are being carried on, but the commercial solution to the question lies in the establishment of a ready and cheap means of transportation. Mountain trails do not offer ideal inducements for moving material and it is perhaps to this cause that the slow progress of the past may be due.

### Volatilization of Metals.

The successful melting of quartz makes possible the manufacture of receptacles which offer unusual resistance to ordinary sources of heat.

In recent experiments noted by H. Bois in La Nature, there was employed a Heraeus furnace, elec-

### Electrical Precipitation in Montana.

Written for the MINING AND SCIENTIFIC PRESS by  
MATT. W. ALDERSON.

In the early history of cyaniding the greatest difficulty met was in securing a successful precipitation of the gold after it had been taken into solution. Gradually this difficulty was overcome until at the present time perfect precipitation can be made from most solutions by the aid of zinc shavings or zinc dust. Difficulty is, nevertheless, occasionally experienced; and it was to overcome such that electrical precipitation was attempted at the plant of the Gold Cord M. Co. at the Empire mines near Marysville, Mont.

The Charles Butters Co. plant near Virginia City, Nev., is also equipped for electrical precipitation.

pump. This pump is at the lower end of the dam and the tailings are sluiced to it as shown in the accompanying illustration. The pump elevates the tailings to a launder through which they flow to a battery of eight classifiers. Forty inches fall was required in the launder to convey the tailings 125 feet from the end of the standpipe of the pump to the classifiers. The classifiers are shown in accompanying illustration. The material as it reaches the classifiers is about one part tailings to twelve of water. When the sand reaches the leaching vat it is about one part sand to three of water, showing a removal of nine parts of water and slimes in the classifiers. The slimes are not being treated at present, but are run back into an upper dam and held for future possible treatment. The sands treated contain about 12% of slimes.

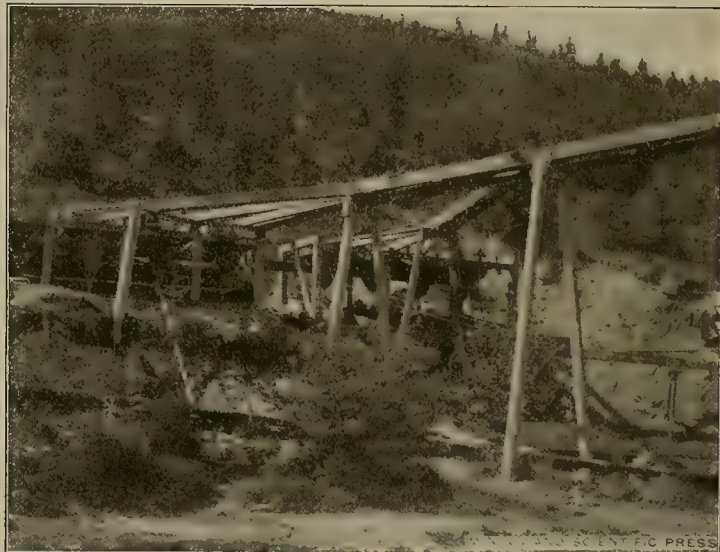
There are five leaching vats 40 feet by 10 feet in



Sluicing Tailings to Vats at Empire Cyanide Plant, Marysville, Mont.



Empire Cyanide Plant, Marysville, Mont.



Spitzkasten, Empire Cyanide Plant, Marysville, Mont.

trically heated, and formed of the tube of porcelain surrounded by a sheet of platinum. The quartz receptacles were in the form of an L, the metal usually being placed in a bulb down at the top of this L and bent. The temperatures obtained were determined by means of thermo pairs of platinum and platinum-rhodium, and a vacuum was created which corresponded to that of a cathodic ray tube.

Zinc began to distill in a very clear manner at 430° C. without melting, the distillation continuing afterwards at a temperature of 300°. The zinc was distilled and condensed six times, three grams of the total evaporating in twenty minutes. Cadmium began to evaporate at 300° C. and distilled visibly at 448°; selenium volatilized easily at 380°; tellurium boiled and distilled quickly at 540° C. Lead was more difficult to distill. At 800° C., however, the metal volatilized sufficiently to form a sheet which could be melted, and at 1160° C. it boiled regularly and distilled easily. Antimony was volatilized at 670° C. and distilled at 780°, while for bismuth the corresponding temperatures were 540° and 1140°, fifteen minutes being necessary for three grams. Tin was volatilized at 1100°; silver began to volatilize at 1200° and at 1340° it distilled at the rate of .09 gram in twelve minutes. Copper was more refractory, beginning to distill only at 1315°; gold resisted still more, being liquefied at 1180°, at 1300° commencing to distill, while at 1375° there was distilled sufficient to form a sheet.

The Montana plant embodies several original features which, with the innovations introduced by J. L. Malm, manager of the company, in the loading of the sands in the vats, make its successful operation of more than ordinary interest.

The first year the vats were loaded by cars which had been previously filled by teams and scrapers in the usual way. Great difficulty was experienced in keeping the track in line, as it would sag in spots where it crossed the tailings dam, and belt conveyors were substituted the ensuing year. With reasonably dry sand these worked perfectly. But a wet spell invariably caused serious trouble. Slimes would "ball up," and at every transfer unite with other masses till they entered the vats as large balls. The extraction from these was naturally very imperfect. Then, again, the tailings had been impounded in a gulch where there was a number of springs, so that it was found impossible to drain the dam, as water would "well up" and run in from the sides.

It was finally decided by Mr. Malm to try loading the vats by the aid of water, and the vats are now loaded by sluicing the tailings to them. The result has been eminently satisfactory. The expense of loading the vats is about one-third the cost of other methods, the vats are loaded in much less time, and a better leaching product is obtained. There was not sufficient fall between the dam and the vats to allow of the work being performed by gravity alone, so the tailings are elevated en route by a centrifugal

size, with four discharge holes in the bottom. From 525 to 540 tons are treated in each vat and three men load one of the vats in eighteen hours. One ton of freshly slacked lime is used to each vat of sand. With the exception of the work of the pump all the work is one of gravity, the sands being spread in the vats by a Butter's distributor. It has been claimed that loading tailings wet would not work, that a film of water surrounding the particles would prevent access of the cyanide solution and preclude the securing of a good extraction. But Mr. Malm's experience shows that this is not so. The sands are evenly distributed and uniform all through, and all portions of the charge leach perfectly.

When a vat is loaded it is allowed to drain five hours. Then the strong solution, containing 3.8 pounds cyanide to the ton of water, is started, the bottom cock being left open. It percolates downward at about 2 feet an hour. About 110 tons of this strong solution are used on each vat. As the leaching solution nears the bottom, air and water bubble out together and the escape cock at the bottom of the vat is closed. The vat is then allowed to stand two hours, or until the solution on top remains stationary, absorption having ceased. The bottom cock is then opened and the escaping fluid is run to wash storage, until it shows cyanide or values, after which it goes to the gold solution vat. The strong solution is followed by washes aggregating about 500 tons to the vat. Four days from the time the sands are



sluiced into each vat are required until they are sluiced out again.

Until this year the gold solutions were assayed by the well-known lead tray evaporating system, a method which has proven more satisfactory than many that have been suggested to take its place. This year, however, all the solution assays are made by a scheme originated by A. Chiddey of Amapala, Honduras, and given to the world about eighteen months ago. It is simple, expeditious, and enables one to assay a large sample speedily, results often being obtained inside of twenty minutes from the time sample is brought into the assay office. The Chiddey scheme is as follows:

Introduce into a breaker, or porcelain dish, four assay tons of solution, add 10 c.c. of a 10% solution of acetate of lead, then 4 grams of zinc shavings; boil a minute, add 20 c.c. of hydrochloric acid. When the action has ceased, boil again. Wash the spongy lead with distilled water; transfer it with a stirring rod to a piece of filter paper; squeeze into a compact lump and place in a hot cupel. It is well sometimes to have a piece of dry pine in the mouth of the muffle so it is filled with flame at the moment of introducing the spongy lead. When the solution does not carry sufficient silver to part, add a known quantity of nitrate of silver before adding the acetate of lead.

The tailings treated at the Empire mines are the lowest in value of any that have been successfully handled in Montana. While the entire lot will average about \$4 per ton, the higher grade are on the bottom; and those being treated at present average about \$2.20. From these the extraction runs from 80% to 84%. It is the intention in the leaching operations to have for precipitation a tonnage of solution equal to tonnage of sands leached. This gives about 500 tons a day; and, when material assays \$2.20, the solution entering the precipitation box averages about \$1.90 and carries 0.8 to one pound of cyanide. When it leaves the extractor—to be used over again—it has from 1 pound to 1.3 pound of cyanide, a regeneration of nearly three-tenths of a pound of cyanide to the ton by the removal of base products. The effluent solution assays from 8 to 10 cents in the precious metals. The solutions are heated by exhaust steam to a temperature of 100° F. before being run into the precipitation boxes, so the leaching solutions are also warm, running about 60°.

(TO BE CONTINUED.)

## The Desert Dry Lakes of California.

Written for the MINING AND SCIENTIFIC PRESS by  
G. E. BAILEY, E. M.

**INTRODUCTORY.**—The following notes on the dry saline lakes of the desert portion of California have been gathered together in the present form in order to call attention to the value of these deposits of salines, and to the importance of protecting and preserving them.

Quotations from all sources of authority are freely made, showing that all who have given any attention to the subject agree that from their very origin all the dry lakes contain valuable deposits of salines, and that they form one of the most important resources of that State. It is a fact, well known to scientists, that the borax, carbonates of soda, sulphate of soda, niter, and similar salines of California, are only found in the desert portions of the State; and that they are, in fact, only in that certain portion which is known to geologists as the "Great Basin." All of the lakes of the Great Basin—whether containing water or whether dried up—are saline in character, and only the lakes of the southwestern portion of the Great Basin, viz., those in California, and those in the southwestern portion of Nevada, close to the California line, carry valuable contents of borax, carbonate of soda and niter, the lakes of the rest of the Great Basin being valuable only for salt.

**DESCRIPTIVE.**—In 1883 H. G. Hanks, State Mineralogist of California, published as "Part 2 of the Third Annual Report of the State Mineralogist," a "Report on the Borax Deposits of California and Nevada," which was accompanied by a map showing the locality of the principal borax fields. This report and the accompanying map show that all borax fields (with one exception) are located in the desert portion of southeastern California and in western Nevada. The one minor exception is the borax in the waters of the small Borax lake in Lake county—a small source of supply soon exhausted. The other points marked on this map west of the desert portion mark only springs, whose waters contain borax. It will be noted from this map that the Nevada fields are really the northern extension of the California fields, the drainage of the Great Basin being towards its greatest depression in the south known as Death Valley. A careful and exhaustive examination of geological surveys, maps, statistics of production, and scientific magazines and papers, fail to show that any borax or niter is known to exist in the United States outside of the Great Basin. The report on the "Saline Deposits of California," which is known as Bulletin No. 24 of the California State Mining Bureau, contains the following statement:

With the exception of salt made from ocean water, the great bulk of the salines of California, the borax, niter,

soda and salt, is found within the boundaries of what is known to the geologist as the Great Basin.

This fact is also shown by the first map in this bulletin where the saline lakes of southern California are printed in blue color on the map, and it is also shown on the last map of the same bulletin where the character as well as the location of the salines of the entire State are printed in red.

**THE GREAT BASIN.**—By the Great Basin is meant the great desert region that lies between the Wasatch range of mountains in Utah, and the Sierra Nevada range in California, extending in the north from Oregon and Idaho to Arizona and Lower California in the south. The Great Basin is divided by geologists into four minor areas, known as Lake Bonneville, Lake Lahontan, Lake Aubury and Lake Le Conte, or lakes that were themselves but remnants of the vast inland sea that once covered the whole of the Great Basin. Bulletin No. 24 speaks of them as follows:

The history of two of these lakes has been published in the volumes of the U. S. Geological Survey. Lake Bonneville filled the depression along the eastern border of the Great Basin, and its lowest depression is now known as the Great Salt Lake of Utah. Lake Lahontan filled a similar depression along the western border of the Great Basin, and the remains of its position are marked by the lakes now known as Winnemucca, Humboldt, Carson, Walker, etc. A third lake filled the southwestern portion of the Great Basin, and its lowest pools are now known as Death Valley, Owens lake, and the host of dry lakes and sinks of the Mohave desert. The fourth lake filled the area now known as the Colorado desert, and its lowest pool is marked by the Salton sea.

In the same bulletin the name of Lake Aubury is given to the third lake and Lake Le Conte to the fourth lake, which is represented now by Salton sea. In 1890 there was published by the U. S. Geological Survey, as "Monograph No. 1," an exhaustive and elaborate report on Lake Bonneville by G. K. Gilbert, from which the following extracts are quoted:

The major part of the North American continent is drained by streams flowing to the ocean, but there are a few restricted areas having no outward drainage. The largest of these is called by Fremont, who first achieved an adequate conception of its character and extent, the Great Basin, and is still universally known by that name. It is not, as the title might suggest, a single cup-shaped depression gathering its waters at a common center, but a broad area of varied surface, naturally divided into a large number of independent drainage districts. It lies near the western margin of the continent. On the north it is bounded by the drainage basin of the Columbia, on the east by that of the Colorado of the west, and on the west by the basins of the San Joaquin, the Sacramento, and numerous minor streams. The central portion of the western water parting is the crest of the Sierra Nevada, one of the greatest mountain masses of the United States, and farther south high mountains constitute much of the boundary. The extreme length in a direction somewhat west of north and east of south is about 880 miles, the extreme breadth from east to west is 572 miles.

Again on page 6 of the same monograph Dr. Gilbert says:

Between the ranges are smooth valleys. In general they are trough like. In the local terminology they are called deserts. The largest are the Great Salt Lake and Carson deserts at the north and the Mojave and the Colorado deserts at the south. Southward there is a gradual and irregular descent to about sea level, and limited areas in Death Valley and Coahuila valley lie lower than the surface of the ocean. Coahuila valley is the old name of Salton sea.

On page 8, Lake Bonneville, Dr. Gilbert says:

In the southern half of the basin there are no lakes dependent for their water on the interior ranges. At the east the most southerly lake is Sevier; the last of the lakes sustained by the Sierra is Owens. Then for 300 miles evaporation is supreme. Playas abound, streams are almost unknown and springs are rare. Death Valley, with its floor of salt spread lower than the surface of the ocean, is overlooked on either side by mountains from 5000 to 10,000 feet high, but they yield it no flowing stream, and more than one traveler has perished from thirst while endeavoring to pass from spring to spring. The Mojave river is 100 miles long, but it preserves its life only by concealment, creeping through the gravel of the desert and betraying its existence only where ledges of rock athwart its course force it to the surface.

In 1885 this work on the Great Basin was continued by the publication of the "Geological History of Lake Lahontan" by I. C. Russell as Monograph No. 11 of the U. S. Geological Survey. The following extracts are from Mr. Russell's general description of the Great Basin:

In crossing from the Atlantic to the Pacific, between the Mexican boundary and the central portion of Oregon, one finds a region, bounded by the Sierra Nevada on the west and the Rocky mountain system on the east, that stands in marked contrast in nearly all of its scenic features with the remaining portions of the United States. He must compare it rather to the parched and desert areas of Arabia and the shores of the Dead sea and the Caspian. To the geographer the most striking characteristics of the country stretching eastward from the base of the Sierra Nevada, is that it is a region of interior drainage. For this reason it is known as the Great Basin. No streams that rise within it carry their contributions to the ocean, but all the snow and rain that falls inside the rim of the basin is returned to the atmosphere, either by direct evaporation from the soil or after

finding its way into some of the lakes that occupy the depressions of the irregular surface. The area thus isolated from the oceanic water systems is 800 miles in length from north to south and nearly 500 miles broad in the widest part. The southern portion of the region includes the Colorado desert, Death valley, and much of the arid country in southern California and Nevada. At the south, the valleys of the Great Basin are low lying, Death Valley and the Colorado desert being depressed below the level of the sea. The valleys or plains separating the mountain ranges, far from being fruitful, shady vales, with life-giving streams, are often absolute deserts, totally destitute of water and treeless for many days' journey, the gray green sagebrush alone giving character to the landscape. Many of them have playing in their lowest depressions—simply mud plains left by the evaporation of former lakes—that are sometimes of vast extent. Other portions of the valley become incrustated to the depth of several inches with alkaline salts, which rise to the surface as an efflorescence and give the appearance of drifting snow. The lakes, into which much of the surface drainage finds its way, are commonly saline and alkaline—their shores, desert wastes, shunned by animals and all but salt-loving plants. It may be taken, as a rule, that all lakes that overflow are fresh; and all lakes which do not find an outlet become in time charged with mineral salts. River water is never absolutely pure, but contains a small percentage of mineral matter, which is left behind when the water is evaporated. Should this process continue long enough, it is evident that a lake without an outlet would in time become a saturated solution, from which the less soluble mineral salts would begin to crystallize.

In speaking of the Mojave desert, Bulletin No. 24 says:

What is now generally known as the Mojave desert was covered by an immense lake that, later on, shrunk by evaporation to an intricate series of chained lakes.

**ALL THE DRY LAKES ARE SALINE.**—This is a fact, no matter whether they contain water or whether they have evaporated to complete dryness. In the quotation made from Dr. Gilbert's monograph on Lake Bonneville, he speaks of "Death Valley with its floor of salt spread lower than the surface of the ocean." In the quotation from the monograph on Lake Lahontan by I. C. Russell, this saline character of the lakes of the Great Basin is noted with a clearness and emphasis that can leave no doubt in the mind of any one.

In applying his definition to localities in California it can be stated, without fear of contradiction, that all of the so called "dry lakes" of the following counties are saline in character, viz: All those in Kern county, south of the Tehachapi and east of the Sierra Nevada range; all of those in Los Angeles county north of the Sierra Madre mountains; all of those in San Diego county east of the main range; all of those in Riverside county east of the San Bernardino and San Jacinto ranges; all of those in San Bernardino county north of, or east of, the San Bernardino range; all of those in Inyo and Mono counties east of the Sierra Nevada divide; and the dry lakes in Lassen and Modoc counties east of the Sierras. This fact is important to remember in connection with the conserving of the salines of the State. All dry lakes of the desert should be reserved as saline whether such salines are in sight on the surface, or covered by strata of sand or clay.

(TO BE CONTINUED.)

## Chlorination at Hodson, California.

Written for the MINING AND SCIENTIFIC PRESS.

A description of the new chlorination plant erected on the Royal Consolidated mine, Hodson, Calaveras county, Cal., is of unusual interest to mining men in California, inasmuch as it is an innovation in chlorinating methods as practiced on the Pacific coast, and may revolutionize the chlorination process in this country. It is important, first, in great saving in labor costs; second, economy of fuel; third, uniformity of roast. The ore receiving the salt at the right time under the proper conditions minimizes the risk of loss of gold by volatilization. The ore leaves the furnace perfectly roasted and in a porous condition, rendering it easy of leaching, free from clinker or lumps of any kind, which tends to the highest extraction of the gold contents. The Merton roasting furnace constructed at this plant is the first erected in America, although largely used in Australia and elsewhere, is 32 feet long by 8 feet 6 inches wide over all, with three floors, one above the other, delivering onto a short finishing hearth. The hearths on the three floors are each 20 feet long by 7 feet wide, and the small finishing hearth 7 feet in diameter, making a total hearth area of 67 feet by 7. The ore is fed into the top of the upper chamber behind the flue; this prevents dusting and is carried by means of rables attached to four vertical shafts which rotate at the speed of 1½ revolutions per minute. The field of each rable intersects the field of the other. In this manner the ore passes from one end of each hearth to the other end, where a slide can be opened more or less, thus regulating the amount of ore to be discharged to the next hearth below; where, as above, it is carried by the rotating rables to the other end, and is discharged to the next hearth below, and so on. The ore may remain on each hearth a greater or less time according to the character of ore being roasted,



and in greater or less degrees of heat at the will of the furnace man. The regulation of heat is perfectly controlled by doors opening direct to the atmosphere, both at the sides and the ends of furnace. At the end of the lower, or third hearth, a connection is made with a flue leading to a chimney stack. This is used to regulate the heat, where the ore being roasted is heavy in sulphur, and is put in use by opening a damper leading to the stack, and putting in a fire-tile damper between the third and second hearths, which causes all the waste gases of fuel combustion, etc., to be carried direct to the chimney and muffs off the two upper decks, which is of importance, as it enables the undiluted sulphurous acid fumes to be conveyed to chambers for the manufacture of sulphuric acid, without in any way interfering with the effective roast of the ore, where circumstances warrant the saving of the acid.

When the ore reaches the finishing hearth, the salt is added—about thirty pounds to the ton of sulphurets—and in about twenty minutes the ore is ready to discharge. By drawing a slide the ore discharges into a double push conveyor, which not only elevates and delivers the ore into the hopper over the barrel, but cools it in transit. The ore is fed from hopper by a chute direct into the barrel, which holds four tons of roasted ore, and is filled in ten minutes. The amount of water used in the barrel is 40% of the weight of ore, to which is added 250 pounds of sulphuric acid and eighty-five pounds of chloride of lime. The barrel is run three hours and then allowed to rest one-half hour; this enables the ore to settle on the filter, forming a natural filter in itself. The barrel is now filled with water and the gold solution is run off into a tank 10x7 feet and containing a filter. The filtered solution is then run into a tank of the same size as the one above. This tank is thoroughly coated with paraffine wax, and is used as a precipitating tank.

The precipitant used is SO<sub>2</sub> produced by the action of H<sub>2</sub>SO<sub>4</sub> on carbon in the form of charcoal in an iron retort. The gas passes through a water cooler by means of a spiral lead pipe placed in a vessel containing a flow of cool water. Four and one-half pounds of acid will precipitate the gold from one barrel of ore. As soon as the solution indicates the conversion of all gold into metallic state, the gas is discontinued and the solution is run direct into a sawdust filter, the solution in the tank being agitated to prevent the gold being precipitated in the tank during, or at intervals, the flowing into the sawdust filter. This is an important improvement on the sulphate-of-iron method used generally in the Plattner process, as the clean-up is going on every day, and only two precipitation tanks are used, there being only four tanks in works having a capacity of ten tons of sulphurets per day. The sawdust makes a perfect filter and where the gold is required, it will be found to be in the first 6 inches in depth of sawdust in the top sawdust filter. This is taken out and the filter refilled with sawdust ready for immediate use.

The sawdust containing the gold is placed in cast iron dishes about 2 feet long by 8 inches wide and 4 inches deep and set in a small reverberatory furnace, capable of holding six or eight of these, and in three to four hours the sawdust is incinerated to ash which contains the gold, no stirring whatever being necessary. This ash is mixed with a little over an equal weight of borax and melted in a clay lined plumbago pot, the resulting gold being nearly 1000 fine. After the solution passes through the sawdust filters, it is conveyed into a sand filter. This sand is assayed at intervals to discover if any metallic gold is being carried through the sawdust. The solution then passes over scrap copper which precipitates any silver present and it then passes through a tank of scrap iron which precipitates any copper, etc., and then flows to waste.

The compactness of the plant and its automatic operation enable the work to be done by two men in day shift and one at night, a total of three men for twenty-four hours.

Oil fuel is used and is proven to be an ideal fuel for this type of roasting furnace; the oil consumption is fifteen barrels for four days operations, which on this ore equals fifteen and three-fourths gallons of oil per ton of sulphurets treated. The cost of oil delivered on the works is \$1.25 per barrel, which equals 47 cents per ton of sulphurets roasted.

	Pound.
Sulphuric acid costs at works.....	2 1/2c
Chloride of lime .....	2 1/2c

The treatment cost per ton of roasted ore is made up as follows:

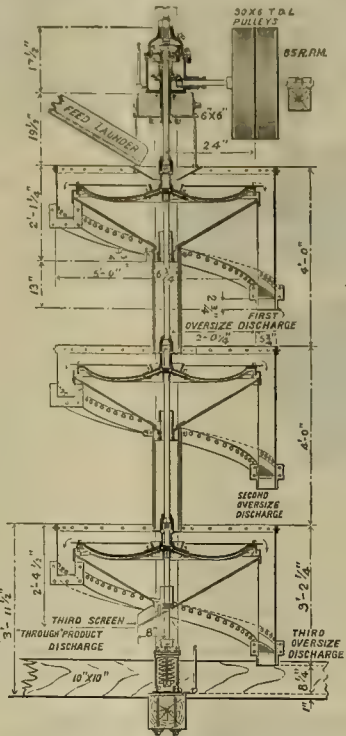
	Per Ton.
In four tons roasted ore, acid .....	\$6.25 = .81
In four tons roasted ore, lime .....	2.10 = .53
In four tons roasted ore, salt .....	.26
Three men treating ten tons in twenty-four hours....	8.25 .83
Oil.....	.47
	3.65
Power.....	.16
	3.84

To this has to be added renewals, depreciation, etc. In Australia, where the Merton furnaces have roasted hundreds of thousands of tons of many classes of ores, the wear and tear, it is stated, does not amount to more than 2 cents per ton of ore roasted, consequently it may be anticipated that this expense will not be exceeded in the United States.

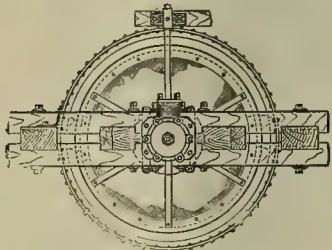
### The Traylor Centripect Screen.

The manufacturers of the Traylor centripect screen, illustrated herewith, claim to have a machine that will perfectly size crushed material, either wet or dry, from the coarsest product up to 100 mesh in fineness, that will absolutely screen without clogging and will operate indefinitely without attendance.

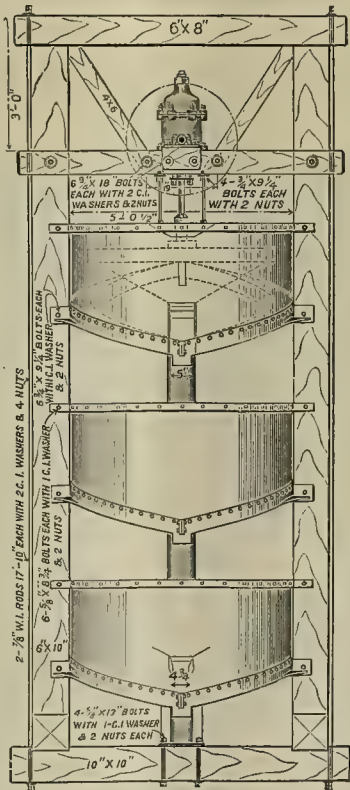
If true, this device represents a radical improve-



Side Sectional Elevation Traylor Centripect Screen.



Plan—Traylor Centripect Screen.



Triple Unit Wet Screen.

ment in ore milling apparatus. Perfect classification means better saving in the mill, and mining engineers who watched the endurance and capacity tests originally made on these screens are enthusiastic supporters of the broad claims made by the manufacturers, one engineer having expressed it as his opinion that "the centripect screen would in a short

time be as widely and generally used as the Wilfley table."

In addition to the broad claims above mentioned, the manufacturers claim the following as specific advantages of the Traylor centripect screen: "Perfect distribution of pulp by means of centrifugal motion and upward impact; upward impact prevents screen cloth from clogging; screen meshes always open; every inch of screen surface working wherever the power is on; has ten times the capacity per square foot of screen cloth of any revolving screen; only ten square feet of screen cloth to be renewed in place of 80 to 100 square feet, as on the revolving screen; screen cloth wears longer; no pounding or brushing to keep screen open; pulp does not drag, but proceeds by leaps or bounds, thus giving all undersize particles a chance to pass through screen and minimizing screen wear; cleaner screening means less slimes, less undersize returned to regrinding machines and increased crushing capacity; in wet screening, no spray or additional hydraulic water is required, the water coming with any pulp being amply sufficient; no 'balling up' of wet pulp is possible on the centripect screen; it sizes more closely than can be done by hand screening; its classification of pulp by size of particles is admirably superior to hydraulic classification."

The Traylor centripect screen depends for its efficiency on centrifugal motion used in conjunction with an upward impact—hence the name. The centripect screen is a slow speed screen and is enabled to distribute the material with only a moderate centrifugal force that would have no effect alone were it not for the upward impacts, 600 per minute, which keep the pulp constantly leaping slightly from the surface of the screen.

The device consists essentially of a dished screen, approximately saucer shaped, mounted on a vertical shaft which rotates at a speed of about thirty revolutions per minute. This slow speed provides ample centrifugal force to properly distribute the pulp, only when used in connection with the upward impact. The crushed material is delivered to a feed plate at the center of the screen and would remain there inert if the screen were simply revolved, as the above speed does not provide sufficient centrifugal force to entirely overcome gravity. However, the manufacturers say: "The moment that the upward impact is used the ore particles are raised slightly from the surface, and by the time the screen has reached its ordinary speed, thirty revolutions per minute, the pulp is fairly alive and the centrifugal force is distributing it evenly toward the periphery where the oversize is taken off, the undersize passing through the screen being delivered to the center of the next finer screen where double or triple unit screens are used."

The mechanism for producing both the impact and the rotary motion has been designed to secure the fewest number of moving parts, and to be so arranged that it is impossible for them to slip or become deranged when in action. The impact motion is obtained by revolving one multiple-faced manganese steel cam against another, thus designed to produce the effect of a succession of cams, and by this means to reduce undue wear incident to a single high-speed cam to a minimum. The tension required for the impact is obtained from a heavy crucible steel helical spring of the railway car type. The operating shaft passes downward through a beveled gear, the shaft being spliced therein so as to produce positive rotation and at the same time permit the free vertical motion required for the impact. The head motion is enclosed in a dust-proof case containing oil, all working parts thus operating in oil insuring excellent wearing qualities and a minimum of attention.

The centripect screens are built in single, double and triple units, i.e. with one, two or three screens operated from one head motion, the accompanying illustration showing a triple-unit screen arranged for wet work. In the case of double or triple-unit screens the shaft of the second screen screws into the hub of the first and so on. An adjustable spring step bearing is provided at the bottom to act as a guide, also to supply additional tension as required.

For wet screening, as shown in the accompanying cuts, a pan of sheet steel of same form as the screen surface is riveted to the screen arms and to the center, but thus forming a water-tight irrigating dish immediately under the screen. The water coming with the pulp is not lost during the first 6 inches, consequently no sprays or additional water are required with the centripect screen. The manufacturers say: "Any pulp that will flow contains sufficient water to irrigate itself perfectly on the Traylor screen."

The irrigating pan is omitted in the dry screen, the "through" product falling directly into the hopper. The housing of the dry screen differs from that of the wet screen in that the launders and hoppers are given a fall of 45°.

A number of these screens are already in use. In addition to screens supplied to Colorado and other Western States, the manufacturers report having shipped machines to Mexico and to Cuba for both wet and dry work.

The Traylor centripect screen is the invention of Samuel W. Traylor, for many years one of the constructing engineers for the Colorado Iron Works Co. and latterly manager of their Eastern office. The

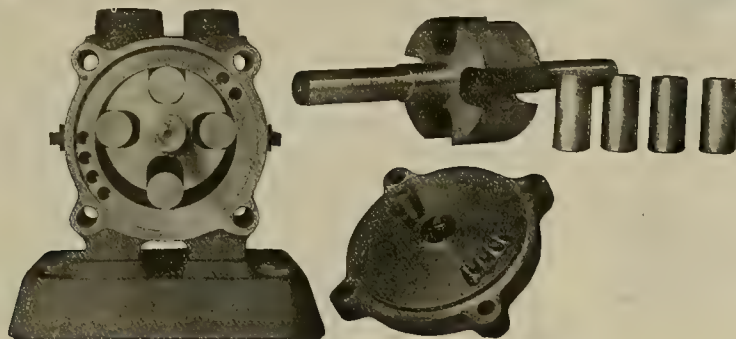


screens are being manufactured by the Traylor Engineering Co., 118 Liberty street, New York, from whom further details may be obtained upon application.

### The Cooley Engine.

The claims of the Cooley General Development Co., Jamaica Plain (Boston), Mass., for the new engine manufactured by them, are that it will withstand hard usage, may be immersed in water, exposed in damp places without injury, has few wearing parts, and does not require an engineer to run. This engine is built on the rotary principle.

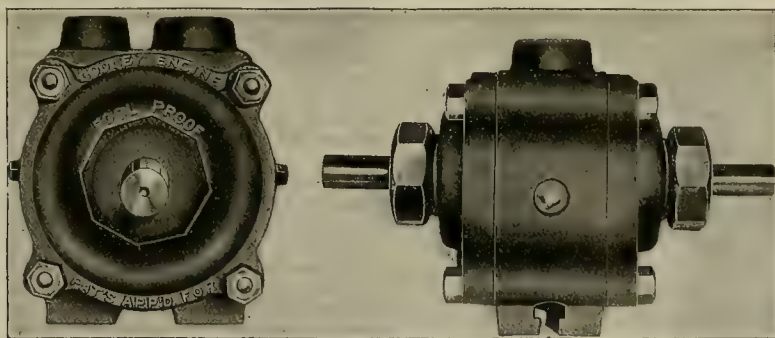
Fig. 1. shows the moving parts in place within the



Internal Construction.

cylinder. These consist, as will be noted, of a slotted hub on the main shaft into which fit the four cylindrical steel roller valves. When in operation the roller valves roll upon the bore of the cylinder and are held there by steam pressure and centrifugal force.

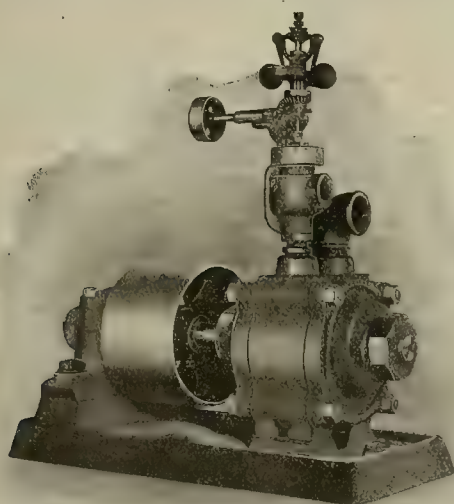
This engine is built for either belt or direct con-



Direct Connected.

nected. For direct connected work it is made in the straightaway and reversible types.

An "industrial type" for use in machine shops,



Industrial Type.

stamp mills, rock crushers, prospecting outfits, drilling sets, etc., is also shown.

The manufacturers say this engine is more remarkable for that which it does without rather than that which is in evidence, and that it will stand up and maintain good working conditions under severe shocks and strains.

In California water has been pumped by steam to supply a 40-stamp mill a distance of 14 miles, with a vertical lift of 500 feet, at a cost of 20 cents per ton of ore treated.

### The Ore Deposits of Bisbee, Arizona.\*

NUMBER VII.

Written by F. L. RANSOME.

In that very productive part of the Copper Queen workings lying northeast of the Holbrook shaft and in the corner formed by the Dividend fault and the contact of the limestones with the porphyry of Sacramento Hill minor intrusions of porphyry, probably offshoots from the main intrusive stock, have evidently influenced the deposition of the ore to an extent recognized by the miners, who expect, usually, to find ore bodies in contact with them. They appear to have the form of irregular dikes, or occa-

sionally sills. They are sometimes impregnated with a little pyrite and often decomposed to a white or yellow clay, which usually reveals its origin by the presence of grains of quartz representing former phenocrysts in the porphyry.

The relation of the ore to the porphyry is illustrated in the old Dividend stope on the fourth level,

about 650 feet northeast of the Holbrook shaft. The drifts running eastward toward the stope pass through metamorphosed limestone, impregnated with pyrite, into an irregular dike of porphyry. The ore occurs as pyrite and chalcocite, with a little chalcopyrite in soft, oxidized ground along the eastern side of this dike. It is possible that some of the ore now worked may have been deposited in porphyry, although, as a rule, this rock, when occurring as dikes and sills in the pyritized limestones, is seldom itself conspicuously mineralized.

Directly under the Hayes air shaft, on the fourth level, there is exposed a mass of porphyry, which apparently forms an irregular sill in the limestones. Immediately under the porphyry, which is undecomposed and not perceptibly mineralized, separated from it by a sharp contact, is a small, nearly horizontal mass of pyritic ore, which, as is shown by the winze, rests upon mineralized limestone.

These and other examples indicate that the presence of porphyry dikes and sills in the limestones, while by no means a necessary condition to the formation of ore bodies, is yet favorable to their occurrence.

That there is a genetic connection between the porphyry mass of Sacramento Hill and the deposition of the ores is certain. The actual relation of the ore bodies to the porphyry-limestone contact is, however, nearly as obscure as in the case of the Dividend fault. On the surface the contact is concealed by surficial material in the gulch. Even on the western slope of Sacramento Hill, where the rocks are well exposed, the alteration of porphyry and limestone is such that the actual contact between the two is rather indefinite. Underground crosscuts have not been driven far enough to throw much light upon the details of the relation between porphyry and ore. They have usually been stopped whenever anything supposed to be porphyry appeared at the face.

The general conclusion drawn from such data as are obtainable in regard to the contact between the Sacramento Hill porphyry and the limestones is given in a few words. The contact is imperfectly explored. It is apparently irregular, with conspicuous departures from a simple curved surface. It is the locus of pronounced metamorphism and mineraliza-

tion which extends both into the limestones and into the porphyry. Pyrite occurs in great abundance in the immediate vicinity of the contact—characteristically in disseminated form, but occasionally in considerable masses. The workable bodies of ore, owing their value to processes of enrichment subsequent to the primary pyritic mineralization, occur within the mass of the limestones, usually at some little distance from the actual contact to whose curved course their distribution in the main conforms.

It is highly probable, if not reasonably certain, that other fissures than the Czar and Dividend faults have helped to determine the form and position of individual ore bodies. Such fissures, however, cannot be satisfactorily studied in mines where ore value and extensive oxidation are so closely related and where workings in the soft clayey ground soon close upon disuse. In the Lowell mine there is abundant evidence that ore deposition was facilitated by irregular fissuring of general north-south trend. Most of the disturbance appears to have consisted in differential movements along planes of bedding (bedding faults) with occasional irregular fractures of no great vertical persistency cutting across the beds.

**GROUND WATER AND DEPTH OF OXIDATION.**—The general ground water level is difficult of definition in the Bisbee district. As in other arid regions, it lies deep, and oxidation has been unable to convert all of the sulphides above it into what are commonly termed oxidized ores. As country rock and ore do not constitute homogeneous material, there is thus a very irregular downward transition from the oxidized ores to the sulphide masses, involving a zone several hundred feet in depth within which ores of both classes occur.

Large masses of sulphide ore have been found on the second level of the Copper Queen mines, less than 200 feet below the surface, in the vicinity of the Dividend fault. In the Calumet & Arizona mine, on the other hand, partial oxidation has extended to a depth of over 1050 feet, as shown by the abundance of cuprite and native copper, with some limonite and malachite. In the Lowell mine oxidation has penetrated irregularly to a depth of 1100 feet. At this depth the mine, formerly nearly dry, developed a flow of water amounting to about 175,000 gallons per day.

Within the transition zone between completely oxidized and unaltered sulphide ores, which has a maximum depth or thickness of about 900 feet, the oxidizing processes are controlled to a large extent by recent irregular fissuring and by the relative permeability of the various sulphide masses to generally descending solutions. Fissures cutting through masses of lean pyrite are almost invariably accompanied by streaks of rich ore, often containing chalcocite, together with cuprite and native copper. Where there are several such fissures near one another important ore bodies result. The general association of profitable ore with fissured, broken, permeable ground is well recognized in practical operations and turned to good account in underground exploration.

Mr. Douglas, writing of the Copper Queen mine in 1899, says: "The sulphurets in these limestones occur in layers of various thickness and solidity. When solid and thin they are generally partially oxidized, and are rich. Two very large compact masses have been encountered and in part explored. The largest apexes on the 200-foot level and has been traced to the 400-foot level, and a string of stopes nearly 500 feet has been opened upon it, but the profitable ore bears only a small proportion to the whole mass. Roughly speaking, the mass is enveloped in a shell of oxysulphide, and streaks of similar black copper ore of good grade intersect it; but the core consists of compact bisulphide of iron, very lean in copper."

The essential facts of occurrence as presented in the foregoing description were confirmed by the observations made during the present investigation. The more recent workings of the Calumet & Arizona and Lowell mines afford ample opportunity for verifying the frequent occurrence of residual kernels of lean pyrite enveloped by good ore, and this in turn sometimes inclosed in oxidized ferruginous clays or "ledge matter." Such a mass of pyrite was noted on the 1000-foot level of the Lowell mine, lying generally parallel with the bedding of the limestones, and in contact with partially oxidized ore both above and below. Some native copper was seen in the oxidized ore close to the pyrite. Similar residual masses of worthless pyrite surrounded by good ore, usually containing chalcocite, were seen on the 1050-foot level of the Calumet & Arizona mine, particularly in a stope about 300 feet east of the shaft.

It thus appears that the oxidizing solutions, guided by fissures, bedding planes, and relatively porous masses of rock or ore, move generally downward, but locally also along lateral planes and upward. Permeable or fissured masses of pyrite have been more or less thoroughly altered, while compact or unfissured masses have retained to a large extent their original character, and contain but little copper.

**GENESIS OF THE ORES.**—The account of the Bisbee ore bodies given in the preceding pages shows beyond need of further demonstration that two general processes have operated to form the ores now exploited. These are (1) metasomatic alteration, including

\* Abstract Professional Paper No. 21, U. S. G. S.



pyritic mineralization, and (2) oxidation and its attendant phenomena of transportation and enrichment. Concerning the precise boundary between these two general activities some difference of opinion is possible, but as regards the essential share of each in the genesis of the ores there can be no question. There are few known ore bodies in the Bisbee quadrangle which do not demonstrably owe their value to the co-operation of both processes.

As shown in those underground workings which are below the intermediate zone penetrated by oxidizing reagents, the sulphide minerals ascribable to the earlier period of metasomatic alteration are common pyrite, and perhaps also a little chalcopyrite and sphalerite. The occurrence of some cerussite in the limestones suggests that galena may also occur, although this mineral has not been seen. Associated with these sulphides are amphibole (tremolite), pyroxene (diopside), garnet (grossularite), vesuvianite, quartz, and chlorite in the limestones; quartz, sericite, chlorite, perhaps kaolin, and a little epidote in the granite porphyry; and quartz and sericite in the Pinal schist. Tests made in the chemical laboratory of the Survey upon representative specimens of the mineralized limestone, containing abundant disseminated pyrite, but no visible chalcopyrite, afforded in one case a trace and in the other 0.12% of copper. The pyrite is, therefore, cupriferous, the copper probably occurring as an admixture of the chalcopyrite molecule.

A mass of pyrite exposed to oxidation by atmospheric agencies is probably gradually changed to ferrous sulphate, and this in turn to the ferric salt. If the sulphur in the pyrite is completely oxidized, some free sulphuric acid is also formed. Such copper as may be originally present in the pyrite, probably in the form of the chalcopyrite molecule, may be supposed to undergo a similar alteration to cuprous and cupric sulphates. These comparatively simple conditions, while they may have obtained at some early period in the geological history of most ore bodies, are not those under which the ore masses actually studied have been and are now being altered. The pyrite as a rule is not exposed at the surface, but is overlain or enveloped by the products of earlier chemical activity, which, while of an oxidizing character in the main, has probably involved reduction as a minor phenomenon. These products the oxidizing solutions must penetrate before they can directly attack the fresh pyrite. Furthermore, in an arid region, such as Bisbee, where oxidation, instead of extending uniformly down to a ground water level at a moderate distance below the surface, has penetrated very irregularly to depths of 1000 feet or more, leaving residual masses of unoxidized sulphides at higher levels, the solutions moving downward to react upon any given pyritic mass that may have been modified not only by passage through the generally oxidized zone and through secondary sulphides, but through original sulphides as well.

(TO BE CONTINUED.)

ONE of the essential features in the economical operation of mines is the construction of good roads with easy grades.

## Some Points in Wet and Dry Crushing by Rolls.

Written for the MINING AND SCIENTIFIC PRESS by R. B. LAMB.

Rock crushing devices are of many kinds, but there is perhaps no crushing machine in use which requires the attention demanded by rolls, if we are to get the capacity at reasonable cost. One of the most important factors in the operation of rolls is the speed at which they are run. On this matter much has been said and written, and mathematical data piled up respecting every portion of the machine, with instructions to direct its operation, but in actual practice we find we are required to work along lines somewhat different from those promulgated theoretically. In both dry and wet crushing the things to be watched most closely are practically the same, the great difference being that in wet crushing the water will give a much greater roll discharge, and therefore the capacity of wet-crushing rolls is correspondingly greater. The first material consideration is the roll shells. There is only one running condition permissible—the rolls must set perfectly level, they must be absolutely parallel and the side alignment must be accurate. That is, the end of one roll must not project beyond the end of the other. There must be no "rims" formed. The formation of rims in the "cheek" plates on either side at once leaves an open space at the opposite end of the roll, between the roll and the plate, and through this space much coarse material will fall, reducing the capacity of the rolls. It is self-evident that if the faces of the rolls are not true, parallel and level, loss in capacity must result. The adjustment of the rolls is of utmost importance. To keep the faces of the rolls in perfect condition nice adjustments must be maintained. These adjustments must be such that the rolls can be easily kept parallel and level, with the ends true, after having been properly adjusted. There are several ways of doing this, and it varies with each manufacturer. If the rolls are not parallel and true in alignment rims will form and cannot be avoided. It may thus be readily understood how the capacity of the rolls may be easily reduced 25% to 30%. If the rolls are not horizontal and parallel it is equally plain that one shell will be worn much more than the other. The next important factor in the operation of rolls is the speed. The best practical speed for coarse crushing—say down to  $\frac{3}{4}$ -inch mesh—is ninety revolutions per minute, and for finer crushing 100 to 160 revolutions per minute, according to the size of the rolls and material operated upon. These speeds are those which are found, in practice, to give the most satisfactory results, while keeping the roll faces smooth. Should any unevenness or bad wearing of the faces occur the roll shell should be replaced by a new one until the old one has been turned up for service again. The roll bed should be solid and without motion—securely bolted down—and there should be no "lost motion" in the journal boxes. The cheek plates must be constantly watched and be at once

replaced when they show signs of wear. For dry crushing, wooden cheek plates are inexpensive and give excellent results. For wet crushing I use an iron back to which a replaceable wood face is attached. This is quickly replaced when worn and is economical. Tension-spring bolts should be kept tight and free from foreign motion. A light spring should always be attached opposite the tension springs to take up "back motion" and to prevent unnecessary jar on the tension-spring bolts when very hard pieces of rock or other very hard substances—such as pieces of drills from the mine, or nuts from machinery, cars, etc.—pass through the rolls. To get full capacity out of rolls when they are properly adjusted, it is necessary to make an even and proper distribution of the feed across the face of the roll. This is best accomplished by means of what is known as a "splitter," being a deflecting device employed in the feed box to direct the fall of the uncrushed ore to the right or left, and being readily adjustable. A feed apron, suspended above the crushing point of the rolls, prevents the rock from flying and jumping out of the rolls.

In wet crushing, if too much water is used, the material is sluiced over the rolls, as it were, and is returned as oversize. This continuing causes this oversize to accumulate and greatly reduces the capacity of the rolls. It is no uncommon thing to find rolls which should crush 100 tons daily, passing only thirty tons, due to improper and inexperienced attention. To secure the greatest capacity rolls must be regularly and properly fed, speed maintained, and the rolls kept tight and all parts free from lost motion. The tension rods must be kept to proper tension so that the material crushed shall not be kept in circulation, instead of passing through the screens. If these essential points in running rolls were given more of the attention they deserve, rolls would find a more extended application.

## THE PROSPECTOR.

The prospector should always be contented to accept nature's conditions as he finds them, for the one who starts out to find a mine resembling some other of which he has personal knowledge or hearsay information, is likely to be disappointed. Nearly thirty years since a prospector discovered a valuable conglomerate deposit in the Black Hills of South Dakota. He made a handsome profit from it and sold to good advantage. He then spent about twenty years in the search for a similar deposit in other countries, and exhausted his capital in a fruitless quest, though he saw many promising mines of real merit, but the geological conditions did not suit him and he persistently refused to entertain any proposition but a "cement" mine rich in gold. No prospector or capitalist can afford to follow in the footsteps of this man, who for years searched vainly for a "made to order" mine.

The mineral specimens sent from Los Angeles, Cal., and obtained in San Diego county, Cal., have been identified as follows: No. 1. Chalcopyrite, altering to bornite. A light-green garnet (grossularite) is also present. No. 2. Pyrite. No. 3. Pyrite, with also crystals of mispickel (arsenical iron sulphide). A small amount of pyrrhotite in fine crystalline condition is seen in this specimen. A peculiarity of this specimen is the occurrence of scales of biotite mica in the ore. As the formation from which it comes is described as mica schist, this may not seem so strange. No. 4 is pyrite, with some chalcopyrite and bornite (black) and dark brown and black micas. No. 5 is largely pyrite and chalcopyrite (copper sulphide). Quartz is also present in this specimen. No. 6 is quartz, with pyrite and chalcopyrite. No. 7 is a variety of amphibole, probably actinolite.

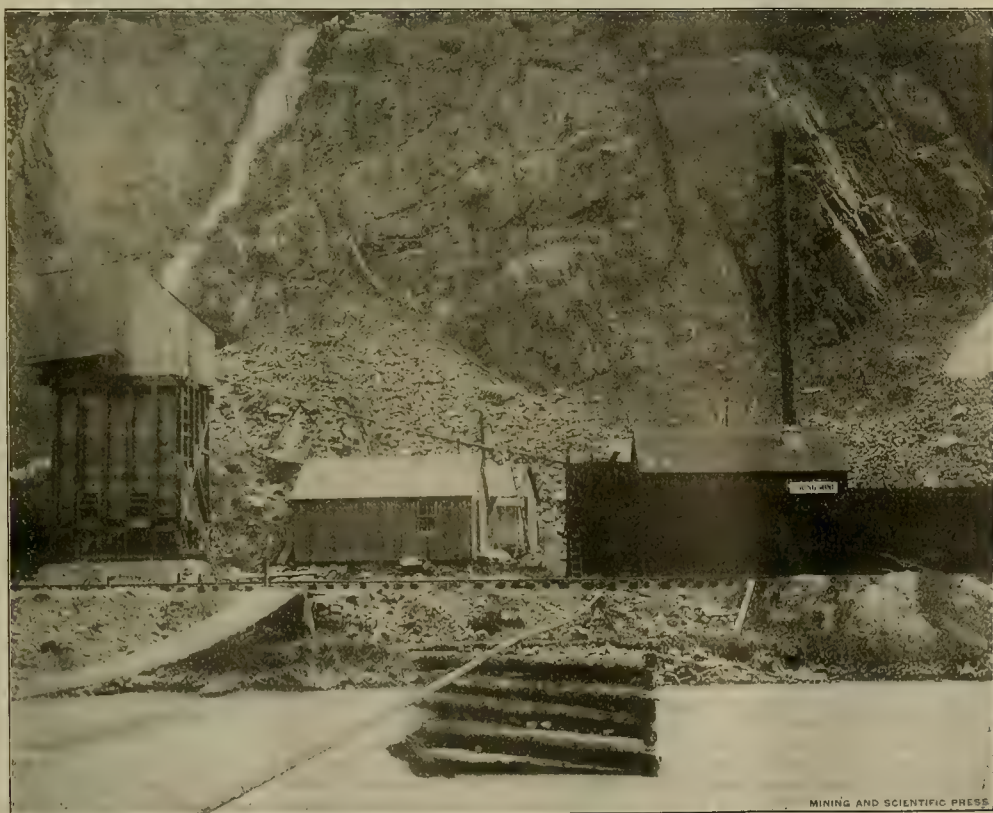
The white crystallized mineral specimens from Barstow, Cal., are calcite (carbonate of calcium). Evidently this mineral has been taken for colemanite (calcium borate). Calcite effervesces readily in cold dilute acids. Colemanite is soluble in hot hydrochloric acid, but not affected by cold acids.

The mineral from Aguanga, Riverside county, Cal., is iron sulphide, variety marcasite. It should be assayed for gold and silver. This "The Prospector" does not attempt, its function being merely to identify rocks and ores as to their general character.

The minerals from Idaho Springs, Colo., are garnet and quartz. Some of the darker gneissoid specimens also contain black mica (biotite) and a little iron and copper sulphide. No tin reaction obtained.

The mineral specimen from Garden Valley, Idaho, is largely silica, and is an altered igneous rock. It contains pyrite and pyrrhotite, but no traces of platinum were found.

The mineral specimen from Manvel, Cal., is limonite (brown iron oxide). The yellow spots appear to be organic.



Power House, Royal M. & I. Co., Near Silverton, Colo.—(See Page 146.)



## Tin Deposits of the York Region, Alaska.\*

NUMBER III.—CONCLUDED.

Written by A. J. COLLIER.

While in this vicinity the writer saw a number of crystals of cassiterite which were practically transparent. Near the end of the season a large amount of supposed tin ore was collected on the flanks of Cape mountain and shipped to Seattle, where it was examined by the writer and from it samples were selected for study in the laboratory. This supposed ore contains very little tin, but several dark crystalline minerals which have been mistaken for cassiterite. The principal constituent is tourmaline, in slender black or brown needles, and wolframite or scheelite are probably present, if, as reported, a considerable amount of tungsten was found.

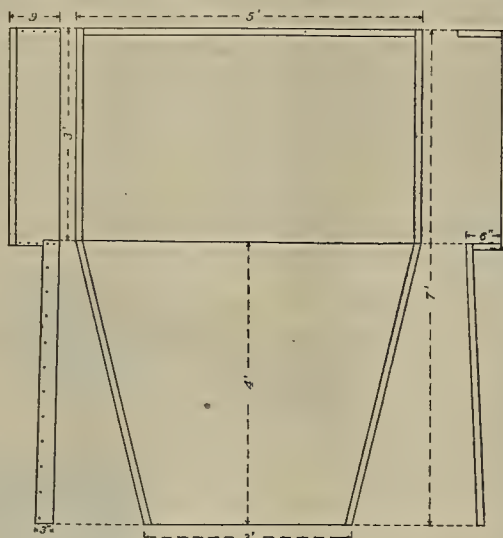
Extensive developments were planned for the season of 1903, and a well-equipped prospecting plant was sent to Cape mountain. A large dynamo driven by a gasoline engine was to be placed near the beach at the point now known as Tin City, and from this dynamo wires to several points on the mountain were to supply power for electric drills. By the use of these drills it was expected that tunnels could readily be extended into the heart of the mountain and cross-cut the ledges from which has come the float ore.

After spending nearly the whole of the season of 1903 in getting the machinery in place and establishing the winter camp it was found that the engine for driving the dynamo was defective, and the plan for development work during the winter of 1903-04 was necessarily suspended. This work, however, will undoubtedly be resumed in the summer of 1904, and it is to be expected that by the end of that season more definite information will have been obtained.

Stream tin is harder to separate from gravel than gold on account of its lower specific gravity, but the methods employed in washing it out were modifications of somewhat primitive processes of gold placer mining. Ten men were shoveling into the one "string" of sluice boxes and a cleanup was made four times a day, so that the work was frequently interrupted. The sluice boxes used were 16 feet long, 24 inches wide at the upper end and 22 inches wide at the lower end, and seven boxes were used in a "string," making a total length of 150 feet. A "dove box" 8 feet long, 4 feet wide at the upper end and 22 inches wide at the lower end, with riffles, was introduced between the fourth and fifth boxes from the upper end. (See Fig. 1.) Ordinary patterns of

purities in the concentrates are mainly hematite, magnetite, quartz and slate.

The discovery of tin ore in ledges has been reported



Box Used for Reconcentrating Stream Tin, Alaska.

by prospectors from many other localities in Seward peninsula, some of which deserve notice, since the geologic conditions are known to be promising.

The Diomed islands, which lie in Behring strait, midway between Alaska and Siberia, are reported to be composed of granite. It is reported that copper ore has been found on them, and should the tin ore found on Cape mountain develop commercial importance they may merit investigation.

Brooks mountain, which lies about 11 miles north of the mouth of Lost river, can easily be reached by a road up Lost river from the beach, or by following up Don river from Port Clarence. Wagons have

about 5 miles in length. About 1 mile from its mouth Buck creek receives a large tributary from the south called Sutter creek, and about 4 miles above its mouth it again forks, the two branches being known, respectively, as Right and Left forks.

Near the mouth of Buck creek boulders and pebbles of greenstone occur in the gravel deposits. These have not been traced to their source, but they probably came from a group of hills on the east side of Grouse creek before the present drainage was established. At a number of places along Buck creek small quartz veins were found cutting across the bedding or running parallel with it through the slate. Some of these quartz veins are as much as 3 or 4 feet thick.

The gravel deposits in the bed of Buck creek are from 10 to 150 feet wide, varying greatly in different parts of the creek.

Cassiterite, in the form of stream tin, is distributed from the mouth of the creek to within 1 mile of its head, above which point little more than traces have been found. The ore varies in size from sand to pebbles weighing thirteen or fourteen pounds. Several pieces from five to eight pounds in weight were seen, though the average size is much smaller. A few of the pebbles are perfectly rounded, but most of them are subangular. The ore from the claims near the mouth of Buck creek is generally well rounded, while that from near the head is sharp and angular. In general the stream tin grows more angular as the head of the creek is approached.

The color of the cassiterite varies from almost black to a light resin or amber; when crushed, however, it makes a light-colored resinous powder, by which it is readily distinguished from hematite or other iron minerals that are frequently mistaken for it, since they invariably give a distinctly red, brown or black powder. Sometimes small pieces of cassiterite are found inclosed between fragments of slate, showing that the ore sometimes occurs as veinlets in the bedrock.

It has been stated that the gravels contain about eight pounds of 60% ore to the cubic yard. The value per yard on this basis, with tin at 28 cents per pound, would be \$1.34, out of which charges for ship-



Cape Mountain, From York.

been driven over both these routes. By the latter route the mountain is 20 miles from deep water of Port Clarence. The bedrock exposed on the mountain consists of highly altered limestones and black slates which resemble the slates near York.

The sedimentary rocks are cut by a number of granite and rhyolite dikes, striking east and west. Don river, York river and Mint river carry granite boulders that have been derived from the mountain. This locality seems promising for the occurrence of tin-bearing veins, though so far as is known to the writer no tin ore has yet been identified.

On the west side of the Don river there is a ridge of high hills composed, in part, of slates like those found near York, which are cut by intrusive dikes of quartz-porphry and granite resembling the intrusives of Brooks mountain and Lost river. Some of the minerals often associated with tin ore have been found here and the region is worth investigating. This region lies about 10 miles east of Lost river and 9 miles north of Port Clarence.

At Ear mountain, 50 miles north of Teller, discoveries of tin are reported.

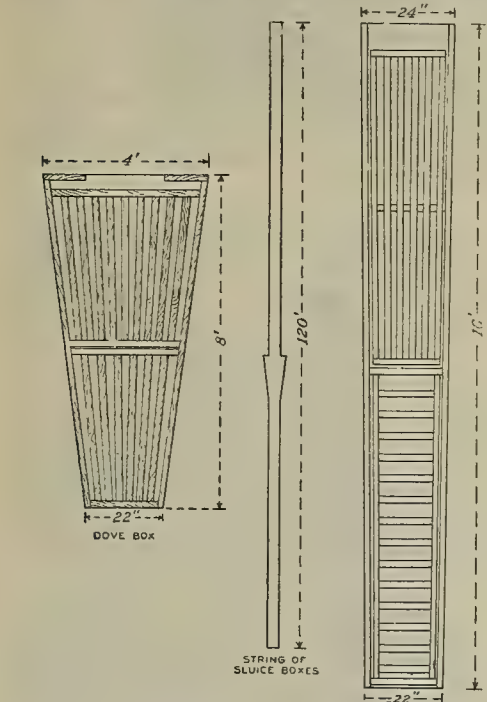
Buck creek was the scene of the first actual mining of tin ore in Alaska, and is the present center for tin placer mining activities. This settlement is on the Arctic slope of Seward peninsula, about 20 miles northeast from York and 4 miles from tide water on Lopp lagoon, an inlet from the Arctic ocean. It is reached by a wagon road from York. Lopp lagoon is not navigable for sea-going vessels and affords no harbor for such craft. Buck creek is a small stream

ping and treatment would have to be paid.

The pay streak appears to be confined to the present stream-bed and flood-plain deposits. In the present creek bed the ore is found from the surface to the bottom of the gravels. Outside the creek bed, in the flood plain, there is a covering of moss and muck above the pay gravel. No cassiterite is known to have been found on the hillsides surrounding Buck creek or on the plateau surface in which Buck Creek valley is incised, though such an occurrence is to be expected. The known pay streak varies in width from 10 to 150 feet, and in thickness from a few inches to 5 feet. Estimates of the amount of tin ore in the gravels vary from eight to twenty-seven pounds per cubic yard.

### Steam Engine Economically Operated.

Of interest are some results lately obtained in an official pumping engine test at the Park Avenue pumping station, Chicago. The engine is of the Worthington, duplex, reciprocating, triple-expansion type, having semi-rotary steam valves, but no fly wheel. The latter is replaced by compensating cylinders so arranged that their pistons retard the motion of the main piston during the first part of the stroke, but assist it toward the close, giving a uniform resultant thrust. The pistons of these auxiliary cylinders work against air under pressure from a tank. The engines are vertical and the weight of the pistons, plungers and rods is counterbalanced



Sluice Used in Tin Diggings, Alaska

Pole and Hungarian riffles were used, except that they were made of 2½ by 1½-inch material, which is larger and heavier than that ordinarily used in sluicing for gold. About 100 miner's inches of water constituted a sluice head for this apparatus. The concentrates from the sluice boxes were further concentrated by hand by panning in a box 5 feet long by 3 feet wide and 8 inches deep, into which water flowed through a canvas hose and flowed out over an apron 4 feet long in a stream about ¼ inch deep, as shown in Fig. 2. The concentrated gravel was gradually worked up over the edge of the pan, which was kept just submerged at the upper end of the apron, where the stream of water carried away the lighter portion, while the heavier particles sank in the box. It is reported that concentrates treated in this way averaged about 50% tin. The larger pieces of foreign matter were picked out by hand. The im-

\* Abstract Bulletin 229, U. S. Geo. Sur.



by another auxiliary balancing plunger, also working through the medium of water against air under pressure.

The capacity of the engine is about 22,000,000 gallons per day against a total head of slightly over 121 feet; 660.9 H. P. were indicated in the test. The duty obtained was 174,735,801 foot-pounds per 1000 pounds of steam used, corresponding to an economy of 11.32 pounds of steam per net horse power delivered in water lifted, or 10.01 pounds of steam per indicated horse power. The steam pressure was 144.45 pounds per square inch, with 154° Fahr. superheat at the throttle, the steam cylinders being provided with jackets and reheaters.

These tests were carried out under the supervision of the Bureau of Engineering of the City of Chicago, and, together with the engines and the power station, are fully described in a pamphlet distributed by Henry R. Worthington, 114 Liberty street, New York City.

### American Mining Congress.

The first annual session of what is now known as the American Mining Congress was held at Denver, Colo., in 1897, the second at Salt Lake City, Utah, in 1898; there was none in 1899; the third session convened at Milwaukee, Wis., in 1900; the fourth at Boise, Idaho, in 1901; the fifth at Butte, Mont., in 1902; the sixth at Deadwood, S. D., in 1903; the seventh assembled at Portland, Or., on the 22nd inst., and began with the usual speeches and preliminaries.

President Richards, in his annual address, proposed the following resolution:

Be it resolved, That the American Mining Congress, in annual session assembled, believing that the time has arrived when a Department of Mines and Mining would be the means of placing the mining industry on a plane commensurate with its independence to all industrial progress, urges the Congress of the United States to at once create a Department of Mines and Mining as one of the great executive branches of our Government.

The session of the 23rd inst. was addressed by E. B. Andrews of Nebraska on "The Promoter, His Place in Our Development;" J. H. Mitchell of Oregon on "Government Branch Mint;" M. D. Leehy of Washington on "Mining Law;" F. H. Newell and G. Pinchot of the U. S. Geological Survey on "Public Lands;" F. V. Drake of Oregon on "The Mineral Resources of Oregon;" Jno. Daggett of California on "The Mineral Resources of California;" O. W. Brown of South Dakota on "Cyanide Ores, Ragged Top District, Black Hills."

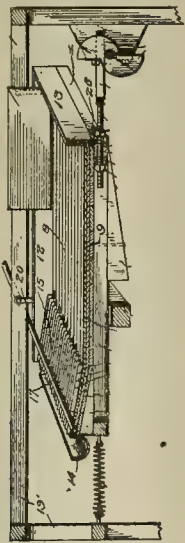
On the 24th inst. E. R. Buckley of Missouri read a paper on "The Functions of the State Geological Surveys and the Bureau of Geology and Mines." On the 25th inst. ensued discussion as to the next meeting place for the Congress. Further report of the proceedings will appear in next week's issue.

## Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 16, 1904.

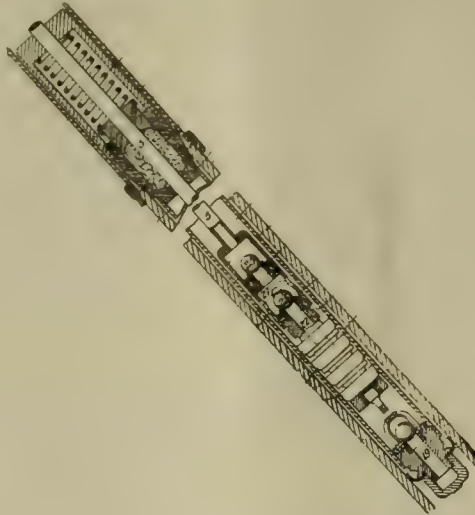
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE CONCENTRATOR.—No. 767,926; C. A. Christensen, Oretown, Or.



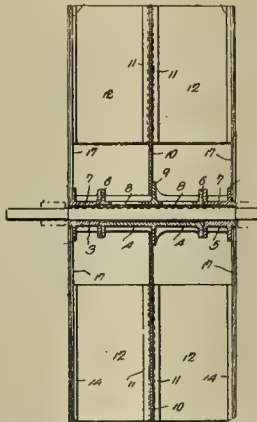
Ore concentrator, consisting of diamond-shaped table having riffles formed across same, table provided with rise or upward incline along one side and up which ends of riffles extend, troughs upon rise or upward incline provided with lateral outlets facing lowest portions or bottoms of riffles, means for supplying water to troughs, receiving trough disposed beneath upwardly inclined ends of riffles, hopper at upper side of trough and opposite end from rise or upward incline, and means for imparting vibratory jarring motion to table.

OIL WELL PUMP.—No. 767,454; W. Taylor, Bonus, Pa.



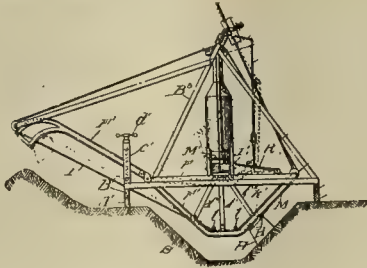
In oil pump, combination of working barrel, sheath provided with standing valve at lower end, packing chamber secured to upper end, provided with tapering portion adapted to seat upon upper end of working barrel, valved piston within sheath, central valve controlled inlet opening therein, tubular shell provided with lateral openings above inlet opening, upper valve, inclosing shell, and hollow piston rod connected therewith and passing through packing chamber.

BLAST FAN.—No. 767,580; D. F. Lepley, Connellsville, Pa.



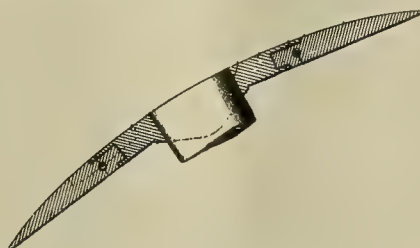
Combination in fan, of hub member having bore of greater diameter at center than at ends, disk secured to central portion of hub, end rings, spider arms connecting end rings to end portions of hub, and blades carried by disk and rings, connection between central portion of hub and disk being such as to permit distortion of such central portion without distorting shaft or affecting positions of end rings and spider arms.

EXCAVATING APPARATUS.—No. 767,765; C. W. Rood, Britt, Iowa.



In apparatus for digging ditches, combination with supporting frame, of shovel for removing earth, means for moving shovel transversely across ditch and means for directing movement of shovel to point above spoil pile.

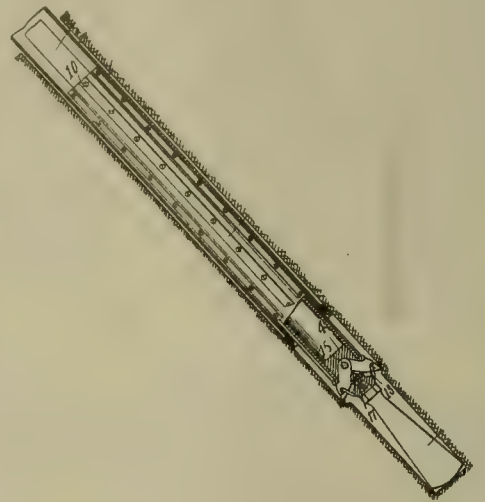
PICK.—No. 767,951; S. Montgomery, New York, N. Y.



In pick, combination with head having arm, and

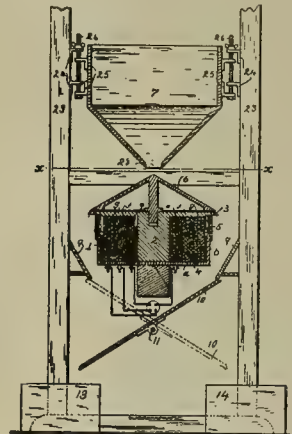
socket in one end of arm, socket having one wall cut away to form slot; of bit adapted to abut against arm, tongue integral with and extending from bit, tongue being adapted to fit snugly within socket and slot, and means for securing tongue within socket, whereby smooth continuous surfaces are produced by faces of arm and bit.

DRILL FOR DEEP WELLS.—No. 767,685; A. F. Darling, San Francisco, Cal.



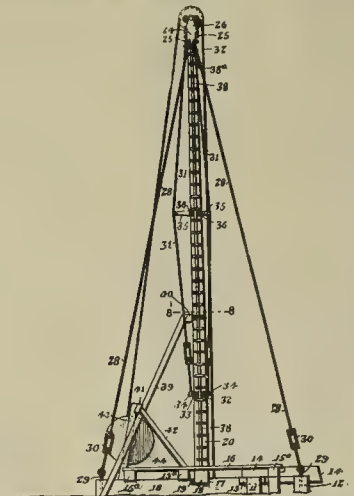
In combination with drill rod and drill bit, device connecting rod and bit having removably secured thereto plurality greater than two of longitudinal skids substantially in contact with casing and arranged symmetrically around device, skids being formed of soft material to prevent wear on casing.

MAGNETIC SEPARATOR.—No. 767,105; M. Dings, Milwaukee, Wis.



In magnetic separator, combination of electro-magnet having substantially vertical axis; cup-shaped lower pole piece partially inclosing magnetic winding; upper pole piece covering magnet and projecting marginally therefrom; non-magnetic ring of less diameter than upper pole piece, but connected to latter and arranged to cover upper edge of lower pole piece.

DRILL DERRICK.—No. 767,638; L. H. Emerson and S. P. Kerstetter, De Young, Pa.



In derrick of class described, combination with mast, of sleeve secured to and surrounding upper end of mast and having relatively immovable upstanding ears, crown pulley journaled to and between ears above mast and having opposite portions projecting beyond opposite sides of mast, and guy cables attached to sleeve.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

H. H. Hunter has the property of the Alaska-Washington G. M. Co. at Yankee Cove, near Juneau, doing development work. He has put up buildings and has driven 200 feet of tunnel in addition to the 400 feet before he took it and has also driven a raise and sunk a 50-foot shaft. The property is owned by a company, of which B. M. Behrends, of Juneau, is president. They have eight lode claims. There is water and timber close at hand with which to work the property. There have been eighteen men at work all summer.

Four tin-bearing quartz claims of J. Hollenbeck on Grouse lake, 3 miles from Lost River, near York, have been bonded to J. H. Morgan, of New York, and R. H. Rogers of London, Eng., and preparations are being made for operation of the mines.

## ARIZONA.

### Cochise County.

The Copper Queen's new smelter at Douglas has five furnaces, each having a maximum capacity of 500 tons of ore daily. It is not, however, expected by Phelps, Dodge & Co., that the Copper Queen shall supply 2500 tons of ore daily. The ores of the Phelps-Dodge mines in Mexico are shipped to Douglas and there treated. Also, a considerable tonnage of ores from the Old Dominion and United Globe mines at Globe is received, which are said to furnish a desirable flux for the Bisbee ores.

### Graham County.

The New England & Clifton M. Co. is reported to have bought the Buckeye and Sharpshooter mines, near Metcalf. The mines are showing bodies of rich ore. The same company also recently bought the Lezinsky claims on Chase creek and has men at work on them. It is said they have crosscut a body of  $3\frac{1}{2}\%$  sulphide ore for 140 feet. Development work is by tunnels, through which the ore will be taken out to the railroad on Chase creek. Development work is also being continued on the Copper King mine, one of the first claims bought by the company.

W. Poland, manager of the Arizona G. M. Co., near Clifton, reports that owing to the hot weather development work has been progressing slowly, but now that the blower has arrived work will be increased. The ore at the mouth of the tunnel averaged \$4 per ton in gold, but at the face of the tunnel it is reported averaging \$15 across 3 feet of ore.

The Z Y X M. Co. has been incorporated at Clifton with the following directors: W. Moore, W. Gunn, C. W. Beck and R. Lakanan. The camp of the company is  $\frac{3}{4}$  miles from Morenci, on Gold gulch, where men are at work. The gold-silver ore occurs in a fissure vein with a clay gouge on either side, with an average width of 15 feet between walls. The pay shoot is 5 feet in width, much of which is said to average from 1 to 3 ounces in gold and 150 ounces in silver. The silver occurs in native form, also in the form of chloride (horn silver) and bromide. Two shoots of ore have been uncovered on the lead, one for a distance of 125 feet, while the other has been prospected on the surface for a greater distance. The company owns 3000 feet of the vein, besides a spring which is 2 miles distant and 800 feet higher than the mine. It is intended to pipe the water to the mine and build a mill. In the meantime the company will continue to take out and ship ore, the income from this source being sufficient to pay operating expenses. The mine is making a sufficient amount of water for camp purposes.

The Detroit C. Co. at Morenci has started building a settling dam a few hundred feet below the concentrator, where the tailings will be restrained and the water pumped up to the mill and used again. It is at the mouth of the old Yankee tunnel and will be 50 feet high. The tailings will be allowed to settle and will then be used as a fill around the works and in the mines, while the saving thus effected in the water that now goes to waste will be a considerable item. The company has placed a motor and pump at the base of operations. The concrete work for the concentrator is growing.

### Mohave County.

The Samoan mine, near Chloride, is adding a compressor and four air drills to the mine equipment. A road has been opened to the mine and hoisting machinery brought in.

It is reported that a strike has been made in the Mocking Bird mine, near Stockton Hill, where a shaft is being sunk below the old workings. The ore is ruby

and native silver. The property is under bond to F. Stull.—Manager W. A. Mensch of the Enterprise mine has men grading a site for the hoisting plant. A road will be graded to the mine.

The pumping plant of the Gold Road M. Co., near Acme, is in operation and water is being forced over the mountain to the town. The mill is being equipped with wet crushing machinery. The plant is working smoothly and enough water for milling and town uses is obtained.—The Pasadena Con. M. Co., near Acme, in the San Francisco district, obtains water at a spring in the mountains, which is carried to the mine in a 2-inch pipe. The company is sinking a two-compartment shaft on the Rhinegold mine.

### Santa Cruz County.

C. Adams, manager of the Hermosa mines, near Harshaw, says the concentrating plant is in place and ready to start. Thirty men are working at the Hermosa mines.—At the Mowry mine, near Harshaw, seventy-five men are at work for the company. Development work is being increased, says Manager Curtis. A. Donan of Tucson is superintendent.

## CALIFORNIA.

### Amador County.

At the Treadwell mine at Volcano, Manager Schenck of the Sutter Creek G. Co., which is operating the mine, says developments are improving. The object of the 5-stamp mill is to test the ore shoots. So far results have been satisfactory and the company is securing adjoining properties. Two tunnels 500 feet in length have been run, following the veins which have proven from 3 to 10 feet in width. A shaft  $4\frac{1}{2}$  by 14 feet is being sunk on the main ledge and is 50 feet deep. Other tunnels and crosscuts will be run. There are fifteen miners employed.

Three men were killed in the Argonaut mine, near Jackson, on the 24th inst., as the result of a premature blast due to defective fuse.

### Calaveras County.

Two shifts are working steadily at the Benson mine, near Angels, the number of men having been increased on account of developments. Work on the mill is being rushed and ore is accumulating on the dump awaiting its completion. The shaft is down 100 feet and at that depth drifts have been run north and south for 35 feet. A crosscut has been started for the hanging wall in the north drift.

Superintendent Chapman has started work in opening up the tunnel on the gravel claim, near the Chris Anderson mine, near San Andreas.—One of the boiler heads blew out at the Lloyd mine last week, causing some damage and an interruption in operation of the mill. The damage is being repaired and the mill will resume this week.—The 12 H. P. engine for the hoist at the Chris Anderson mine is set up. The gravel mill is on the ground.

### Fresno County.

Coalinga reports say an oil gusher was struck last week on the ground of the Coalinga O. & G. Co. The derricks were torn down and workmen were covered with the spouting oil. The strike was made at a depth of 1630 feet. The owners expect a yield of 1000 barrels a day. The work of boring on the well began on April 26.

### Inyo County.

M. O. Hoyt, S. A. Overholtzer, O. L. Emery et al. of Colton, San Bernardino county, have incorporated the Lone Star G. M. Co., to develop a group of claims in Death valley. It is intended to put up a 2-stamp mill and a cyanide plant.

### Kern County.

Among the industries at Bakersfield, as a result of the discovery of oil in the Kern river field, says the Californian, are the oil refineries. That of the National Refining Co. of Chicago, Ill., is south of the Standard Oil Co. storage tanks. The work of construction is progressing and all of the preliminary work completed. A water well has been sunk, two 50 H. P. boilers and the necessary engines for power are in place and an electric light plant has been installed to furnish lights. The water tanks are also in place and an air compressor is used to pump water from the 450-foot well. The refinery proper will consist of five 378-barrel stills, together with the necessary coolers and condensers. Two of these stills are on the road and will be in place ready for operation next month. G. C. Calhoun is president and general manager of the company.

### Mariposa County.

At the Austin group of mines, adjoining the Triumph mine, near Whitlock, on the north and west, work is progressing in development and extraction of ore. The principal workings are on the Regan and Coronada claims. Superintendent W. H. Cavin says the ledge has an average width of 3 feet, and the ore mills \$20

per ton in free gold. A tunnel is being run to tap all the ledges in the group. The Hayseed, Regan, Coronado, Golden Gate and Dusenberry claims comprise the group. The full length of the tunnel will be 1120 feet. There are 600 feet more to run.

At the Omparisa mine, near Whitlock, H. A. Kunz, superintendent, is increasing work on the Mountain King claim. Ground is being leveled for a balance gravity tramway from the mine to the river. A crosscut tunnel is being run that will give 700 feet of backs on the ledge. Five ledges will be cut by the tunnel. A 10-stamp mill will be put in, a ditch 9900 feet in length being dug which will give a 32-foot head of water at the mill. It is proposed to build to that point a road connecting with the Mariposa and Bull Creek roads. The company will build a sawmill near Bower Cave to furnish lumber for flume and buildings.

W. B. Sayers, superintendent of the U. Roy mine at Indian Gulch, says he is putting in a hoist and other machinery to be used in development work. A stamp mill is already on the property and ore is being taken from the mine.

### Mendocino County.

A ledge of copper is reported uncovered near Eden Valley, 30 miles from Willits. R. Singleton and W. Ellis were making a road from Singleton's place out to the public road and struck the top of the ledge. Prospecting developed the ledge 20 feet in width. A pit 6 feet deep was dug and a well defined wall found on east side of ledge and in contact with this wall was found a body of malachite. It is said to be a contact vein, with serpentine on one wall and slate on the other. Arrangements are being made to do development work.

### Mono County.

Bodie reports say three roads are being built into the Masonic Mountain district—from Bodie, from Bridgeport and from Sweetwater. At the Pittsburg work will be started on winter quarters and they will work the claim through the winter. At the Myrtle & Julia group work is progressing.

### Nevada County.

F. E. Kline of the Continental C. & G. M. Co. says preparations are being made to reopen the Badger mine on Pike Flat at Grass Valley. The company will also develop copper claims near Newtown.

The Golden Star mine in Forest Springs, near Nevada City, under bond to Arbogast Bros., is being equipped with a hoisting and pumping plant. The Golden Star is near the Norambagua mine. There is a 2-foot ledge uncovered and in places free gold shows in the quartz.—The Blue Ledge M. Co. of Grass Valley, operating near Nevada City, reports work progressing. The Blue Ledge is in the Willow Valley district. They have a well developed ledge and expect to have the shaft cleaned out this week, so that sinking and drifting may be done. W. T. Jones is superintendent of the Blue Ledge.

### Placer County.

At Dutch Flat, W. & P. Nicholls are cleaning out the Somerset shaft, which was sunk about twenty years ago. The shaft is 110 feet deep and down to bedrock; a tunnel of 70 feet was run from bottom of the shaft. They have men at work on eight hour shifts and will further develop the ground.

### Plumas County.

R. E. Carswell at Taylorsville, manager of the Regal mine (formerly the Peter mine), in the north arm of Indian valley, reports his company will increase development work. It is intended to sink the shaft to 500 feet below the level of the valley and to crosscut from different levels to the vein, which is 80 feet in width. He reports a smelter necessary to extract all the values from the ore. A quartz mill was bought and will be set up and operated until other arrangements are made.

### Riverside County.

G. I. Leonard of Corona, manager, reports that it is proposed to equip with machinery the tin mines on the San Jacinto estate, 7 miles east of Corona. The mines have not been worked since 1891.

### San Bernardino County.

The Fletcher smelter at Needles is running and turning out bullion. About 1500 tons of ore were shipped from the Stockton Hill, Ariz., section and the mines are turning out 700 tons per month. During July 612 tons were shipped from Kingman, Ariz., and Berry to Needles. The company is preparing to develop the properties for increased output.

### Santa Clara County.

An agreement has been recorded by which J. V. Coleman et al. bind themselves to sell to H. C. Davy the Guadalupe quicksilver mines, near San Jose, including 1520 acres of land, machinery, etc., for

\$250,000, at any time within five years. Davy obligates himself to operate the mine continually, and to pay specified royalties on quicksilver, graduated in proportion to the product of the mine.

### Shasta County.

At French Gulch it is reported that S. Jones and M. Russell of Wallace, Idaho, negotiating for the Washington mine, will enlarge the mill.

### Siskiyou County.

C. J. Bryan has men at work putting up a quartz mill on Deadwood creek, a short distance above the junction of Cherry and McAdams creeks, near Yreka.—The Mount Vernon Co., at top of divide between Greenhorn and Cherry creeks, south of Yreka, intends putting up a 10-stamp mill to be run by electricity, for which a foundation has been laid, and the lumber will be sawed out by the sawmill which the company has built. There is quartz in sight from two years' prospecting to justify putting up a quartz mill.

### Trinity County.

(Special Correspondence).—The property on Quimby creek, which Beall & Temple sold to San Francisco parties, is under development and showing promising values. At the surface the ore is free milling and at 135 feet in depth, where the ledge is 15 feet wide, shows sulphurets with average value of \$14 in gold. The owners have a 10-stamp mill on the ground which will be set up and arranged for winter operations.—The Camp Smith claim is being prospected by parties who report having struck a 3-foot gold-bearing ledge in granite and porphyry.

J. E. Blair of Weaverville reports from the New River mining district. Manager Keith of a zinc plant at Denver, Colo., is negotiating for a copper proposition on Quimby creek. This property consists of six claims, three of which extend for 4500 feet on a ledge which is 30 feet in width and in granite and limestone formation. The claims are owned by J. R. Blair et al. Beall & Temple own claims in the same locality, the ore assaying \$10 in gold and 10% copper.

On China creek, a tributary of New river, the hydraulics worked by sixteen men for San Francisco parties uncovered recently a porphyry dyke 100 feet in width by 700 feet in length, showing gold values in numerous seams. It is stated that the whole dyke carries values of \$8 in gold per ton. A 10-stamp mill is being built.

Weaverville, Aug. 23.

V. L. Fox, A. Reeves and D. Pierano, operating the George Klein mine near the summit of the Deadwood divide, near Deadwood, are shipping ore to the smelter.—Work on the road, which will connect Dedrick with the Mason & Thayer mines on Little East Fork, is progressing. There are fourteen men employed and about half of the road, which will be 4 miles in length, has been completed. There are twenty men on the payroll at the Globe mine, across the divide from Dedrick. They are getting out ore and running the 5-stamp mill. The development work leads directly through the mountain, and eventually all of the operations of the company will be carried on on the Dedrick side of the hill.—The Chloride-Bailey mines, with a 20-stamp mill on the creek and a 10-stamp mill on the mountain-side of the mine, are idle. Three men employed throughout the winter did considerable development work. The working tunnel is in 1000 feet. On resumption of operations at the Chloride-Bailey mine it is expected the two mills will be consolidated on the creek.

Weaverville reports say the La Grange Hydraulic M. Co., operating the La Grange hydraulic mine on Oregon Gulch mountain, between Weaverville and Junction City, will rebuild the flume which forms a part of the water supply system of the mine. Eleven miles of flume must be rebuilt. The company has bought a tract of timber land and a sawmill with which to cut the lumber for rebuilding the flume, but before the mill can be taken to the head of the ditch, where it will be set up, the wagon road up Stuart's Fork must be rebuilt for a distance of 10 miles and several bridges put in. The water supply system of the La Grange mine, which includes 11 miles of flume, 15 or 20 miles of ditch, a pipe siphon which carries water through a 30-inch pipe from a point on the mountain side 1100 feet above Stuart's Fork across that stream and up the mountain on the opposite side of the stream, 1000 feet above the creek, in addition to a tunnel 1 mile in length, driven to accommodate the system, was installed about eight years ago, said to be at a cost of \$1,500,000. Under management of P. Bouery, the La Grange mine has been yielding \$30,000 per month, the property being operated almost throughout the year.

The Lappin mine at Deadwood, under bond to J. Beatham, W. L. Wilson and



P. Hogan of Port Hudson, Mich., is being worked by Superintendent F. Hollingsworth. J. Beatham is manager for the company. The Lappin mine comprises eleven claims, two of which are patented. The mine is said to be favorably located for working, with plenty of timber and sufficient water for mill and mining purposes. Most of the work heretofore done on the property has been in the nature of prospecting and development. There is an ore body in sight for stoping and the extension of the lower tunnel will open up another body of ore. The company will increase development work. A stamp mill is proposed.

**Tuolumne County.**

The incline shaft at the Mohican mine, near Groveland, is 320 feet below the tunnel level. Stations have been cut at a depth of 200 and 300 feet and drifts are being run north and south. Three 8-hour shifts are sinking the shafts. Two more machine drills will be put into the mine. The 5-stamp mill is running steadily. Thirty-two men are employed by F. Chappellett, superintendent.

At the Beehive mine on Table mountain, near Tuttletown, twelve men are employed, and the cement gravel mill that has been put up was started last week.

A diverting dam is being built on the main Tuolumne river, near Groveland, by the Garner M. Co., for conveying water into a flume and thence to the company's mines on the north river hillside, below the Lost Fox mine.—The Pennsylvania mine at Cherokee, near Carters, is being unwatered, says D. B. Neagle, owner.

It is said the Vine Springs mine, near Columbia, will resume operations.—The App mine at Quartz is running full-handed and the 60-stamp mill is crushing steadily.—In the Soulsby mine at Soulsbyville the shaft is down 400 feet. High-grade rock is being extracted at that level south. The shoot that was worked at the 300 is being opened on the 400.—In the Santa Ysabel mine, near Steat, the main shaft is sunk 650 feet. A station has been cut at the 400-foot level. It is intended, says Manager E. C. Loftus, to open the same and exploit thoroughly. The shaft will be continued down.

W. H. Martin of San Francisco has a bond on the New Albany quartz mine and its extensions, near the Grizzly and Lady Washington mines, on the North Fork of the Tuolumne river, near Carters. Superintendent W. Connolly has development work under way.

**Yuba County.**

The two dredge mining machines of the Hammon Co. on the Hallet place, 10 miles east of Marysville, are at work. Manager W. P. Hammon says the second machine has been set to work, as there is sufficient electric power.

**COLORADO.**

**Boulder County.**

The Chicago-Bird's Nest M. Co. has granted a lease to H. D. Fulton of Denver for one year of the Bird's Nest mine, on Spencer mountain, near Eldora. The mine is equipped with machinery. The vein is 2 feet wide and is said to be free from waste. Fulton is pumping out the surface water, and as soon as the shaft and levels are clear men will be put to work taking out ore.—R. Lee et al. have a lease on the eastern end of the Red Bird, on Spencer mountain, and will increase work. The mine is owned by J. W. Bowles of Littleton.

**Clear Creek County.**

Manager E. J. Wilcox of the Waldorf M. Co., operating the Stevens property near Silver Plume and other holdings in East Argentine district, says a large amount of ore is blocked out. The construction of the electric line for supplying power for the Stevens mine and mill is under way. The line will be extended from the Stevens over the crest of McClellan mountain to furnish power for the Wilcox tunnel, which has been driven a distance of 3100 feet. Three more jigs have been put in operation at the Stevens mill, and its capacity will be further increased by addition of more jigs. Arrangements are being made for carrying on development work in the mine below and above the tunnel level. Below the tunnel a streak of mixed lead and zinc ore is showing, and it is thought by extending the upper levels into new territory other large bodies of ore will be found. The erection of another mill for treatment of ore exposed in the Waldorf properties is said to be under consideration.

**Chaffee County.**

At the Jim Elaine mine, at Sherrod, owned by H. Whitehead et al., a hoist and pump are being put in to unwater the shaft. The ore carries values in silver and gold.

**Custer County.**

A small streak of high-grade copper ore

has been opened in the Rappahannock mine at Rosita. The copper ore is being saved and shipments will be made.—The lessees operating at the 500-foot level of the Bassick mine are extracting telluride ore.

**Dolores County.**

H. Obendorfer and J. Erler are developing their California group of mines, on Expectation mountain, near Rico. J. Holzner of Bisbee, Ariz., is also interested in the property.

Dunton reports say that in running a crosscut from the main tunnel of the Smuggler group of mines, which is being worked by A. J. Horlick and the Milwaukee G. M. Co., a body of ore 10 feet in width has been cut. The ore is said to be of shipping quality.—A. C. Krez has a lease and bond on the Iron Mine lode near Rico, and has let contract for development work.

**Gilpin County.**

Arrangements are made for starting up the Pewabic and Federal group of mines near Russell Gulch by a company of Eastern and California men. They will operate the property as the Pewabic Con. G. M. Co., and J. C. Fleschhut of Central City will be in charge. Manager Fleschhut intends giving a contract for sinking the Federal shaft at least 100 feet, its present depth being 275 feet, and also a contract for extending the lower levels east and west of the shaft.

Arrangements are made by the New York and Colorado owners for starting up the Dallas property on North Clear creek, near Central City. It is also reported that the same parties will resume operations on their Pleasant View group on Gunnell hill, where it is expected a new shaft will be sunk.

**Gunnison County.**

The Lakeview group of ten claims, near Tin Cup, has been sold to H. M. Gilbert et al. of Cripple Creek. The Lakeview has a showing of gold and lead ore opened up in several places. Development work will be conducted by tunnels.

Contracts are completed by which the Colorado Fuel & Iron Co. gains control of the Lewis iron mines at White Pine, containing estimated ore bodies of 50,000,000 tons, says the Chieftain. The company has a lease on these iron properties for twenty-one years, the minimum amount to be taken out each year being 75,000 tons. The terms of the lease are not made known, but it is supposed from the minimum amount to be taken out the Lewis royalties will be \$11,000 or \$12,000 a year. The Pueblo furnaces of the company are using 2500 tons of iron ore a day, nearly all of which they are shipping a distance of 500 miles from properties in Wyoming and New Mexico. If the White Pine mines contain the estimated tonnage of ore they will ship from there as soon as a road can be completed into the camp. The operation of the mines and a railroad will make it possible for other idle properties to work. The Denver & Rio Grande has surveyed a road from Sargents to White Pine, but it is thought the road will be built in from Salida by way of Marysville and Garfield, crossing the Continental divide on to the Tomichi, 3 miles above White Pine. Besides giving a shorter route that would give a 3% grade. The Lewis estate also owns iron mines in the Cebolla valley and it is said the Colorado Fuel & Iron Co. will get these as well as the Tuller & Riley properties in White Pine. The White Pine district has been producing zinc, lead, silver and iron ore from shallow workings. The Akron Co. is in with a tunnel 4000 feet long and cutting several veins on the May Mazappa and North Star mines, besides unwatering them and making it possible to increase work. Besides these are the Tuller & Riley, the Spar copper, the Edie and Eureka, the Clover mountain, the Comstock and other properties. J. D. Gilchrist is superintendent of the Colorado Fuel & Iron Co.

Gunnison reports say the mining industry of the county is improving. Pitkin and Ohio City are experiencing benefit from the mining companies now developing properties in the Gold Brick district. The Raymond M. Con. Co. is driving its tunnel to cut the Raymond vein at a depth of 1500 feet. The tunnel is in 1000 feet and has cut four leads of ore, varying in width from 2 to 5 feet and assaying from \$40 to \$70 per ton in gold principally. In the same district the Gold Link M. Co., operated by A. E. Reynolds, is driving a tunnel to cut practically the same leads as the Raymond and also the Sacramento vein, which has produced 3000 tons of ore. The Golden Islet M. Co., composed of Kansas City, Mo., men, has bought the Golden Islet group and is pushing developments on the same. The mill will start treating ore next week. Ore running thirty ounces in gold has been taken from the Golden Islet. In the silver belt at Pitkin the Colorado S. & M. Co., of which A. E. Reynolds is manager,

is increasing developments on a tunnel under the Mineral Farm basin. In the basin are the Maid of Athens and Citizen mines. These two properties are producing 300 tons of ore per month, which is going to the Denver smelters. J. C. Teller is operating the Red Jacket mine and expects to be shipping ore next month. The Tin Cup district is active and is producing considerable ore. The West Gold Hill M. & M. Co. is completing a fifty-ton mill at its properties on West Gold hill and will have it in operation next month. The company has opened ore bodies 40 feet wide near the surface with a value of \$12 per ton. The Woods G. M. Co., which represents Kansas, Mo., men, is completing a milling plant to handle gold ore from its mining property in Pieplant gulch, on the east side of Taylor park. The ore bodies opened are large.—The gold belt south of Gunnison, including Vulcan, Spencer, Dubois and other camps, is receiving attention and systematic work is going on. The milling plant recently constructed at Vulcan to treat the low-grade ores of the Goodhope and Vulcan mines will be in operation next month. The Continental mine has shipped a car of ore which returned a value of \$1000 for the carload.

The boiler has been placed on the Gold Links mine, near Pitkin, in the gold belt, and the compressor is being set up. An office building and tool house are up. A water line will be laid this week. Superintendent Pearson says he expects to have everything ready to start the tunnel by Sept. 1.

**Lake County.**

Work will be resumed on the Jay Gould group, near Leadville, next week. The property has been idle for the past fifteen years. Manager Pogue, who has been operating on the Russia, has arranged for starting work on the Jay Gould. He has a body of low-grade ore on the Russia which has been developed. The building of a mill to handle the ore from the Russia and the Jay Gould is being planned.

A new ore shoot has been opened in the Peerless Maude mine in the Horseshoe district, near Leadville. The Peerless Maude is one of a group of claims being worked by H. Dyatt. Shipments of ore have been steadily made from the group, principally from the Peerless Maude during the past few months. The mines are near the location of the eastern portal of the proposed tunnel planned by J. A. Shinn, and when that tunnel shall have been completed the ore which is now being sent east to railroad points on the other side of the range will be diverted to Leadville as the nearest shipping point. The new shoot in the Peerless Maude lies west of and parallel to the ore body which has been previously worked. Its values also are in silver and lead. In the lower level of the Peerless Maude, at a depth of 160 feet from the surface and 25 feet from the shaft, stringers of ore were found which ran high in silver. Dyatt started a drift 50 feet higher up in the shaft, and 25 feet from the shaft the drift broke into the top of the ore shoot. The vein was found to extend from northeast to southwest. The drifting will follow the shoot lengthwise through the Peerless Maude claim and through virgin ground.

In Little Frying Pan gulch, on southwestern slopes of Sugar Loaf mountain, near Leadville, considerable ore of fair grade has been taken out and steady shipments are reported. The Golden Curry, which is being operated under lease from H. R. Pendery et al., is the largest producer. The ore body has been opened up in the breast of the tunnel. Below the Golden Curry is the Venture, which is being worked by Superintendent Kavanaugh. He is taking out ore and is doing exploration and development work. The T. L. Welsh mine, under lease to Leadville parties, is being developed. There is a large body of low-grade ore in sight, but this is not being taken out as yet. The lessees are drifting for a body of high-grade sulphuretted ore thought to extend through the property. Shipping is expected to resume next month.

Leadville reports say the London mine of the Mosquito range section is producing ore that carries high values in gold. Since last winter only enough has been shipped to pay the running expenses of the mine, but the output will be increased. The lower tunnel has been driven in 3500 feet. The width of the vein varies but little and the values are uniform, says J. Kuehn, manager. As large bodies of ore are opened up it has been decided to increase shipments and more men have been put to work breaking ore. The average value of the product runs \$80 gold per ton.

**La Plata County.**

(Special Correspondence).—C. Newman, of Durango, part owner of the Ruby King mine, near Oro Fino, says he has put down an 80-foot shaft and has let a contract to crosscut from the bottom of the

shaft, a distance of 20 feet, when he expects to strike the vein.

**Durango, August 21.**

(Special Correspondence).—The Durango Girl G. M. & M. Co. was recently organized with A. Cornforth president, G. Olbert, A. D. Leimer and J. Olbert officers, and E. A. Ritter consulting engineer. The property of the company is at the headwaters of Junction creek, about 13 miles northwest from Durango. The mine is on the slope of Lewis mountain and embraces nine claims. Two of the claims, the Durango Girl and New Hope, are patented. The mine is opened by a tunnel 650 feet in length with crosscuts. A contract has been let to drive the tunnel 100 feet additional and when that is completed the company will put in power drills and do the work on company account. The mine has produced some good ore. They have a large amount of milling ore which will be left in the stopes until a mill is built on the property.

**Durango, Aug. 22.**

**Larimer County.**

C. S. Foote of Pearl says several mining companies operating in Pearl district have merged their interests to such an extent that a joint smelter is in course of construction for treatment of ores of the mines in the combine, the plant to have a daily capacity of ninety tons and to cost \$250,000. In the merger are the Coldwater Co., the Swede Co., the Big Horn and several others. At the Wolverine mine of the Coldwater Co. there are stored 150 tons of ore which will run 40% in copper, the ore being copper glance and gray copper, and of this quality and character of ore they report a 7-foot body in the mine workings. At the Swede mine the working shaft has been sunk to a depth of 1000 feet on ore, and the property has been further developed by a 1000-foot tunnel. The ore in that mine is of low grade.

**Montrose County.**

Montrose reports say C. Westerfield of Philadelphia, Pa., has bought La Sal copper mine in Paradox valley, Montrose county, for \$255,000. The former owners in the company are J. McBride, S. M. and L. Gates, H. T. Goober and W. A. Cashill and first payment of \$125,000 made. It is said to be a dry mine and well situated for development.

**San Juan County.**

(Special Correspondence).—The Gold Tunnel & Railway Co., operating the Highland Mary mine, near the head of Cunningham gulch, has fourteen patented claims on King Solomon mountain. One and one-half mile comprises the underground workings. The vein averages 3 feet in width. When No. 5 tunnel is completed it will cut the vein 2500 feet below the surface, which it is said will be the lowest workings in the district. The lake which supplies the mill and power plant with water for power holds, when full, 53,000,000 gallons of water. The pipe line is 5100 feet in length and is made of 16-inch steel, riveted pipe. The fall is 930 feet. Work is being done in the mine by air drills. As soon as certain improvements are completed in the mine to facilitate handling ore a night shift will be put on in the mill. The mill is handling sixty tons per day. Some crude ore is shipped direct to the smelters. A canvas plant is being added to the mill and if the experiment proves a success slime tables will be put in. The mill was erected above the tunnel entrance in order to escape the path of a snowslide which comes down each year, and on this account it is expensive handling the ore, as it has to be hauled to the top of the mill from the ore bins below the tunnel. This will be overcome by means of the new tunnel being driven. The plant is 9 miles from Silverton and about 5 miles from the railroad at Howardsville. J. A. Snedaker is consulting engineer and T. Graham manager, J. J. Morris mill superintendent and W. E. Wilson mine superintendent.

Two miles below the Highland Mary mine, in Cunningham gulch, is the Pride of the West mine, under lease to E. Smith of Los Angeles, Cal. C. W. Denison, manager of the property, is erecting a dam in Cunningham gulch and will utilize the power for air compressor and electric lighting. The property is on Green mountain and comprises eighty acres and millsites and mill at Howardsville, on the Animas river, 2½ miles from the mine. The mine is extensively developed by surface workings to a depth of 160 feet and a crosscut tunnel. An aerial tramway connects the upper and lower workings. In Cunningham gulch the Green Mountain M. & M. Co. (see front page) is owner of twenty-one claims developed by two parallel crosscut tunnels 1200 feet apart.

They have cut two veins, the first 300 feet from the Lawrence tunnel showing ore 5 feet wide that averages \$8 per ton, and the Osceola vein is cut 600 feet from the portal of the tunnel and averages 20



feet wide and \$12.50 per ton in gold, silver, copper and lead. The plant is equipped with 10-drill Rand compressor, Leyner 4-drill compressor and 150 H. P. boiler and one 60 H. P. return tubular boiler. They are installing water power from Cunningham creek, where they have a fall of 384 feet, and will put in a water wheel and electric plant for lighting the mine. The mine is 2 miles from the railroad and the shipping point is Howardsville. A 150-ton mill will be built this fall or early in the spring. F. J. Frost is superintendent.

Howardsville, Aug. 21.

(Special Correspondence).—The Venetian M. Co. owns twenty-six claims on Anvil mountain and is running a crosscut tunnel which will cut a majority of the veins at considerable depth. The company has a Durkee electric drill in operation. The tunnel is in 490 feet and will be driven 1400 feet to cut the ore shoot which shows on the surface. Power is developed from Cement creek. O. O. Larson is superintendent of the property. The mine is owned by Chicago, Ill., men. Gladstone, Aug. 21.

(Special Correspondence).—The power house, bunk houses and lower terminal of tramway of the Royal M. & I. Co. (see page 141), are on the Animas river, 2 miles below Silverton. The mine is across the river from the power house and on Sultan mountain. The company has 3000 feet of work done in the lower tunnel and 1500 feet in the upper workings. A raise is being driven to connect the lower workings with the upper which will be 600 feet on the King vein. They are also drifting on the Zeppa, from which they are taking gray and yellow copper ore showing ruby silver. A large percentage of the ore is mill dirt, but considerable ore is being shipped to the smelter. The tramway is 1200 feet in length and the lower terminal is on the D. & R. G. R. tracks.

W. R. Pyke, superintendent, states they are increasing development work, and when they have the mine well opened up a mill will be put in.

About 5½ miles up Cement creek is the Mammoth tunnel, operated by the Stony Pass M. Co. This tunnel is in 879 feet and is 7½x8 feet in the clear. When completed, it will be used for transportation purposes as an outlet for the ores from the company's mines in Prospect basin. They report making on an average of 3 feet per day in the tunnel with the Gardner electric drill recently installed. It is proposed to install a power plant, water wheel, etc., on Cement creek to develop power for working the company's mines in Prospect basin. The company also owns several claims on Mt. Bross, near the Gold King mine, and other claims on Green mountain. A. A. Brown is manager.

Silverton, Aug. 22.

(Special Correspondence).—Eight miles north and west from Silverton, up Mineral creek, on the Silverton & Red Mountain Railroad, is the Silver Ledge mine and mill, owned and operated by the San Juan M. & L. Co. J. B. Warner is manager. The mine is on Lookout mountain, which is an extension of Red mountain. The property consists of sixteen claims and two mill sites. The mine is 3000 feet from the mill and is connected by an aerial tramway. All the work is done through a 500-foot shaft on the property. A crosscut is at each 100-foot level, cutting two veins to the east and one to the west of the shaft. The ore occurs in parallel fissures running lengthwise of a rhyolite dike. The ore is zinc, iron and lead sulphide occurring in shoots from 100 to 160 feet in length and 6 to 15 feet in width. The mine is producing 200 tons of ore per day, all of which is treated in the mill. The ore is crushed in a 10x20 Blake crusher and fed into 16x36-inch rolls and crushed to ½ inch and then elevated into storage bins. The crushing capacity of the mill is 200 tons in ten hours—the day shift storing ore for night milling. From storage bins the ore is fed to two 6-foot Chilean mills. It is then crushed through a 25-mesh screen and elevated to hydraulic classifiers by spiral sand pumps. The product of each Chilean mill is distributed to five Wilfley tables from which a 50% lead product is produced and the middlings fall over the side of the table directly onto a small table patterned after the Wilfley, 2½ by 6 feet. On this small table the iron is taken out and the middlings, consisting of iron, zinc and silica, together with the heaviest product from the large table, are carried to another standard size table, where more iron and lead are taken out; the middlings are fed onto a small Wilfley on which the zinc is separated from the silica. This product carries about 30% zinc and 15% iron which is elevated with a conveyor into a rotary dryer to be dried for treatment on Blake electric separators. The product is distributed to four Blake separators, where the separation of the zinc

and iron is completed. The iron product from the electric machines is mixed with the iron concentrates from the tables and shipped to the smelters. The zinc product, which is 50% to 52% zinc, is shipped to the zinc smelters. The process throughout the mill is automatic, from the time it is dumped into the tramway bucket until it is loaded into the cars. The mill (see front page) is at the town of Chattanooga.

Chattanooga, Aug. 22.

The Excelsior properties near Hancock gulch, near Silverton, have been taken over by a company of Denver men, with M. Smith at its head.

#### San Miguel County.

S. D. Nicholson and Leadville men have leased the Smuggler-Union property at Telluride and have taken charge. The Smuggler-Union is thoroughly developed and equipped with machinery. It contains extensive bodies of low-grade ore. It has mills at Pandora.

#### Summit County.

The foundation for the additional twenty stamps that are going into the Cashier mill at Breckenridge is completed. With forty stamps Manager Wood says he can handle the product of the mine without crowding the mill.

One-half mile from Breckenridge, in French gulch, the Reliance G. Dredging Co., under Superintendent E. L. Smith, has work under way. Materials and machinery are arriving on the ground. The dredger is expected to be completed and ready to handle the placer beds in French gulch by next spring.

At the Admiral mine, in the Ten Mile district, near Breckenridge, drifting on the Frank vein has cut at a point 1000 feet from the mouth of the tunnel a 2-foot streak of \$80 gold ore. This is the second vein struck in the tunnel, while its destination lies 1000 feet ahead, says A. C. Frost, president of the Admiral Co.—A centrifugal pump has been set in the bottom of the Gold Pan pit, at Breckenridge, to handle the seepage water. The pump is driven by electric power from the Spruce creek plant. This leaves all of the present limited supply of water free for hoisting gravel.

Equipping the Jessie mine, near Breckenridge, with machine drills, new tracks and new timbers (where needed), and overhauling the mill, with the addition of three concentrating tables, is under way, necessitating almost complete cessation of mining and milling operations during month of August. The new air compressor, weighing fifteen tons, is a double cross compound machine with 16-inch cylinder. Manager Griffith, with it, bought 3000 feet of steel tubing for the air line. Pneumatic hammer drills will be used.

W. B. Le Wald, manager of the Ohio and Pennsylvania mines, at Argentine, reports the properties are improving. He employs forty men in mine and mill. About one-third of the product is sent direct to market from the mine, and the other two-thirds is concentrated at the mill. The mill, heretofore run by water power exclusively, is being fitted with steam power, so that it can be used all the year round instead of during summers only.

#### Teller County.

The Mary McKinney Co., operating on Raven hill, Cripple Creek, has opened up two more ore bodies. While doing development work between 500 and 600 feet north of the shaft, at a depth of 600 feet, the men cut an ore body, and the entire vein, which measures 3 feet, will return smelter grade. On same level and about same distance south of shaft, an ore body 2 feet across was also opened up which is proving a shipping proposition. It has only been a short time that the company has been able to work at the 600-foot level on account of water, but since drainage by El Paso tunnel this level has been dry.

The Cripple Creek & Pueblo Railway Co. will resume operations in the Ophelia tunnel near Cripple Creek. It is said the breast of the tunnel will be driven to the east slope of Bull hill. The breast of the Ophelia tunnel is 1½ mile from the portal. If it cuts Bull hill, it will cut it at a depth of 1500 feet, which means drainage and transportation for the mining companies.

Cripple Creek reports say all the dumps of the properties of Stratton's Cripple Creek M. & D. Co. on Bull hill have been leased and are being worked. The last lease granted was on the dump of the Nightingale mine, which is taken to show that the company does not intend for the present at least to lease any of the underground workings. G. Balderson, formerly manager of Stratton's Independence mine, was lessee of the Nightingale dumps. It is thought the dump ore will return values of one ounce gold to the ton.

The Cripple Creek Gold Temple Co., operating the main Gold Sovereign shaft near Cripple Creek, will sink the shaft to obtain additional stopping ground. The

ore body where they are breaking ore in the bottom level measures 36 feet in width.

The Findley mine at Victor is shipping an average of sixty tons of ore per day which gives average returns of \$25 gold per ton. The company is employing 110 men. All of the ore is being mined between the tenth and fourteenth levels. The veins in each level are wide and machine drills are breaking it down. The Shurtloff is mining from the seventh level down. The grade of ore in the Shurtloff is higher than in the Findley, although the tonnage is smaller. The Shurtloff management has sixty-five men steadily at work.

#### IDAHO.

##### Blaine County.

Supplies are going into Mackinaw gulch in Copper basin, near Hailey, to begin work on the Mackinaw group of copper claims, in which E. Daft, of Hailey, is interested. Daft has charge of development work and will sink an incline shaft 100 feet on one of the claims. He says that there is exposed a vein of 4 feet of ore carrying 12% in copper, besides values in lead and silver.—J. Peterson, operating the Blue Bird group near Muldoon, says he has uncovered a body of lead ore. In an open cut he has a body of carbonate and solid galena, which has been penetrated 15 feet.

##### Boise County.

The officials of the Lincoln mine, at Pearl, have the matter of building a smelter under consideration. The mine is equipped with a mill and from it concentrates are shipped to Salt Lake City, Utah, but due to disclosures of high-grade ore it has been concluded it would be a matter of economy to provide the mine with its own smelting facilities. J. T. Hodson of Salt Lake City, Utah, is manager of the Lincoln.

J. B. Coats of Atlantic City, Ia., president of the Oxbow M. Co., which is driving the Oxbow tunnel, near Idaho City, says the company owns 5 miles of the river bed. Two miles of it will be worked after the river is turned through the Oxbow tunnel. A flume will be built from the tunnel to carry the water, which will enable the company to work the 3 miles of ground below the Oxbow. Coats expects the water will be turned through the tunnel about October 1. Four machine drills will be put into the tunnel next week.

N. W. Lowman, operating at the mouth of Clear creek, near Idaho City, says the Magnolia mine on Miller mountain is taking out ore which mills over \$10 a ton. The ore is taken from an open surface cut, 150 feet east of the point where the ledge was tapped in the lower tunnel. The ledge is 4 feet wide. A drift was run 150 feet east from the lower tunnel, but has not reached the shoot, which is thought to dip east and will be tapped by extending the drift. The company is running a raise from the drift to the surface. Lowman says Payette river and Clear creek are lower than they have been for several years past.

##### Custer County.

At the Lost Packer mine on Loon creek, near Hailey, M. Finlen, of Butte, part owner, reports it is intended enlarging operations. A sawmill and an air compressor plant will be installed and the number of men increased. The company is building a road from Custer to the mine, which will be completed September 15. The maximum grade is 10%. The ore values are in gold and copper.

##### Idaho County.

Thunder Mountain region is to be equipped with another mill with which to reduce its gold-bearing ores by the Twentieth Century M. Co., controlled by Cleveland, O., men, says H. B. Fulton of the company. The plant is to be equipped with thirty stamps to begin with.

Roosevelt reports say general activity prevails over the entire Thunder Mountain camp. The Sunnyside mine has a payroll of 258 men. The Dewey and H. Y. have a large number. The Thunder Mountain Lightning Peak Co. and the East Dewey are having their work done by contract. The Sunnyside has sixty men building a wagon road from the mine to connect with the Dewey and H. Y. mines. It will be extended to the State road, which is within 19 miles of Roosevelt. The companies on Big creek are considering two roads—one from the south and the other from the north of the State. The P. & I. railroad will extend its line to Meadows, and possibly Warren. There is a good road from Grangeville. The Dewey mill is working steadily, with satisfactory results.

##### Kootenai County.

Manager M. W. Caldwell of Clarks Fork reports opening copper ore 12 miles from Clarks Fork in the Queen of the Lakes mine. It is reached by boat on Lake Pend d'Oreille.

##### Lemhi County.

W. H. Goss of Salmon City reports arrangements have been made between the American S. & R. Co. and the Gilmore mine, in Texas district, 80 miles from Dubois, on the Oregon Short Line road, as a result of which the ores from the mine will be shipped to Salt Lake City, Utah, for smelting. The Gilmore mine is sending ore to Dubois by means of twenty-two 10-horse teams. The ore from the Gilmore, says Goss, is netting its owners \$25 a ton after deducting wagon haul, transportation charges, sampling and smelting costs.

##### Owyhee County.

At South Mountain, near Silver City, work is progressing on the Standard Co.'s group, and they report opening their vein of high-grade carbonates for a length of 200 feet, and have a shaft down 45 feet, the ore running 40% lead and eighty ounces in silver.—At Wagontown, near Silver City, the Scales cyanide has completed treatment of the tailings dump and the final clean-up is being made.

##### Shoshone County.

Wallace reports say men are working on the Laclede M. Co. property, adjoining the Hercules mine. Buildings and other equipment for development will be put up.—The middle crosscut tunnel of the Iron Crown M. Co. is in 190 feet. It will require an additional 55 feet to strike the ledge. The miners are working in mineralized quartzite. Values in gold, silver and copper were found in the shaft sunk on the lead.—The lower contact tunnel of the Echo M. Co. is in 500 feet and nearing the ledge.

Reports from the King of Pine Creek group, near Wardner, say in a tunnel run 175 feet, 5 feet of milling ore has been cut at a depth of 80 feet. For nearly the entire distance the tunnel has been driven on the ledge. The croppings can be traced to summit of the mountain, and by continuing the tunnel a depth of 1000 feet can be obtained. The property is 3 miles from the Pine Creek spur. A good wagon road has been built to the property. The company is planning extensive development work during the winter and is erecting buildings. Articles of incorporation of the company have been filed by G. S. Olson, J. H. Otto, E. C. Young, C. A. Solberg and M. Webster. E. Young is secretary and manager.

##### Washington County.

The Chicago & Idaho M. Co. has been organized and is doing development work on quartz properties owned by it on Cuddy mountain, 40 miles north of Weiser and 12 miles west of Council. The company's group is 3 miles northwest of the Bundy group, owned by Brown Bros. The main ledge is 20 feet in width and has values in copper and gold. More men will be put to work to explore the property during the fall and winter, preparatory to installing machinery next spring.

#### MONTANA.

##### Flathead County.

G. Walker, part owner of the Copper Reward group of claims on Cherry creek, near Libby, says work continues satisfactorily. They ran 70 feet of tunnel since spring. The Copper Reward group is composed of five claims. The principal work has been done on the Copper Reward. On that claim they have a tunnel in 400 feet. Of this 160 feet is a crosscut. About 125 feet vertically above the tunnel they have a shaft down 25 feet, and from the shaft have a 50-foot drift. In face of the tunnel, which is run from about the bottom of Cherry creek, there are 20 inches of clean ore and 18 inches of quartz. The vein is between slate and quartzite walls and is a fissure. The values of the ore are in gold, silver, copper and lead. It is also said to contain 5% in nickel.

#### NEW MEXICO.

##### Eddy County.

Every well drilled around Artesia this year has shown traces of oil, says the New Mexican. Two months ago, E. H. Baugh began boring for artesian water on Seven Rivers at a point supposed to be out of the artesian level. This proved to be true, as at a depth of 475 feet no water flow had been secured, although it is found at 150 feet a few miles east. At 350 feet oil sand was struck and the water so impregnated with oil as to be useless. As the drill went on down, the flow of oil increased. The Standard Oil Co. has had men in the field hunting for the oil field supposed to be east of the Guadalupe mountains, and has filed placer mining claims on 3520 acres of land lying south and west of the Baugh well. The country where the find was made is said to consist mostly of gypsum hills. Crystallized sulphur may be found on the surface, and croppings of brown sandstone where there contain enough oil to burn when broken open and a match applied.



NEVADA.

Elko County.

R. R. Ives, operating the Resurrection mine at Mountain City, says to reopen the ledges at greater depth they are sinking a double-compartment shaft. In addition to the Resurrection, the company has a group of claims traversed by two fissures in the granite and on which work will also be started. Of the reported suspension at the mill with which the Nelson group was equipped, Ives says it is that the mill may be remodeled, the plant to resume as soon as the changes are effected. Operations on the groups that have been acquired by the Newhouse-Peery Co. are progressing with satisfactory results.

Lincoln County.

T. J. Osborne, of Pioche, and P. Sheehan of Stateline, Utah, will begin work in the development of the Groom mines in Lincoln county. Although it is productive of high-grade ore, it could not be worked to advantage and profit on account of the long wagon haul to a railroad shipping point. The building of the Salt Lake route through Nevada, however, has changed local conditions. It is expected the railroad company will ultimately build a spur or branch into the Groom district. It is stated in the workings of the main property of the group there is a 9-foot body of ore, developed to a depth of 125 feet, that assays 40% lead and 18 ounces in silver.

H. Tarbet of Salt Lake City, Utah, manager of the Arrow M. Co., says he is preparing to increase development of the company's group of mines in the Arrow range.

The Iyanough mine at Camp Dupont, near Searchlight, is reported to have opened up 5 feet of high-grade ore by a drift in the foot wall and then cross-cutting. The company will build a road into the camp. The proposed road will shorten the distance to Searchlight by 3 miles and will avoid most of the washes, says Manager Thacher. He is increasing development work.

Lyon County.

As the result of two days' labor, C. J. Orth, of Dayton, reports having cleaned up gold to the value of \$177 in his kitchen yard. The find was made while Orth was digging a well. He has rigged up a 2000-gallon water tank for use in washing the dirt. The earth when worked over is turned back to the ground excavated and in this manner Orth expects to work out the mine and still have his home property.

Storey County.

The Best & Belcher M. Co., at Virginia City, J. H. Kinkead superintendent, reports on Sept. 1 the mine will be closed down temporarily and arrangements will be made to carry on work from the Sutro tunnel.

Washoe County.

In bottom of shaft on the Ora mine, at Olinghouse, 17 feet from croppings, they have gone into quartz 4 feet wide, assaying \$20. Crosscut will cut vein at depth of 100 feet vertical and is in 129 feet. They expect to tap vein at 168 feet if no change occurs in dip of vein. It is free milling ore. The Ora tunnel will be extended to the Forlorn Hope and Crown Point vein to drain same, and to permit hauling of ore from these properties, giving them a depth of 350 to 500 feet respectively. A vein of sulphides was cut in the Ora, being 35 feet in width.

OREGON.

Baker County.

A. M. Paul has bonded the Imperial group of claims in the Cable Cove district, near Sumpter. The Sumpter Sampling Works are being removed to the mine, and as soon as installed, will start treating the ore on the dump. Development of the property will also be taken up again.

M. F. Muzzy has begun work on the Marshall group in the McNamee gulch district, near Sumpter. Two claims comprise the group, the Marshall and Copper Chance, with a shallow shaft and a cross-cut tunnel of 35 feet that has tapped the vein. Work will be centered in drifting on the vein from where cut. The vein is 3 feet wide. Later a sinking plant will be put in.

Jackson County.

A. C. Hooper of the Mount Pitt Hydraulic & Quartz M. Co. says he is putting in machinery for the development of his ledge on Jump-Off-Joe, near Medford, which he has bonded from the Hydraulic M. Co. A small quartz mill and equipment is being set up.

Josephine County.

The 100-ton smelter being built by the Takilma Smelting Co., at Takilma, for the Waldo copper mines, is nearing completion, and is expected to be ready for its initial blowing in before Sept. 10. The

last of the machinery is being placed at the plant.

A. C. Hooper of Portland, manager of the Mount Pitt Hydraulic & Q. M. Co. properties, on Jump-Off-Joe river, near Grant's Pass, is superintending development of the property. He is putting in a mill and development plant. The ledge is 3 feet wide and carries values, largely in free gold.

Grant's Pass reports say an ore strike has been made by the American G. F. Co., at the Granite Hill and Red Jacket mines. Superintendent Wickersham says the mill is running steadily. The new mill handles ore from the Granite Hill and Red Jacket mines. On the former the main shaft is down between the 300 and 400-foot levels, and the 200-foot level is opened up with over 350 feet of drift and 60 feet of raises being carried to the 100-foot level. Machine drills are used. The cage used in the shaft is provided with extension guides for lowering below timbers, thus facilitating the shaft sinking. A pumping plant has been installed in the pump station at the 220-foot level, capable of pumping 370,000 gallons a day. The mill plant contains ten 1000-pound stamps, four Frue vanners, 80-ton crusher, a 65 H. P. engine, a 10 H. P. engine for concentrators and a six-drill compressor. An electric light plant is also in operation and the mine is lighted by it. The steam plant comprises three boilers, aggregating 200 H. P. The Red Jacket mine is being operated in conjunction with the Granite Hill. A drift constituting the present workings affords 70 feet of back at present face and drifting westward will increase it. The hoist and boiler formerly used on the Granite Hill are being moved up to the Red Jacket to continue work on the winze. Ore is now hauled to the mill by steam, but as the Red Jacket develops an aerial tramway will be utilized.

SOUTH DAKOTA.

Lawrence County.

The Deerlick M. & Dev. Co., owning an acreage of mineral bearing ground in Iron Creek mining district, 12 miles west of Deadwood, is preparing for opening up of work, says G. W. Nash, vice-president of the company.

Lead reports say an extension has been given in the deal on the Wasp No. 2 and adjoining properties in Yellow Creek district, south of Lead. The Venture Corporation of London, England, has an option on the group. The extension is given that further exploration may be done with a coal drilling apparatus which will explore the quartzite levels. It is stated the corporation will take in the deal the property of the Belt Dev. Co., which is south of the Homestake. A cyanide plant will be built.

For the year ending May 1 the Clover Leaf M. Co. at Roubaix has treated a total of 27,200 tons of ore which averaged \$5 a ton gross. The cost of pumping water alone for that time was \$28,908. There are seven levels in the mine, on four of which are pumps that force about 1000 gallons of water a minute to the surface. The mine last year paid above operating expenses \$11,000, and the mill will be increased to 100 stamps. At a recent meeting of the directors it was decided to sink the shaft from the 700-foot level to the 1000-foot level, which will open up additional ore. The ore is free milling. The cost of mining the ore was \$2.29, and milling 75 cents per ton. S. W. Russell is manager of the company and O. B. Amsden is superintendent. The mine is developed with 7700 feet of drifts and raises.

Pennington County.

Work in the placer mining district in the southern hills is reported active. The Elkhorn Bar P. M. Co. is carrying on work. Several new appliances have been put in and satisfactory results are reported. There are a number of other promising properties in the section near Silver City that are giving good indications as work continues.

UTAH.

Beaver County.

For the mill with which the properties of the Estella M. Co. near Milford are being equipped machinery is being placed, says Manager S. Tarbet. The trials made at the Baxter plant have shown that Estella ores, which have an average of \$10 gold per ton, can be made to afford a profit with amalgamation and subsequent leaching by cyanide process. The foundation for the plant has been completed, and, with five stamps dropping, twenty tons will be reduced daily.

Box Elder County.

The Sunrise M. Co., operating at Park Valley, is reported preparing to build a mill to handle its gold-bearing rock, says President S. Simon. Stamps and concentration will be used to recover the contents from the ore, which shows values of \$14 per ton. Manager A. Lochwitz is increasing development.

Salt Lake County.

So satisfactory has been the service of the electric locomotive in handling slag at the Bingham Con. smelter, at Bingham, that a third one will be put in. With the three in operation and a fifth furnace in commission, Superintendent Nutting will be prepared to increase the output.

Thirty additional vanners and four tables for the Utah C. Co. mill in Bingham camp, which will enable the management to reduce 750 tons of copper, gold and silver-bearing ore daily, are being set up. The framework for the additions to the main plant within which the tables are to be housed is completed, with the metallic roofing being put on. With the additional machines the vanners at the plant will have been increased to fifty in number, the tables to forty, with two slimers. Just when the next unit will be added to the plant, the ultimate capacity of which will enable the company to reduce 5000 tons of ore daily, has not been decided, says Manager D. C. Jackling.

Superintendent W. H. Nutting, of the Bingham Con. smelter at Bingham, says the fifth furnace will be ready to be blown in by October 1. The new sampler is doing its work satisfactorily. Meantime a large volume of ore continues to arrive at the bins.

From Yampa mines at Bingham there are going to the Yampa smelter in Bingham canyon 200 tons of ore daily, with this to be doubled when the capacity of the latter, for which contracts have been awarded, shall have been increased, says W. H. Craig, superintendent. In the production of the present tonnage no stopping whatever is being done, the ores coming entirely from development and the extension of the levels into the copper, gold and silver zone. Since completion of the main tunnel through which the ores are found the work has been in ore.

Plute County.

The Bradburn M. Co., of Marysville, has resumed work in its mines.

Work is progressing on the mill for the Sevier Con. mine in Gold mountain, near Marysville, and it is expected the plant will be ready to go into commission by October 15.

At Gold Mountain district, near Marysville, mining is progressing. P. W. Madsen, of the Madsen G. M. Co. at Gold Mountain, says the mine is developing satisfactorily. Additional force of men has been put on development work. At present they have drifted 500 feet on the vein, which, throughout, has maintained its size and richness. At the end of the tunnel the crosscut shows a vein 26 feet wide. From an 80-foot raise at end of tunnel ore is being taken. The directors propose building a mill.

Summit County.

To the output of Park City is being added the output of concentrates from the Comstock company's mill, which is again in commission, says Superintendent Hickey. He says a considerable quantity of high-grade ore has been coming from the mine and has accumulated in the ore house to the amount of 300 tons. At the mill one 10-hour shift will be worked at present. Hickey is drifting in the ore body, but progress is rather slow from the fact that all the product must be handled by windlass. There is still considerable water in the mine, so work must be concentrated to the one point. The mill has a capacity of 120 tons per day.

Tooele County.

It is reported W. B. McSherry, president of the Conner M. & E. P. Co., is preparing to build an electric power plant in Soldier canyon, 3 miles out of Stockton.

That its gold-bearing ore bodies may be resampled and provision made for recovery of their values, the Herschel company's mine at Mercur will be reopened this week and rock on which to try at least two new processes forwarded to Salt Lake City, says Manager J. Smith.

WASHINGTON.

Ferry County.

R. L. Boyle, president of the Keller & Indiana Con. S. Co., says he has machinery on the ground at Keller and preparations are being made for a smelter. The flume right of way is completed; 300,000 feet of timber have been cut and the sawmill is expected to begin sawing the logs into plank and timber for the flume this week.

Snohomish County.

Portland, Or., men are developing mines in the Index and Silver Creek districts of Snohomish county. The Smuggler G. & C. M. Co. owns the Achilles, Ajax, Smuggler, Pandora, Oriental, Red Cliff and Smuggler Extension. McK. Mitchell, of Portland, Or., is president and W. J. Walters general superintendent. The work so far done consists of 50 feet of tunnel. The breast is in ore showing average value of \$11. It is of a concentrating character. The Smuggler

is 2 miles southwest of Monte Cristo, where is located the Rockafellow mines, and 15 miles north of Index, on the main line of the Great Northern Railroad. The New York M. Co., adjoining the Smuggler, has started a sawmill that will furnish timbers for mining purposes and to build a mill. F. E. Sanders, of Seattle, expects to have in operation by April 1, 1905, a road to the district that will be constructed past the property. The home office of the New York M. Co. is at Vancouver, B. C.

Whatcom County.

Bellingham reports say the 6-stamp mill of the International G. M. Co., in Mount Baker district, will be operating in September, according to J. Templin, president of the company. The mill is at the Fraser river. The power plant is in place. The ore is said to be free milling.

WYOMING.

Carbon County.

A mill will be built for the Evening Star mine at Encampment.

The Dillon Con. M. & T. Co. will drive a 3500-foot tunnel, starting north of Dillon and crosscutting the country from north to south. H. O. Granberg of Oshkosh, Wis., is vice-president and C. De Witt of Dillon is secretary.

Laramie County.

Cheyenne reports say the Fairview mine in the Silver Crown district, 25 miles west of Cheyenne, will be sunk to depth of 1000 feet. The shaft is 157 feet in depth. The Fairview is owned by the Fairview M. Co. of Colorado.—The Colorado & Southern Railroad this fall will build an 8-mile spur from Silver Crown station to the mill at Hecla, for handling concentrates and ores. The principal ore treated at the mill comes from the Louise mine, owned by the Hecla C. & G. M. Co., and is of low grade.

Deeds have been filed for record showing that the Colorado Fuel & Iron Co., heretofore simply a lessee of the iron mines at Sunrise, becomes sole owner of the properties, comprising 10,000 acres. It is said the company pays \$1,000,000 for the Sunrise properties, which includes two shafts and several surface mines, where steam shovels excavate the ore, which is used in the manufacture of steel at the Pueblo, Colo., works of the company.

FOREIGN.

AFRICA.

Rhodesia.

The total gold output of companies making returns to the Rhodesian Chamber of Mines at Bulawayo for month of June is given at 20,402 ounces (Matabeleland 14,441 ounces, Mashonaland 5961 ounces). The returns for first six months of 1904 compared with 1903 were:

	GOLD.		SILVER.	
	1904.	1903.	1904.	1903.
January .....	19,859	16,545	3,521	.....
February .....	18,373	17,060	3,461	.....
March .....	17,756	16,626	5,453	.....
April .....	17,862	20,727	4,275	.....
May .....	19,424	22,137	4,062	.....
June .....	20,402	22,166	5,225	.....
July .....	.....	23,571	.....	.....
August .....	.....	19,187	.....	.....
September .....	.....	15,741	.....	4,160
October .....	.....	19,518	.....	4,281
November .....	.....	15,714	.....	4,757
December .....	.....	18,750	.....	2,754
Totals .....	113,476	231,872	25,997	15,952

Lead—1904.		Coal—1904.	
May, tons .....	35	May, tons .....	3,705
June, tons .....	34	June, tons .....	5,416

Transvaal.

Johannesburg reports say the output of gold, silver, coal and diamonds from the Transvaal during the six months of 1904 ending June 30 was valued at \$3,672,647, an increase of £950,031 as compared with the last six months of 1903.

ARGENTINA.

It is reported that the Compania de Sutphen de Lavaderos de Oro de Buenos Ayres proposes buying additional gold dredging machines, to be used in working its holdings. E. W. Sutphen of Buenos Ayres is head engineer of the company.

BRITISH COLUMBIA.

Boundary District.

M. Kane et al. have bonded the Silver King mine, in Skylark camp. It joins the Silver Cloud. Considerable work has been done on the property and there is high-grade ore on the dump. The mine is owned by F. P. Hogan of Spokane, Wash., A. N. Pelly, A. Ferguson, J. C. Douglass and others.—I. Skidmore has uncovered a vein of high-grade ore on the Humming Bird mine, which adjoins the E. P. U. on the north. He was working to crosscut the E. P. U. lead on his property.

East Kootenay District.

The approximate mineral production to southeast Kootenay for first six months



of the present year shows increase over 1903, says the Fort Steele Prospector. The North Star mine has shipped 800 tons of silver-lead ore. The St. Eugene mine at Moyie which was idle for some time is employing 300 men and is turning out a 68% lead concentrate at the rate of 100 tons per day. Since Jan. 1, 1904, south-east Kootenay has produced 16,000 tons of ore carrying the following values: Gold, 50 ounces; silver, 150,000 ounces; copper, 3000 pounds; lead, 4,000,000 pounds. At Marysville the Sullivan Group M. Co. is building a smelter which will be ready for operation this fall. On completion of the smelter the Sullivan mine will start operations, and the production is estimated at 200 tons daily. On the east side of the Kootenay river, in the main range of the Rockies, are a number of properties having ore on the dump which will become producers on completion of the Kootenay Central Railway.

#### Slocan District.

The daily output of zinc at the concentrators around Sandon is fifty tons. The Star alone turns out twenty tons every twenty-four hours.—The Silver Cord, above Cody, and the Dixie Hummer, near the Sunshine, owned by P. J. Hickey, manager of the Ivanhoe mine, are being worked.—The Mountain Con. has twelve men on the payroll. Work has been confined to driving an intermediate tunnel, which has tapped the raise. McLeod & Thomson, lessees, report that in drifting on the intermediate tunnel 500 sacks of ore were taken out while driving 60 feet. This came from the width of the tunnel alone, the vein being passed in order to tap the raise. They have built a hoisting station and put everything in shape for shipping. The developed ore bodies are being worked and a pack train will be kept busy packing down ore.

#### Vancouver Island.

(Special Correspondence).—The Tyee C. Co., Ltd., at Duncan's Station, reports returns for month of July: Smelter ran seventeen days; 3625 tons of Tyee ore treated gave a return, after deduction of freight and smelting charges, of \$48,878.

#### Duncan's Station, Aug. 20.

Repairs to the Western Fuel Co. pit-head works in Nanaimo are expected to be completed next week and work in the mines will then be fully resumed. In the meantime the opening of the new mine at Departure Bay is so far advanced that the driving of entries and stalls will be started.

At Alberni considerable mining activity is reported and two mines are ready to start regular shipments. The tramway of the Cascade Co. has been completed and 200 tons of ore are ready for shipment. The ore is said to be of high grade. The Southern Cross Co. is also ready to make shipments of ore. Work has not yet started on the Nahmint mines (the Hayes mines), but will begin next week. It is stated that \$60,000 have been provided by the owners for further development. Development work is progressing on the Happy John group, a lower tunnel being run to tap the showing of ore in the upper tunnel.

#### West Kootenay District.

Near Poplar, J. A. Magee, superintendent of the Spyglass mine, at head of Poplar creek, reports a shoot of ore carrying native silver has been struck in No. 2 tunnel on the Spyglass.

#### Yale District.

The bond on the St. Lawrence group of mines in Yale district, near Kamloops, has been taken up by C. F. Law of Vancouver and W. F. Armstrong, who will increase developments. There are three claims in the group and the vein has been opened by open cuts and shafts along the surface through all the claims, the deepest shaft being 55 feet. No ore has been shipped, as the claims are 80 miles northwest of Spence's, on the Canadian Pacific Railway, that being the nearest railroad point. The ore contains gold and silver and a little lead, and will be reduced by concentration. The ore body is from 4 to 8 feet in width.

At the mines of the Nicola Coal Mines, Ltd., Manager P. Bockmier of Spokane, Wash., says a drift has been run on the croppings and there is in the face a 7-foot vein of coal of coking quality. The claims cover six full sections, a portion of which is held by crown grants. The claims are in Nicola valley and are 150 miles from tide water. A contract has been let for continuing development work. Surveys for a railroad are being made through the valley. Seven American companies have secured claims in the valley and are prosecuting developments. The Kootenay I. & C. Co. is prospecting with a diamond drill plant. The coal basin is said to be surrounded by a mineral district containing deposits of copper ores, some of which are being developed.

The St. Lawrence group of mines, near Kamloops, has been sold to C. F. Law

and W. F. Armstrong, of Vancouver, for \$40,000. The properties are 80 miles north of Spence, on the Canadian Pacific railroad. Law & Armstrong had a bond on the group and have carried on development work, opening surface cuts and shafts. Ores sent out for test have shown average of \$60 per ton in gold and silver. The ore contains a little lead and will be handled by concentration.

### CANADA.

U. S. Consul-General W. R. Holloway at Halifax writes that the bounty of 1½ cent a gallon on crude oil recently granted by the Dominion government has stimulated development of oil territory and development of the New Brunswick oil field is increasing. A New Brunswick petroleum company has found oil in paying quantities in a district covering several square miles. The company has thirty-four wells producing at the rate of fifty barrels each of oil daily. This is in excess of the product of the Ontario wells. The company is multiplying its wells (eleven more wells will be producing next month) and erecting storage tanks. The storage tanks are being built between Memramcook station and the river. They will form the nucleus of the refinery to which the oil will be brought by gravitation through pipe lines; crude, refined and other oils and by-products will be dispatched by rail and water. The natural gas issuing from the wells in operation will be used primarily to operate the company's plant, but as the supply increases with the number of wells the gas will be piped to consumers.

### KOREA.

(Special Correspondence).—The annual report of Manager H. F. Meserve for 1903 has been issued by the Oriental Con. M. Co., operating mining concessions in Wunsan district, and gives the following summary of operations: The 200 stamps on the concession averaged 278 days full run out of the 365 days in 1903, "due to extraordinary local conditions," thereby cutting down the tonnage figures and increasing cost of mining and milling figures per ton. Development work in the mines also suffered from the same causes. [During 1903 a severe epidemic among the bulls in Korea left us without sufficient means of transportation for cordwood, mining timbers, etc. \* \* \* Labor was deficient during the year, as the scarcity and high price of rice and millet, due to the bull sickness, drove thousands of Koreans out of our district.] In spite of the above conditions, they reduced the operating costs per ton from \$2.73 in 1902 to \$2.225 in 1903. They worked out, during the year, a successful treatment of their Tabowie and Taracol concentrates by the cyanide process. The company's Maibong and Chittaballie mills were not taken down, as expected, but were run at a good profit for the year, and on January 1st, 1904, the ore reserve in sight at the Chittaballie and Charabowie mines was nearly the same as on January 1st, 1903, with the latter mine looking hopeful in the new lowest workings. The year's production of the company was divided among its mines as follows:

	Tons.	Total Value.	Cost of Milling per Ton.
Chittaballie	18,295	\$ 91,406	\$1 735
Tahowie	43,782	275,201	36 0 905
Taracol	75,972	563,661	19 0 740
Kuk San Dong, North	10,639	64,456	40 1 565
Kuk San Dong, South	10,653	37,500	73 1 335
Charabowie	27,065	179,098	74 1 355
Maibong	9,937	75,350	41 0 135
Tongkoll	2,007	74,150	33 2 335
Totals, by company	198,410	\$1,380,736	82
Totals, by tribute	5,157	98,219	96
Grand totals	203,567	\$1,478,956	78

The cost of mining includes all underground development work in the mines. H. C. Perkins of New York City, N. Y., is president of the company.

Puk Chin, Aug. 2.  
C. G. Dennis of Nevada City, Cal., of the Oriental Con. M. Co., says the company has a concession covering several hundred square miles of mineral territory in Korea. The company, which is composed of New York men, is developing or working 30 different mines, employing 2000 native Koreans as laborers and miners, governed and directed by a staff of eighty whites, both Europeans and Americans. The ores are quartz, 50% free milling, in fissure ledges in granite. The deepest shaft is 700 feet. Steam power is mostly used. An electric plant, with water for the initial generating power, is being built. They are cutting ditches constructing dams and storage reservoirs. The mines are 150 miles in the interior of Korea, in Wunsan district, and part of the time within the zone of operations of the Russian and Japanese armies. The Japanese drafted many of the company's native laborers into their transportation service, confiscating the bullock carts, and so crippling

the mines' working force that they had to temporarily close down.

British Vice-Consul Lay at Seoul writes that Japan practically takes all the gold bullion that Korea produces for export, which amounted to £556,985 in 1903. Exports for 1903 included:

Copper, pounds	409,066	£ 4,694
Gold ore	.....	14,247

### MEXICO.

#### Aguas Calientes.

The Guggenheim Exploration Co. has begun operations on the San Pedro mines, in Tepezala camp. The mines are copper producers.

#### Chihuahua.

Near the famous Cigarrero mine of the Sierra Almoleya district, between Jimenez and Parral, S. Rios, of Parral, owner of the Fragua mine, is straightening out the working. The mine has shipped 11-kilo silver ore, but is shipping nothing at present.—The Cumbre mine is shipping.—S. Rodriguez is principal owner.

—The Mina de Agua, now known as the Guatemoc mine, is in payable ore.—The Independencia mine is shipping. Stalforth et al. are interested.—N. O. Bagge, principal owner in the Almoleya M. Co., and manager D. W. Shanks are at the mines and increasing operations. The company will put in a 150 H. P. electric plant at Dorado to increase operations. Power is to be transmitted 5 or 6 miles to the several workings of the company.

L. M. Tidwell, W. C. Meyers and A. H. Couch, owning a gold-silver group at Guaynopita, 60 miles from Nuevas Casas Grandes, report the ores run \$15 to \$250 per ton Mexican money, and they will start work thereon next week.

It is stated the Lluvia de Oro gold-silver mine in Urique district, western Chihuahua, 6 miles from the Sinaloa mine, has considerable ore blocked out, and milling is under way. There are five properties included in the Lluvia de Oro group, one of which is the Cuatemoc. The initial run of the 20-stamp mill with its four concentrating tables was made in July and is in steady operation. A. J. Underwood is manager.

J. G. Hardy, manager of the Dolores mine at Dolores, in western Chihuahua, says he is putting in machinery for a 50-ton mill for the Dolores mine. A cyanide plant of equal capacity is to be built on the ground. This will be used for treating the low-grade ores, and the rich ores are to be treated in a 15-ton pan amalgamation plant. Part of the mill machinery is at Minaca and will be hauled out to the mine.

Dale Bros. & McDonald have their two pumps of 675 gallons capacity each per minute unwatering the Americano mine at Terrazas. Ore is exposed where the water has left it, and it is thought the caves are filled with bodies of ore.

It is reported that P. Alvarado, owning the Palmilla mine at Parral, has bought the Tres Rosas mine and proposes building a reduction works and a concentrating plant at Jimenez.

#### Guanajuato.

D. Furness of Guanajuato says it is intended, at the quicksilver mines of the Dolores M. Co., to put in additional machinery.

#### Jalisco.

Buckner & Whitney have been delayed by excessive rains in getting their reduction plant near Etzatlan in operation. It is expected to have it in operation by Sept. 1st. The equipment consists of a crushing mill, pans and settlers and cyanide process. The San Miguel mine will furnish the ores for the mill, and it is thought the owners will build another mill for the Zapopan mine during the coming year.

The United Mexican M. & S. Co. of Duluth, Minn., F. W. Page manager, has completed and blown in its quicksilver furnace at El Moral, near Mascota. The company owns four mines near El Moral.

The company composed of Pennsylvania men, of which N. Z. Seitz is manager, expects to have its reduction works in operation by September 15th. The company's mines are the San Felipe group, near the boundary of Jalisco and Tepic, near San Marcos. The power is to be electric, generated by water power from the Amajac river.

#### Mexico.

The manager of El Oro M. & R. Co. at El Oro reports for month ending June 30: Mill ran twenty-six days, crushing 8574 tons, producing from 100-stamp mill \$105,646, producing from old cyanide plant \$3966. The annual clean-up produced \$16,375. Total reduction, \$125,987. Working expenses and development were \$62,961. The profit from the railway for the month was \$5200. From that is deducted estimated monthly expenses in London and manager's salary, £700. There has been expended on permanent improvements, including \$16,285 expenditure on new mill, \$18,573. The manager says the

low tonnage for the month was caused by a break in the mill shaftings.

#### Nuevo Leon.

Texas men have organized in Laredo, Texas, the Laredo M. & S. Co. The company owns the La B. mine in Nuevo Leon. Operations are to be increased and a smelter built on the ground. The La B. mine is in Galliana district and is under the management of W. N. Banks.

#### Sonora.

Near Soyopa, at La Mina Mexico, A. Lott, superintendent, has the working shaft, an incline, down 670 feet, and reports taking out high-grade silver ores, which have been shipped, and has piled on the dumps second-grade rock, for reduction of which a smelter will be erected. The ore is sorted, and rock which yielded less than 150 ounces per ton goes onto the dump. The shipping ores run from 150 ounces per ton up to 600 and 700 ounces silver. La Mina Mexico has been in operation seventeen years, and is owned by C. Ortega and F. Monteverde of Hermosillo. The ledge is narrow, carrying lead and iron sulphides, also silver. The formation is quartzite, with a lime contact, but the ledge is in quartzite.

At the Swansea mine, 16 miles from Bacoachi, J. B. Tomlinson, principal owner, proposes to build a mill this fall. Development work is being increased.

P. Adkins of Norman, Okla., reports he has bought two gold properties 140 miles southeast of Nacozari, on the Rio Bonito, and expects about October 15 to start work on the mines.

The English, Alaska & Mexican M. Co. has bought 1000 acres of placer ground on the Yaqui river, near Buena Vista, and is preparing to begin operations. Machinery will be placed and it is expected that extraction of gold will start this fall.

At Los Coches the work of getting in the machinery for Los Coches M. Co. has been delayed by storms cutting out roads. Mine development continues steadily and bodies of gold are exposed, ready for stopping.—At the Marquesa mine, near Matape, two shifts are working and high-grade copper sulphides are being extracted.

R. E. Gayou has men on development work on a gold property within 200 yards of the track of the Sonora railway at Llano. It is said on account of its proximity to the track it is named Los Rieles (The Rails). Three veins, close together, pitching at an angle of 45°, are to be cut by a vertical shaft down 50 feet. One of them has been cut and the shaft is in the second. Each is 2½ feet wide.

F. Garretson, manager for the Garretson-Sahuaripa M. Co., which has properties near Calera, says a pyritic smelter, with a capacity of fifty tons daily, is being erected at Calera. It will be completed and ready to blow in by October. A small trial stack, made of adobe, was put up there by Garretson last spring and worked satisfactorily. The mines of the company are on the mountain overlooking the camp. The workings consist of several shafts and tunnels, most of them showing ore. Through granite and porphyry a 60-foot dike of diorite cuts across the ridge, and in this dike are said to be several mineralized sections, 18 inches to 6 feet in width, in which the diorite is impregnated with copper and iron sulphides, carrying gold and silver. In another working bismuth ores have been taken, assays yielding 4% of that metal, as well as copper and silver.—Three miles from Calera are the properties of the Buffalo-Sonora M. Co., of which F. Garretson is also manager. It is a lead-silver proposition. The pay streak is 3 feet in width and has a foot of "petasque," which is said to yield 1000 ounces silver per ton. There are four shafts (2000 feet between the two farthest apart), and they are all in ore. One is 210 feet deep, one 75 and two 60 feet each. In all some drifting has been done. The mines and the camp are connected by telephone.

#### Tamaulipas.

The American International Fuel Co. is preparing to drill two wells for oil at Los Esteros, on the Mexican Central railway, northwest of Tampico. W. E. Lucas is superintendent.

#### Tepic.

The rainy season is reported to have stopped the work of securing salt from the deposits on Las Tres Marias islands, opposite the port of San Blas, and also at Cuyutlan, near port of Manzanillo. It is reported that during the dry season just passed 9,000,000 pounds of salt were taken from the latter deposits. A smaller amount of salt was taken from the beds on the three islands off the Tepic coast. The Tres Marias were recently bought by the Federal Government, and as soon as provisions are made for long-term convicts on the islands, particular attention will be paid to the exploitation of the salt deposits.



Personal.

H. E. PICKETT, a mine owner of Nevada City, Cal., is in San Francisco, Cal.

J. B. OVERTON of Virginia City, Nev., is in San Francisco, Cal., on mining business.

H. W. TURNER of San Francisco, Cal., is at the quicksilver mines of Terlingua, Texas.

E. BAMBERGER, assistant manager of the Daily-West mine, Park City, Utah, is in the East.

F. HOLLINGSWORTH is superintendent of the Lappin mine at Deadwood, Trinity county, Cal.

J. R. FOCHT has accepted a position with the Amalgamated C. Co., at Anaconda, Mont.

W. P. HAMMON, interested in gold dredging at Oroville, Cal., is in San Francisco, Cal.

W. J. DOUGLASS, a mine superintendent of Virginia City, Nev., is in San Francisco, Cal.

J. W. TAYLOR of El Paso, Texas, is examining mines in the Sierra Madre mountains in Mexico.

F. A. STEVENS of the Zubiata M. Co. at La Colorado, Sonora, Mexico, is visiting in Philadelphia, Pa.

E. W. YOUNG of Denver, Colo., is at the Mystic Shrine mine at Bingham, Utah, in which he is interested.

H. N. BOWEN, for the past year superintendent of the Annie Laurie Co.'s mines at Kimberly, Utah, has resigned.

W. H. ALDRIDGE, manager of the Trail smelter, returned to Rossland, B. C., last week from Montreal and Quebec.

A. J. McMILLAN, managing director of Le Roi C. Co., returned to Rossland, B. C., last week from London, England.

H. TARBEK, of Salt Lake City, Utah, is manager of the Arrow M. Co. properties on Arrow Range, Lincoln county, Nev.

I. E. ROCKWELL, manager of the Minnie Moore mine at Hailey, Idaho, is in Salt Lake City, Utah, on company business.

S. LEVERETT, engineer for the Sunset Dev. Co., at La Barranca, Sonora, Mex., is in Tucson, Ariz., and will return to La Barranca September 1.

L. GLOCKNER of Salt Lake City, Utah, has gone to Kalgoolie, Western Australia, to accept a position with the Golden Horseshoe M. Co., Ltd.

H. SABIN, night foreman of Le Roi C. Co. smelter at Northport, Wash., has been appointed superintendent of the plant, vice E. J. Wilson, resigned.

J. H. MCCHRYSAL returned to Salt Lake City, Utah, last week from Custer, Idaho, where he has been conducting an examination of mining properties.

W. H. CHILD of the Sheba M. Co. returned to Salt Lake City, Utah, from its mines and mill in Humboldt county, Nev., accompanied by President Barch.

F. W. HOAR, former superintendent of the Old Dominion copper mine, is at Globe, Ariz., from Houghton, Mich., and about September 1 expects to open an office in El Paso, Tex.

C. JOHNSON, superintendent of the Skeleton Creek mines, in Wood River district, near Hailey, Idaho, who has been visiting in Salt Lake City, Utah, has returned to Hailey.

W. E. DEFTY and W. C. FOSTER of Phoenix, Ariz., manager and secretary, respectively, of the American-Mexican M. Co., are at the company's La Gran Providora de Cobre mines near Caborca, Sonora, Mex.

GAYFORD & CALLOW of Charlotte, N. C., have instructions from the Empire M. Co. of Pittsburg, Pa., and of Lytton mining district, North Carolina, to proceed with plans for a 100-ton cyanide plant to treat ores from their mines at Thomasville, N. C.

J. W. LYONS has resigned as manager of the power department of the Allis-Chalmers Co. to take the position of consulting engineer to the Elgin Watch Co. of Elgin, Ill. Mr. Lyons takes with him the good wishes of all his former associates in the Allis-Chalmers Co.

E. H. BENJAMIN, secretary of the California Miners' Association, has been appointed on the International Jury of Awards at the St. Louis Exposition. The appointment carries all expenses and \$7 per day from Sept. 1. Should his private business permit, Mr. Benjamin may attend as a public duty.

Commercial Paragraphs.

THE Brown Corliss Engine Co., of Corliss, Wis., has a contract for four large vertical cross compound Corliss engines, to be direct connected to generators, for the Washington navy yard—an important installation.

THE Redfield Drill Co. is now located at Davenport, Wash., having removed its headquarters there from Denver, Colo., but orders may still be sent as before to Jno. H. Redfield, 1606 Blake street, Denver, Colo. The company reports considerable good business.

THE Victor Metals Co., East Braintree, Mass., are now erecting a rolling mill for the manufacture of their Victor non-corrosive silver metal into sheets and rods. This mill is found necessary, as the demand for their metal is so large that other mills, now manufacturing alloys, cannot handle this metal to advantage. Catalogues of rolling mill machinery and furnaces are requested.

THE Rand Drill Co. of New York is shipping an Imperial compound compressor to be used on the extension of the Chicago drainage canal. A compressor of the same type is already in operation on this work and is furnishing compressed air for ten Little Giant drills (No. 3). The two compressors have a combined capacity of furnishing 3400 cubic feet of free air per minute.

THE S. H. Supply Co., Twenty-second and Larimer Sts., Denver, Colo., report sale of four 350 H. P. Babcock & Wilcox boilers, consisting of nine carloads, to Ashland, Ky.; 10-stamp mill complete, to Boulder, Colo.; 25-ton concentrating and crushing plant, to Chesaw, Wash.; 100-stamp mill, to California; 200-ton cyanide plant and electric lighting plant, to Laramie, Wyo.; 10-stamp mill and air compressing plant, to Russell, Colo.

THE Wellman-Seaver-Morgan Co. have cablegram advices from their branch office in London, England, that they have been awarded a contract to manufacture and erect for the Fresno Copper Co., Ltd., of England, one of the most complete copper smelting and refining plants in the country. The plant is to be located in Fresno county, California, and at present will consist of two large copper smelting furnaces with a complete equipment of hot blast stoves, blowing engines, Bessemer converting plant and stock handling equipment. The plan is expected to effect a saving in fuel and labor cost. The entire equipment making up this order will be manufactured in every detail in the works of The Wellman-Seaver-Morgan Co., located at Cleveland and Akron, Ohio. The company is able to build equipment in their own works, covering every stage of the operation from taking the ore out of the mine to putting it into completed product.

Books Received.

"Production and Use of Petroleum in California," being Bulletin No. 32, by P. W. Prutzman, issued by the California State Mining Bureau. Price 75 cents. It deals with the geology of oil occurrences, the field operations, the uses of oil as fuel and otherwise.

Under the title of "Mineral Resources of the United States for 1903," the United States Geological Survey has issued in pamphlet form the following: Production of Talc and Soapstone in 1903; Production of Asbestos in 1903; Production of Salt in 1903; and Production of Monazite and Zircon in 1903. These may be had upon application to the Director of the Survey, Washington, D. C.

Obituary.

J. A. KEATING, a pioneer mining man of Montana, died at Lenox, near Helena, Mont., on the 15th inst. Deceased was a native of Liverpool, England, born November, 1836.

R. H. GEARY, a pioneer miner of Colorado, died at Denver, Colo., on the 18th inst. Deceased crossed the plains in 1864 and engaged in mining in Colorado and New Mexico. He was associated with the late H. A. W. Tabor in the discoveries made in California gulch at Leadville. He was born in St. Lawrence county, New York, April, 1840, and was a veteran of the Civil War.

Latest Market Reports.

SAN FRANCISCO, August 26, 1904.

METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 57½c, refined (1000 fine); San Francisco, 57½c; Mexican dollars, 47½c San Francisco, 45½c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.50; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.25; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £57 7s 9d spot per ton.

Copper shows little sign of important movement. Some large producers are said to be quoting Lake at \$12.62½@12.75. The metal report of Lewis & Sons, Liverpool, England, states that the total visible supply August 1, 1904, was 12,862 tons, as against 15,298 tons July 1, 1903, and 23,231 tons July 1, 1902. On July 1, 1900, it was nearly 30,000 tons, thus showing a constant falling off in visible supply on hand during the past four years. This can only be attributed to the increasing demand, with which the supply fails to keep pace. Under these conditions a higher price will eventually obtain, despite any manipulation by large producers and dealers.

Following are the figures of the German consumption of foreign copper for the months January-June, 1904, as compared with the same period of time for 1903-1902:

	1904.	1903.	1902.
Import, tons.....	56,316	43,688	41,524
Export, tons.....	4,063	5,380	4,486

Consumption, tons. 52,253 38,308 37,038

LEAD.—New York, \$4.25; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 13s 9d long ton.

SPELTER.—New York, \$4.95; St. Louis, \$4.75; London, £22 12s 6d long ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$26.85@27.00; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, \$30@32½c. London, £122 7s 6d spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 17s 6d San Francisco, local, \$41.50@43.00 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.00@42.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.85 @13.20; gray forge, \$12.00; San Francisco, bar, 8c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer .....	\$14 75@15 00
Foundry Northern 1.....	13 75@14 00
Northern 2.....	13 25@13 50
Northern 3.....	12 75@13 00
Southern 1.....	13 40@13 65
Southern 2.....	12 90@13 15
Southern 3.....	12 40@12 65
Forge .....	11 65@11 90
Charcoal .....	14 50@15 00
Billets, Bessemer .....	23 00@24 00
Bars, iron .....	1 35@1 40
Bars, steel .....	1 51@1 51
Rails, standard .....	28 00@28 00
Rails, light .....	23 00@25 00
Plates, boiler .....	1 91@2 01
Tank .....	1 76@1 81
Sheets, 27 store .....	2 26@2 31
Angles .....	1 76@—
Beams .....	1 76@—
Tees .....	1 81@—
Zees .....	1 81@—
Channels .....	1 76@—
No. 1 railroad wrought.....	10 00@11 50
No. 1 cast, net ton.....	10 00@10 50
Iron rails .....	15 00@15 50
Car wheels .....	11 00@11 50
Cast borings .....	3 75@4 00
Turnings .....	7 00@7 50

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½ lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11c. No. 2\*, 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chloride of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2½c; flour sulphur, French, 3½@3½c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rook Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19c; Lard Oil, E. W. S. bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, ½ lb., 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

MOLYBDENUM.—Best, \$2.00 per lb.

CHROMIUM.—90% and over, ½ lb., 80c.

PHOSPHORUS.—American, ½ lb., 70c.

SILVER.—Chloride, per oz., 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride, ½ lb., 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—½ lb., \$2.75.

SODIUM.—Metal, ½ lb., 50c.

BISMUTH.—Subnitrate, ½ lb., \$2.10.

URANIUM.—Oxide, ½ lb., \$3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)



## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING AUGUST 16, 1904.

767,792.—CLOTHESPIN—H. S. Broughton, Salem, Or.  
767,626.—CIGARETTE MAKING DEVICE—A. E. Buckingham, Oakland, Cal.  
767,386.—POTATO SLICER—C. Canciani, Sonora, Cal.  
767,926.—CONCENTRATOR—C. A. Christensen, Orestown, Or.  
767,544.—BRIQUET MACHINE—J. J. Crawford, S. F.  
767,634.—CROSSCUT SAW—D. E. Crouch, Tollhouse, Cal.  
767,685.—WELL DRILL—A. F. Darling, S. F.  
767,546.—RAIL JOINT—J. T. Davis, S. F.  
767,397.—SAWING MACHINE—O. W. Fairfield, S. F.  
767,403.—WRENCH—Glover & Hulbert, Santa Rosa, Cal.  
767,562.—WINDMILL REGULATOR—A. R. Hoesly, Martinez, Cal.  
767,890.—HARROW—G. W. Hoyle, Cloverdale, Cal.  
767,893.—ROSE COUPLING—W. S. Jewell, Oakland, Cal.  
767,586.—FIRE ENGINE HEATER—J. C. Mattheis, Alameda, Cal.  
767,824.—CONVEYOR—W. J. McCabe, Seattle, Wash.  
767,911.—SWIVEL TRUCK—W. J. McCabe, Seattle, Wash.  
767,835.—GEAR WHEEL—M. McIntyre, Canyonville, Or.  
767,908.—KITCHEN CABINET—F. Miller, S. F.  
767,592.—MACHINE TOOL STOP—J. B. Orbison, S. F.  
767,526.—CYLINDER REDUCER—J. N. Paulson, Seattle, Wash.  
767,527.—CYLINDER REDUCER—J. N. Paulson, Seattle, Wash.  
767,443.—WELL—M. D. Rochford, Los Angeles, Cal.  
767,601.—OIL BURNER—A. J. Smithson, Portland, Or.  
767,919.—BEET PLOW—H. F. Thompson, Springfield, Cal.  
767,610.—TICKET DISTRIBUTOR—C. H. Townsend, Berkeley, Cal.  
767,616.—BELT SHIFTING DEVICE—J. Weichhart, S. F.  
767,619.—CUSPIDOR LIFTER—J. M. Whitney, Sonoma, Cal.  
767,464.—GAS VALVE—G. Wilson, Los Angeles, Cal.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CIGARETTE MAKING DEVICE.—No. 767,626. Aug. 16, 1904. A. E. Buckingham, Oakland, Cal. Assigned to Melville Hart, of San Francisco, Cal. This invention relates to a device which is designed as a magazine for containing tobacco, papers for the manufacture of cigarettes, also matches, and a former, with means for attaching it to the tobacco-containing magazine, said former serving

to receive the paper, which is wrapped around it to form the cylinder, and after this has been done the tobacco from the magazine is delivered directly into the interior of the former. The end of the paper cylinder being then closed, by means of a plunger the tobacco is forced out of the cylinder into the paper envelope, which is simultaneously forced off the former and may then be closed to complete the cigarette. By means of this device cigarettes can always be made of the same size and length; also it is designed to form a convenient receptacle in which the tobacco, the sheets of paper for the cigarettes, the forming apparatus and matches can all be conveniently carried in a single receptacle.

CROSSCUT SAWING MACHINE.—No. 767,634. Aug. 16, 1904. D. E. Crouch, Tollhouse, Cal. This device consists in mounting a saw of any suitable or desired length in a traveler which is movable between horizontally disposed guides and connecting the traveler with a chain which is movable about sprocket wheels fixed at any desired distance apart to provide the required length of stroke of the saw. A vertical guide is disposed upon the traveler having a length equal to the distance between the two parts of the chain, and a roller travels in this vertical guide, the shaft of said roller being connected with the chain, so that power being transmitted to drive the chain, the traveler and the saw will be moved any required distance, depending upon the distance between the sprocket wheels over which the chain passes.

TICKET DISTRIBUTOR.—No. 767,610. Aug. 16, 1904. C. H. Townsend, Berkeley, Cal. This invention relates to an apparatus designed to distribute tickets and the like, and it consists of a holder within which a continuous line of separable tickets is contained and a means by which said tickets can be drawn out and separately distributed. It is especially useful in all places where it is desirable to know the order of arrival of customers or patrons and provides such patron with a ticket of identification.

HEATER FOR STEAM FIRE ENGINE.—No. 767,586. Aug. 16, 1904. J. G. Mattheis, Alameda, Cal. This invention consists of a supplemental water heater compartment carried upon the engine frame, having connections with the main boiler and a stationary exterior burner, into relation with which the portable machine is brought, and means for automatically shutting off the flame of the burner when the apparatus leaves its position with relation thereto.

BELT SHIFTING DEVICE.—No. 767,616. Aug. 16, 1904. J. Weichhart, San Francisco, Cal. This invention consists in a belt-shifter, the combination with fast and loose pulleys, of belt-shifting means comprising a support and a bar fixed thereto, a box adjustably mounted on the end of said bar, said box provided with a bracket, guide pulleys journaled in the bracket, a bar disposed at right angles to the first named bar and passing through said hanger, collars adjustably fixed to opposite ends of the second named bar, a bracket adjustably fixed to the end of said second bar, and provided with a roller, and ropes passing around the guide pulleys and connected to said collars, one of said ropes provided with a weight whereby the shifting rod is normally projected across the belt away from the loose pulley and clear of the belt.

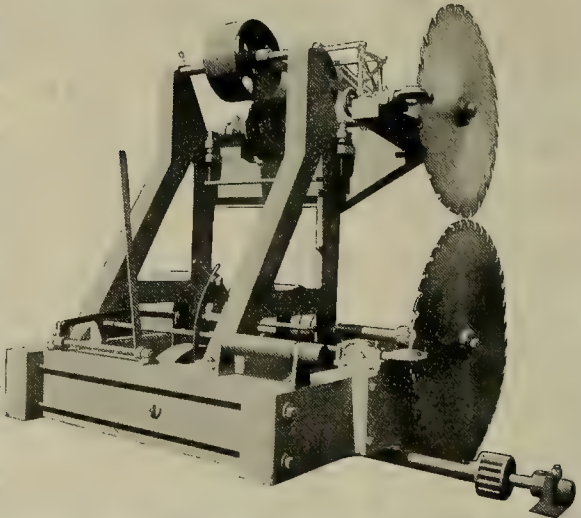
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CIRCULAR  
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DOUBLE  
CIRCULAR  
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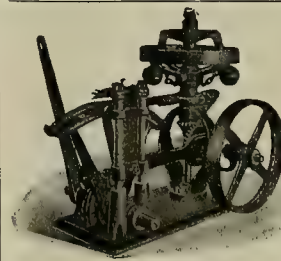
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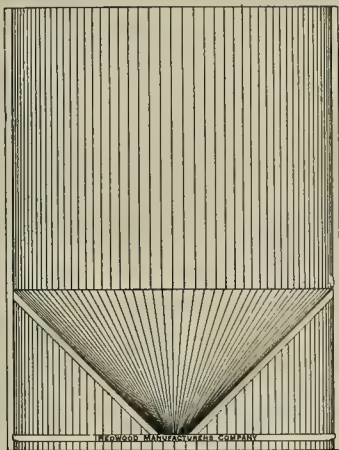
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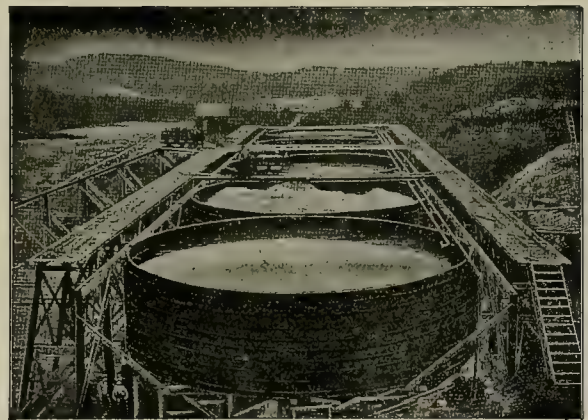
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# MINING AND SCIENTIFIC PRESS

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## Mines of the Rand.

Among the most noted gold fields of the world are those of the Witwatersrand, in the Transvaal, South Africa. The center of the mining industry is Johannesburg, a city of upward of 75,000 inhabitants (see accompanying illustration). The discovery of these famous gold deposits was due indirectly to the discovery and development of the diamond fields in the Kimberly region, several hundred miles southwesterly

reefs, and one of them was traced without much difficulty for several miles by its repeated outcrop along the surface. The first reef to be developed was called the Confidence, but it proved pockety and unsatisfactory, and the returns in a mill built to crush the ore were insufficient to make it a paying proposition. The owners of the Confidence expended over \$50,000 in the equipment and development of their property, but, meeting with such indifferent success, were about to abandon it, when, in 1886, a

the mines of that district just prior to the outbreak of the Boer war was nearly \$100,000,000 annually. Since the close of the war—during which only a few mines were operated—the output has slowly increased, until it has now reached a monthly production approaching \$6,000,000. Three of the engravings herewith show the types of head frames constructed at the inclined shafts. Those built later over the vertical, deep shafts are of somewhat different type; and those now in use at vertical shafts of 3000 and



The Market Place, Johannesburg, S. A.



Head Frame Crown Reef Mine, Johannesburg, S. A.

from Johannesburg. From that center prospectors and adventurers scattered over thousands of square miles of South African territory, and one excitement followed another in rapid succession. The discoveries were generally reported to be far richer and more extensive than they really were, but these reports served to keep interest alive and there was no cessation to prospecting merely because a new field proved to be less profitable than had been anticipated or reported. In 1882 rich discoveries were made about 250 miles east of Johannesburg, and the district of Barberton was boomed in a manner calculated to put a decided check upon legitimate mining in new districts in South Africa. About this time gold was discovered on the Rand, the first discoveries being of placer gold in the little gullies cutting the sandstones and conglomerate beds of the region. In 1883-84 gold was discovered in the veins, and conglomerate

man in their employ found the conglomerate reef, now known as the Main reef leader. One of the accompanying engravings is that of the head frame built on the Robinson mine in its early history, and another is a view of the great tailings wheel, a device often necessary on a flat country like the Rand. Even after the discovery of rich ore on the Rand the pathway to success was not smooth. Difficulty was found in working the ore, and for two or three years the industry made slow headway. The gold was found to be very fine and difficult to save by the usual methods of gold milling. About this time experiments were being made with the cyanide process of extracting gold from ores. It was tried on the ores of the Rand, and found to work more satisfactorily than on any material previously submitted to the process. From the date of that discovery the mining industry of the Rand grew rapidly. The output of

4000 feet depth may be modified somewhat when built over shafts calculated to descend to 6000 or 8000 feet—for such shafts have come to be recognized as a probable necessity of the near future on the Rand, and the engineering problems connected with such undertakings are not regarded with greater concern than was felt over the equipment of shafts intended to sink to 4000 feet a few years since. The past two or three years—in fact, since the end of the war—the all-absorbing problem on the Rand has been the securing of a sufficient number of unskilled laborers to do the necessary work in the mines. The South African natives (Kaffirs), who in former years did this work, can no longer be obtained in sufficient numbers for the purpose, and as a last resort the mine managers have turned to China as the only available source of supply and thousands of coolies are being taken to the Rand.



Tailings Wheel, Robinson Mine, Johannesburg, S. A.



Head Frame City and Suburban Mine, Johannesburg, S. A.



Head Frame Robinson Mine, Johannesburg, S. A.



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FROM Salt Lake City, Utah, comes an allegation that a "business arrangement" or "alliance" has been effected between the Selby Smelting & Lead Co. of San Francisco and the American Smelting & Refining Co. Investigation discloses the fact that the assertion is but one of similar tenor made heretofore, and is entirely without foundation. The manager of the Selby Smelting & Lead Co. in San Francisco and the manager of the American Smelting & Refining Co. at Salt Lake City both say that "there is nothing in the story."

ONE of the most interesting of the numerous annual reports of the operations of corporate mining companies is that of the Con. Mercur Gold Mines Co. of Mercur, Utah, issued August 1. The report appears in the usual form, giving a financial statement of operations at that property. It shows that the gross value of ore treated was \$3.89 per ton and that the recovery averaged \$2.86, leaving an average value in the tailings of \$1.03. The amount of ore treated was 226,701 tons, which is stated to be the smallest amount ever produced and treated in one year since the organization of the company. This was accomplished at a cost of \$1.40 for mining and \$1.60 for milling, making the total cost for every expense, except construction, \$3 per ton, or 14 cents per ton over the total average amount recovered. The report shows that the costs of mining and treatment have been reduced to a figure favorably comparable with those in more favored localities. The variations in the ore at the Mercur mines has made the metallurgical problem one of unusual difficulties, and has necessitated frequent changes in the past. At present, however, the recovery is high, and it is thought it can be maintained.

## The Mining Law.

It has been suggested that a great improvement might be made in the existing Federal mining law if the prospector were not required to find "mineral-bearing rock in place" before locating his claim, and that he be given ninety days in which to decide upon the dips, strike, etc., of his vein after finding it, before proceeding to locate permanently—defining his boundaries in the usual manner. Without doubt the clause of the law requiring the discovery of "mineral-bearing rock in place" is a serious handicap upon the bona fide locator, and a change in this feature of the law might be made to advantage, but the suggestion that he be given ninety days within which to decide how he will locate his claim is an impossibility in any place other than a new and isolated district, and where no other prospectors are in the neighborhood.

Anybody who has been in a stampede mining camp can appreciate this. Where there are hundreds of men, each eager to find a mineral deposit which may make him a fortune, there are no ninety-day periods possible within which to decide upon how a location shall be made. Indeed, the locator has enough to do to locate as quickly as possible, and must then exercise vigilance to preserve and defend his location against the encroachment of others not less eager than himself. A single glance at a claim map of a rich mineral district like Cripple Creek, Creede, Leadville, Butte, or any other of a score of rich camps, will show the inadvisability of attempting to amend the law in this respect. If changes are to be made in the mining laws they should be of such a character as will simplify and not increase the difficulties of obtaining those rights which the Federal statutes are supposed to grant.

There has been a great deal said about the relation of location monuments to the position of the claim on the ground, and this has resulted in an understanding, which is backed by legislation and Supreme Court decisions, that the monuments control, but when there is a dispute the locator is usually at fault. Considering the loose manner in which many prospectors locate their claims, it is surprising that there is not more trouble over the position of claims than there is. The law is plain enough, but the prospector often neglects its simplest requirements, one of which is "The location must be distinctly marked on the ground so that its boundaries can be readily traced." The prospector often neglects to thoroughly and plainly mark the boundaries of his claim, contenting himself with a location stake, a monument or two, or blazed trees, and makes no serious endeavor, as a rule, to comply with the letter and spirit of the law to so mark his location that "its boundaries may be readily traced." If this be done, and witnesses secured to the marking and the notice of location recorded and assessment work performed, there will be little, if any, litigation over title.

THE reports of phenomenal strikes of gold in the new Goldfield district of southern Nevada, whether accurate or otherwise, will have the effect of greatly augmenting the population of that section. In their eager desire to secure a fortune in a day, as it were, hundreds will rush to the newest El Dorado, arriving only to find that the country is staked for miles in every direction in the neighborhood of the new camp; but the stampede cannot fail to produce beneficial results, as there are many other hills in the southern end of that State which have been but slightly prospected, or not at all, and the probable result will be other new and valuable discoveries. It is an important fact that almost every hill and range rising out of the sagebrush-covered wastes of the great basin contain mineral deposits, which have a greater or less value, according to their situation as regards water and transportation facilities. Railroads are building through that region and water is being found by shaft sinking. These two important factors being supplied, the remainder is comparatively easy of accomplishment, for where the railroads go fuel and supplies may be taken readily and ore may be shipped out, though freight charges are high. However, the ores recently developed in that region seem to indicate that they will stand a heavy charge for transportation and reduction, and leave a substantial profit besides.

## Location by Agent.

There are many things in the mining law which undoubtedly could be changed to advantage; but it is often difficult to anticipate the effect of any proposed change. One of the proposals in this direction, which appeared in the form of a resolution presented at the American Mining Congress held last week at Portland, Or., was to the effect that location by power of attorney of claims in Alaska be limited to two claims in a district. Undoubtedly the privilege is abused, for thousands of claims are located by agents who have not even a power of attorney—which is not really necessary anyway—and these claims are held for speculation in the names of non-residents, who never saw them and who probably never will. Under the mining laws the locator is required to do nothing during the period between the date of location and the first of the following January, and he may then delay the performance of assessment work until the latter part of the second year. By taking advantage of the law, locator agents may hold a large number of claims for nearly two years, performing no work whatsoever on these claims, which are taken for speculative purposes only. The purpose of the law is to foster and promote the mining industry and to secure the development of the mineral lands of the United States territory, while protecting the claim holder in his possession of the claims. Looking at it broadly, it seems to matter little whether the lands are held by a large number of individuals or by a smaller number who control large holdings, so long as the law is complied with; but in many instances neither the individual holder of a large number of claims nor the wealthy corporate owner of an equal number of claims actually complies with the law—the one from inability, the other from disinclination. The United States statutes fix the minimum of requirement, and the several States and Territories may add additional requirements as a part of the act of location—such, for instance, as the performance of a certain amount of work within stipulated time, as ninety days in Arizona. Alaska is not a Territory and has no Legislature, and therefore legislation of this character can not be enacted within that district; but Congress may make laws controlling the disposal of Alaska's mineral lands, and the wholesale taking of claims by agents who perform no work is a matters deserving of congressional attention.

IT has been planned to have an exposition of mining and hydraulic machinery at Barcelona, Spain, this year, but, strange to say, American manufacturers, it is reported, have made no application for space, though German and English founders and manufacturers are in the field. American manufacturers are usually so alert to these opportunities, and enter into such keen competition with foreign markets and with each other, that the lack of American interest in this Spanish exposition, held in a country where mining is one of the chief industries, is the more remarkable. Spain has large developed and undeveloped mineral resources, but methods in many instances are primitive. There are said to be great latent, undeveloped water powers, dredging possibilities, mining and metallurgical opportunities in Spain, of which American machinery manufacturers should inform themselves. It is stated that all exhibits will be admitted free of duty and reduced railroad charges will be made.

THE death by premature explosion of several miners engaged in sinking the shaft of the Argonaut mine near Jackson, Cal., again emphasizes the necessity for carefully testing the fuse used in blasting operations. It is said that in this instance the fuse was of a make unfamiliar to the men, who, supposing it to be similar to ordinary fuse, prepared their blasts, spit them and turned to take the skip to ascend to a point of safety, but the blasts exploded before they could leave the bottom of the shaft. Defective fuse is one of the most dangerous elements in mining. Whether it be too fast or too slow, it matters little. There are many more accidents from slow fuses, which cause men to return to a delayed blast, than those which burn so rapidly as to allow insufficient time for escape. Between the two, undoubtedly, the latter is the more dangerous. It shows the necessity of carefully testing new invoices of fuse, whether of a kind previously in use or a new and untried brand.



## CONCENTRATES.

SEVERAL questions stand over to be answered in the issue of next week.

If a cubic foot of the alloy weighs 678 pounds, its specific gravity is 10.848.

STEEL HOISTING ROPES having hemp centers weigh about two pounds per foot for each square inch of cross section.

A GEAR whose pitch is 2½ inches, pitch diameter 44.66 inches, and which makes 80 revolutions per minute, will safely transmit 42.24 H. P.

INFUSORIAL EARTH is used as a fine abrasive and is sold under the name tripoli. There are numerous deposits of this material in the United States.

ARTIFICIAL cinnabar can be produced by the action of a superheated solution of alkaline sulphide on the black amorphous sulphide of mercury.

A TIMBER FLUME 10 feet wide and running 5 feet deep, with an inclination of 9 inches to the mile, would, theoretically, discharge 114.5 cubic feet per second.

A SHAFT sunk 1000 feet at an angle of 75° from the vertical will depart from a vertical line 258.8 feet. The shaft at the 1000-foot point will be 965.9 feet vertically below the collar.

THE compartments of a shaft through which men are hoisted are usually lined, as a means of securing greater safety. One inch boards are considered sufficiently heavy for this purpose.

If the 24-inch pipe discharges 2 cubic feet per second, under the same circumstances a 28-inch pipe would discharge 3 cubic feet per second. It would take sixteen 8-inch pipes to discharge as much as the one 24-inch pipe.

THE distance between supports on aerial tramways varies greatly with the contour of the ground. On level country it is usually 250 to 300 feet, but in hilly or mountainous regions it may be less and is often very much more.

AMONG the placer miners of southern Mexico the adarme is used as the standard of value. There are sixteen adarmes to the ounce, and gold buyers in the vicinity of the placers pay \$2, Mexican, per adarme for gold dust.

A HEMP ROPE is not exactly round, and the proportion of the diameter to the circumference (3.1416), does not hold good. For a three-strand rope the circumference would be about 2.86 times the diameter; for a seven-strand, about 3.

IN sending questions for answer in "Concentrates" it is essential that all the facts be given, and that all the factors entering into the solution of the question be correctly furnished. Otherwise it is impossible to give accurate or satisfactory answer.

ONE advantage of patenting a mining claim is that it secures the owner in his title, and there is no further necessity for assessment work nor danger of encroachment by others. Both patented and unpatented claims are subject to taxation.

THE maximum working load in pounds that may be allowed on a wire rope equals the square of the circumference of the rope in inches, multiplied by 600. Hence a wire rope 4 inches in circumference should not have a load to exceed 9600 pounds.

A CHURN DRILL for deep holes—18 to 20 feet—may be made of a length of 1½-inch pipe to the end of which is welded a few feet of drill steel, provided with a suitable bit. In rock of ordinary character two men can cut 10 to 20 feet in a shift with this drill.

AT sea level the rending force of black powder is calculated at thirty tons per square inch. Black powder is deemed better for coal mining than dynamite, the former breaking it into convenient shape, the latter tending to waste by shattering it into dust.

THE value of asbestos produced in the United States in 1902 was \$16,200. In 1903 it was \$16,700, though the quantity (887 tons) was much less than during 1902, when it was 1005 tons. During 1903 Canada produced 22,328 tons of asbestos, valued at \$904,852.

THE only "sulphate of copper mine" known to "Concentrates" is the Copacquire deposit near Huatacondo, Province of Tarapaca, Chile, S. A., a rainless region. It is reported to average 2% metallic copper and is being worked by the Copacquire Copper Sulphate Co. of London, England.

SOME of the States have statutes requiring any one operating a stationary steam engine to have a license,

duly issued by a board of inspectors. The suggestion that every mine hoisting engineer should have a license is one that has been urged upon the attention of the Federal government.

THERE has been an attempt to recover lead from roasted ores by the use of hydrochloric acid, the lead to be precipitated by metallic zinc, the zinc remaining in the solution to be thrown down by lime, but while theoretically exact, the method does not appear to be satisfactory in a practical way.

WHERE a flume has dried out and become useless by shrinkage of the boards, it is cheaper to remove the boards and rebuild the box by tearing off the boards and turning them. New battens are usually necessary and many leaks will at first occur, but these will diminish as the water continues to flow through the flume.

BRIQUETTING fine ores for smelting has aided in the successful solution of that problem, and another plan has met with fair results wherein what may be styled "metallic coke" is produced. Coal dust, fine iron ore, and the requisite amount of flux thus produces in the coking oven a metallic sponge for the blast furnace.

ZINC SHAVINGS used in the precipitation of gold from cyanide solutions will weigh about 6.5 to 7 pounds per cubic foot when well packed. It has been found advantageous to pack the precipitation boxes closely and firmly, as this offers a greater surface of zinc to the passing solutions than where they are loosely packed.

THE practice of mixing rich ore with that which is too poor to pay is a bad one, though of frequent occurrence. Where the ore is treated at a custom mill at a stated price per ton, this is sometimes done to the advantage of the millman, but at a loss to everyone else concerned, and when this is done some one is at fault at the mine.

A NARROW MORTAR with low discharge is not suited to amalgamation in the battery where it is not easily and quickly accomplished. Amalgamation in the mortar has a tendency to flour mercury. Cyanide men do not agree upon the advantage or disadvantage of having mercury in the tailings to be treated by cyanide process.

SHALES are less important as carriers of oil and gas than either conglomerates, sandstones or limestones. The occurrence of oil of great commercial importance is always in a rock or bed of loose porous material. Shale and other fine-grained rocks are too dense to afford room for large amounts of oil to occur in the interstitial spaces.

CONSIDERABLE silver, lead and gold mining has been carried on in the Argentine Republic, S. A., mostly by English companies, with unsatisfactory result. It would be folly for an American miner to go to that country in search of work, or under other conditions than at an assured salary for a definite period from a responsible company.

AMAZONSTONE is a variety of potash feldspar (microcline). It occurs of light bluish-green color and is found in several localities, notably in the granite of Pike's Peak, Colo., and in the Ural mountains. It is like orthoclase in composition, containing 64.7% silica, 18.4% alumina and 19.6% potash. Soda is also usually present in small amount.

IMPERFECT WATER JACKETS on blast furnaces are an element of great danger, as in the event of a leak appearing on the inner sheet of the jacket a large volume of steam is suddenly generated which is likely to cause an explosion. An accident of this nature occurred a short time since in one of the furnaces of the Old Dominion Co. at Globe, Ariz.

A NATIONAL BUREAU OF STANDARDS was organized by the United States Government nearly four years ago, and while it has not yet got to testing the accuracy or setting the standard for instruments used in mines or by mining engineers, its progress in standard tests for the U. S. Geologic Survey and Coast and Geodetic Survey indicates reasonable belief in the ultimate standardization of mining instruments.

THERE are ore deposits on Cedros island, off the coast of Lower California, of considerable extent. These ores contain gold, silver, copper, zinc, iron, sulphur, arsenic, antimony and other bases, beside in places masses of native sulphur. Specimens of native sulphur have been found in these mines which contain gold, it is said, to the amount of \$100 per ton. The ores occur mostly in diorite and other dark, basic rocks.

HEATING the feed water of a boiler will save from 25% to 30% of the fuel. A good heater may be made which will utilize the exhaust of the engine, which will raise the feed water almost to the boiling point. Exhaust steam may also be used to advantage in the change and drying room of the mine in drying ore and concentrates, and in various other ways where an economical means of utilizing waste heat is desired.

A NO. 7 NEEDLE-SLOT punched screen is equivalent to a 30-mesh (900 holes to the square inch) woven wire screen. The width of the slot is 0.024 inch. The slots in screens of this kind are made ⅓ of an inch long.

Screens are made for laboratory use as fine as 200 holes per linear inch (40,000 holes per square inch). They are used in making tests of slimes and ores in which the precious metals are finely disseminated.

DIKE ROCKS frequently carry payable gold ores, both free and in the various combinations of sulphur, arsenic, tellurium, etc. Silica in free state (quartz) is not always in evidence. Rocks should not be condemned merely because they do not carry free quartz. If panning after crushing does not show gold, assaying should be resorted to. Often the fine alluvial below a gold-bearing vein will prospect in gold, thus affording an indication of its character, when no gold is seen in the rock itself.

THE principal advantages of hoisting by stages from great depth, in having the hoisting plant at the surface, is in that a reel or winding drum of much smaller size is possible, than if all the rope were wound on one reel, the lift being made in a single stage. Another advantage is in not being obliged to place the heavy machinery required under ground, which in itself is an item of great expense, as the machinery must be made in sections, and a large station cut out for its reception underground.

PYRRHOTITE often contains nickel, sometimes in paying quantities. There is no quick "wet" method of making nickel determinations, as all of the processes involve both dry and wet methods, and all are elaborate and complicated. When nickel-bearing ores—which usually also contain cobalt—are oxidized, the green color of the nickel silicate, and often the pink color of the nickel arsenate, erythrite (cobalt bloom), may be seen. If, upon heating, the odor characteristic of arsenical fumes are given off, nickel and cobalt may be suspected.

THE result of fusion of the sulphide ores of copper in either stacks or reverberatories is essentially the same. In either case the operation results in producing two distinct products. First, slag, which contains mainly the earthy portions of the ore and such iron as may be present in the form of oxide; second, matte, composed of copper and sulphur, in the form of sub-sulphide of copper, with such amount of sulphides as can be formed from the surplus sulphur that remains after all the copper has been satisfied. The matte also contains any gold and silver that may have been present in the original ore. These latter are of no consequence from a chemical point of view in the operation of the furnace, though they may be of great importance from the commercial standpoint.

REGARDING the Beaumont and Sour Lake oil fields of Texas, in the former the oil-bearing territory is about 250 acres in extent. The oil-bearing rock is porous dolomite, which occurs as a dome shaped mass at a depth of 800 feet, at the point of its greatest elevation, near the center of the field, from which it dips away in all directions. As the edge of the oil field is approached the dip increases to nearly 60°. At this place the oil rock has been proven to be over 1000 feet thick (due to the dip, in part). Beyond the dip again flattens, and as far as the territory has been proven by borings the oil ceases. The formation (dolomite) is 70 feet in thickness, and is defined by an area of less than 300 acres. At Sour Lake, 20 miles west of Beaumont, the geological structure is similar, but the oil-bearing stratum is loose sand. In one portion of this field the sand is partly cemented by dolomite. The temperature of the oil from this field is as high as 104° F. In both the Beaumont and Sour Lake fields rock salt underlies the oil-bearing formation, and in some of the oil fields of that region oil occurs in the rock salt, and in a layer of clay above the salt are found galena and zincblende. Other accompaniments of these oil occurrences are gypsum, sulphur, hot sulphurous waters and hydrogen sulphide.

IN Mexico iron is found in commercial quantities in the States of Durango, Jalisco, Michoacan and Guerrero. The Cerro del Mercado, situated immediately north of the City of Durango, probably contains one of the largest bodies of iron ore in the world. Humboldt estimated the value of this immense deposit at over nine billions of pesos, silver value. This is over ten times the present property valuation of the City of Mexico, and nearly three times the value of the silver coinage of Mexico for the last 350 years. North of Tapalpa and east of the copper zone, ranging northeast by southwest in the State of Jalisco, are large bodies of iron which are worked by Americans and treated at the iron plant at Tule. In the southern part of Jalisco, at Pihuamo, are also large iron ledges which are being worked. These ledges carry small gold values, but not enough to affect the market price of the ore. Near the Michoacan and Guerrero boundary line is an extensive iron belt running southeast by northwest in which iron bodies outcrop on all the mountain spurs running toward the coast. Nearly all the ore in this belt contains a small percentage of copper, while to the south running parallel is an extensive zone of gold placers. Near the Rio Balsas are large deposits of iron which are soon to be exploited with American capital. All the iron belts of Michoacan merge into copper as they approach the Rio Tepalcatepec. In Guerrero, south of the Rio Balsas, are situated the iron interests of the Standard Oil Co., which rival in size and value the Cerro del Mercado. The States of Sinaloa, Chihuahua and Oaxaca and the Territory of Tepic also contain large iron deposits.



## Some St. Louis Exhibitors.

[FROM OUR WORLD'S FAIR CORRESPONDENT.]

So much has already been sent you illustrating and describing exhibits of manufacturers and display of products, that it may seem like piling it on to send any more concerning that great feature of the Exposition, but the extent and importance of those exhibits certainly justifies further mention.

The palace of mines and metallurgy, in which are installed mineral products, the machinery for mining and the equipment for utilizing the same, together with the resultant metals and other products, occupies the southeastern corner of the fan-like spread of the leading exhibit palaces, its main entrance being directly opposite the palace of liberal arts.

The interior is treated with screen effect, the base of the screen consisting of dividing columns separating panels which illustrate the history and operations of mining and metallurgy. Two of the main entrances are signalized each by a pair of obelisks and fine statuary ornamentation. The building occupies an area of nine acres, being 525 feet wide and 750 feet long, and was erected at a cost of \$500,000. It is well lighted. Within this building and in the adjacent outdoor mining reservation are displayed the mineral products of the world, together with illustrations of mining and metallurgical processes. The leading metallic ores, iron, lead, zinc, gold, silver, etc., are mainly illustrated by examples from the several States and foreign collective exhibits. These are supplemented by metallurgical exhibits and coal displays made by private individuals and corporations.

In the gulch such exhibits as operating oil wells; gold, silver and lead mills and furnaces, aerial tramways, coal-testing equipment, mining railways, etc., are fully displayed in actual size and under the customary methods of operation. Especial attention is given to the new and rarer minerals and processes for their reduction, and rare stones and crystals are exploited at their best, and the methods of cutting and setting them are illustrated by an operating lapidary establishment. Clay and its products have been given a prominent position, and here are found not only the raw material, but the most finished and modern ceramic art products, together with an operating pottery.

The palace of mines and metallurgy and its adjacent areas contain all that is new or interesting in the special field allotted to it.

In the mining gulch are now being completed two exhibits, the coal-testing plant of the United States geological survey and the timber-preserving plant of the bureau of forestry.

The mining gulch entrance is diagonally opposite the southeast corner of the mines and metallurgy building. The Government coal-testing and timber-preserving plants stand along the railroad tracks which run up the gulch and are near the entrance.

The work of the coal-testing plant will be the determination of the respective fuel values of every grade of coal which may be submitted. A 250 H. P. horizontal Allis-Chalmers engine in this plant will supply power for the various mechanical operations to which the samples of coal will be subjected, and serve to give practical tests through its power-producing qualities of the actual values of the various coals. The samples of coal will be analyzed, burnt under boilers under varied conditions, coked and used for gas producing. Their values for gas production and the power qualities of the gases will be tested in a gas engine.

Records of every test will be kept, and it is believed that before the fair is over data will have been secured which may result in the early development of several new coal fields in the country.

The timber-preserving plant, which stands about 100 yards farther up the gulch, is under the direction of H. Van Schrenk. Its special work will be to test all the various methods offered for preserving railroad ties. For this purpose the Allis-Chalmers Co. has lent, free of charge, a tie-treating retort and two tanks for the preservative solutions. Practically all the methods which are now in use for preserving railroad ties and other timber from rotting when exposed to earth and weather are alike in the treatment and differ only in the preservatives employed.

The system supplied consists in placing the ties in the retort, where the first operation is to dry out all of the water and sap by heat, and exhaust all of this and the greater part of the air from the retort proper by pumps. Then while the pores of the wood are all open and practically free from vapor, moisture or air the preservative mixture is let into the retort from the tanks. The preservatives are thus, under the influence of the vacuum in the pores of the wood, carried into every part of the timber. At the plant in the gulch it is intended to treat various lots of ties by different processes. Each batch of ties will then be put into regular service in some railroad track and a record kept of each tie until it is worn out or rotted out. As these tests and records will be official, they will carry great weight.

In the mining gulch the Star Drilling Machine Co.

of Akron, O., show the following machines: No. 7 drilling machine, capacity 2500 feet; No. 0 water well machine; traction prospecting machine; 20 H. P. oil country boiler. Also a full equipment of drilling tools. In charge of O. E. Peppard.

The Keystone Driller Co. of Beaver Falls, Pa., also have a fine exhibit in the mining gulch. They are drilling a well with one of their machines at their exhibit, and are now down over 210 feet, through formations of clay, sand, shale and St. Louis limestone. Other types of their machines are shown. In connection with this exhibit, the J. L. Downie Pump Co., Downieville, Pa., show types of their double-acting deep-well geared pump, as well as single acting. They can be driven off line shaft, or by motors, belted or direct connected.

The Keystone driller is in widespread use for testing gold placer ground; about forty huge gold dredgers, costing from \$35,000 to \$50,000 each, have been put in in various gold-dredging ground in Montana, Colorado and California on results secured by tests made by the Keystone driller. E. O. Eyer has charge of the exhibit.

The performance of 54,000 horses represents the power required for lighting, pumping, and for operating concessions and exhibits in the Exposition. This mammoth power plant occupies practically all the western half of the palace of machinery, a space about 600 feet long by 300 feet wide. Installed here are engines and generators representing the best type of prime movers from the greatest works of this country, England, France and Germany. The steam for the operation of these engines is generated in the steam, gas and fuels building, a fire-proof structure 330 feet long by 300 feet wide, about 100 feet distant from the palace of machinery. The pipe lines, conveying the steam from the boilers to the engines and returning the condensed water back to the boilers from the condensers, fill a tunnel 7 feet broad and 8 feet deep.

The eastern end of the palace of machinery is occupied by exhibits of machine tools and wood-working machinery and all the accessories needed in a complete power plant and a machine shop. The scope of the exhibits in machine tools covers the entire field, from the small machines for working out the tiny screws, bolts and gears of a watch to the huge lathes for turning the shafting for an ocean steamship or the big guns of a man-of-war. In the wood-working line there are machines that do the most delicate grill work, and on up to the great mechanisms contrived to turn the giant trees of the forest into lumber for the world's markets. One especially interesting machine is the immense hydraulic press from the Krupp Works, Germany, used for embossing metals.

The department of machinery furnishes as an exhibit the three massive pumps that deliver 90,000 gallons of water per minute to flow over the cascades. This building is an exposition in itself, and deserves more extended notice, in which every reader of the MINING AND SCIENTIFIC PRESS who visits the fair will heartily agree.

The Lunkenheimer Co. have an exhibit in Block 26, Machinery Hall. A full illustrated description of their exhibit was given in your columns of the issue of July 23d. The exhibit is in charge of E. G. Greenman. The pyramids of their various makes of valves are a noticeable feature of the Lunkenheimer Co.'s exhibit. These include regrinding globe, angle, cross and check valves in the smaller sizes, and iron body globe and gate valves up to 15 inches. They also exhibit a line of plain, chime and fire alarm whistles, blow-off and pop valves, lever valves, generator valves, and a complete line of oil and grease cups and lubricators, besides single and double feed mechanical pumps. Multiple oilers, automatic injectors, cross head oilers and water columns are also shown in different forms and sizes. In all cases, where practical, sections are shown so that the interior construction may be seen at a glance.

The Jeanesville Iron Works Co. of Hazelton, Pa., make a fine showing in Block 42, Machinery Hall. They exhibit one of their triple-expansion duplex pumps having an 11-inch high pressure, 17-inch intermediate and 30-inch low pressure, with a 10-inch plunger and 36-inch stroke. It delivers water to a fine water wheel, direct connected to a 150 K. W. Crocker-Wheeler generator used in connection with the Inter-mural railroad. Other pumping machinery is also shown. A. Middlebrook is their Denver, Colo., manager.

The Robins Conveying Belt Co. of Park Row Bldg., New York City, in Block 31, Machinery Hall, exhibit one of their latest type of belt conveyors with automatic tripper for transporting ore and other materials. The conveyor is in operation, and a Richardson scale is also connected with it.

To avoid dust and dirt, small pieces of rubber are put through the machine instead of ore, etc. An exhibit is also made in the mining gulch.

The Philip Carey Mfg. Co. of Lockland, O., in Block 26, Machinery Hall, report that, aside from their regular exhibit, 526,000 square feet of their steam pipe and boiler covering have been used at the Fair. Their product is largely used by the United States Government. R. D. Gray is in charge.

The Roe-Stephens Mfg. Co. of Detroit, Mich., are in Block 26, Machinery Hall, and show a line of

valves, fittings, etc., in connection with C. W. Thomas of Detroit, in charge of A. Fitzgerald.

The Weber Gas & Gasoline Engine Co. of Kansas City, Mo., exhibit in Block 44, Machinery Hall, and have also a live exhibit in the Gas, Steam & Fuel Building.

Aside from their regular line of gas and gasoline engines, they display the Weber suction charcoal gas producer, which has lately been brought out. This machine automatically produces a combustible gas which can be piped direct to the cylinders of an internal combustion engine and used as power.

They have a complete plant in operation in the Gas, Steam & Fuel Building, consisting of a Weber two-cylinder upright gas engine, operated on charcoal-producer gas furnished by the Weber gas producer.

A number of these producers are in operation throughout the United States and Mexico. The manufacturers claim that one pound of good charcoal will furnish fuel to operate a gas engine 1 H. P. hour, and that one man can look after a plant ranging from 500 to 1000 H. P., it only being necessary to see that the producer is supplied with fuel and that the water supply is not interrupted.

The exhibit is in charge of Allen H. Allen, general manager of the company's interest in northern Mexico, who will be glad to furnish any information desired.

One of the most imposing exhibits of Machinery Hall is that of the Wm. Powell Co. of Cincinnati. In this exhibit may be found all modern mechanical brass and iron fittings for the boiler and engine room and gas-engine practice of high grade of manufacture. Signal oilers, well known to engineers world over, and North Star valves may be examined and explained at the booth. The company also make and show injectors, whistles and oiling devices of all classes and for all uses. The exhibit is illuminated by a 5-foot star, the company's trade mark. The name Wm. Powell Co. in blue lights makes a very pretty soft-blue contrast to the white and gold columns and arches.

The Murray Iron Works Co. of Burlington, Ia., are in Block 42, Machinery Hall, operating a Corliss engine of the rolling mill type, 800 H. P., 26x48 inches. This is one of the engines that runs the power plant of the Intramural railway that encircles the Exposition grounds. H. A. Hewitt is in charge.

The Brown Corliss Engine Co. of Corliss, Wis., in Block 45, Machinery Hall, have two vertical cross compound engines, each of 750 H. P., which are part of the power plant of the Intramural railroad. These are direct connected to 500 K. W. Crocker-Wheeler generators. F. A. Yard is in charge.

The Stillwell-Bierce & Smith-Vaile Co. of Dayton, O., in Block 50, Machinery Hall, make an exhibit of condensers, heaters, pumps, etc., which are in connection with the various exhibits of engines which operate the Intramural road and cascades, and also show a 7000 square foot surface condenser. F. H. Kessler is in charge.

The Lidgerwood Mfg. Co. of New York City, in Block 30, Machinery Hall, show a general line of high-grade hoisting machinery, both steam and electrically driven, for contracting, conveying, erecting and mining purposes and general railroad construction. During the year 1903 they built and sold 1805 hoists and 560 boilers, which is an indication of the merit of their product. F. E. Rainer is in charge.

The Yale & Towne Mfg. Co. of New York City, in Block 29, Machinery Hall, has the most complete exhibit of hand chain hoists at the Fair. Chain hoists are hung exactly as they are in machine shops, and range from those of a capacity of  $\frac{1}{2}$  ton to 20 tons each. It is not generally known that a chain hoist can be made by which one man can raise 20 tons by hand, and this exhibit is unusually interesting for that reason. Chain blocks, electric hoists and conveying appliances are shown. The company is well represented by F. J. Ford.

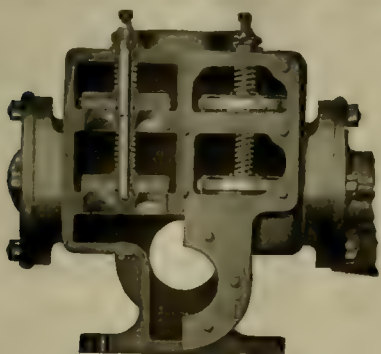
The Hercules Gas Engine Works of San Francisco, Cal., have an exhibit of their marine gasoline engines. In the gas engine section, Block 34 of the Machinery Building, that attracts attention. Their exhibit consists of five marine engines, ranging from 5 to 60 H. P., of single, double and triple cylinder, four cycle type. They are fitted with positive motion on their intake and exhaust valves, automatic throttling governors, ignition control, centrifugal circulating pumps, submerged exhausts, Hercules patent reverse gears and various ingenious devices.

The Hercules people are pioneers in the gas engine business, and their marine engines shown in this exhibit appear to be of excellent design and construction, and look as if they would substantiate their builders' claim that they are durable, reliable and especially constructed to stand long-continued hard service. Every one interested in gas engines should see this exhibit.

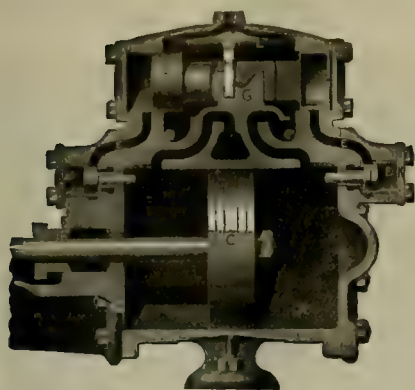
Noticeable also is the fine exhibit of the A. S. Cameron Steam Pump Works in Block 33, Machinery Hall. Such a showing as that made by the Cameron people impresses one with the power of inventive genius and the mechanical ability to put the ideas in practicable shape. For mines especially is noted the Cameron outside-packed plunger station pump for hard service in hard water, whether installed underground or on the surface. The gentleman in charge reports that the works were established in 1860, and of late years the export branch of the business has



grown to rival in extent the sales to domestic buyers. They supply Canada, Central and South America, Australia, South Africa, Continental Europe and the East Indies with the "Cameron" pump, there being varieties suited to every required condition. Here-with are cuts of two parts of the Cameron pump,



The Cameron Water Valve Chest.



The Cameron Steam End.

"the Cameron water valve chest" and "the Cameron steam end," which to engineers or users of steam are sufficiently clear to render unnecessary any extended explanation.

In addition to the outside-packed plunger station pump, designed where the water contains acid, or is sandy or gritty, there is also noted the "mountain

the expense of having to shovel out of cars. This arrangement also enables them to keep constantly on hand in the vicinity of the exposition grounds thirty-five cars of coal, making it unnecessary to actually carry on the grounds more than a maximum day's supply, or some 500 tons, that being the capacity of the storage pocket. The capacity of the boilers is upwards of 40,000 H. P. The boilers are arranged in four parallel rows running north and south, the size of the power house being about 300 feet square. Coal is received on two tracks, running into the building at the west end. Beneath each track is a steel hopper, 40 feet long, into which the coal is dumped. From each hopper coal is taken by a steel apron conveyor in a uniform stream to breakers placed in a pit beneath the storage pocket, the coal being reduced by these breakers to about 1 inch in size, or size suitable for the mechanical stokers and chain grates used with the boilers. Running beneath the crushers, ascending and passing over the 500-ton storage pocket, is a gravity-discharge elevator conveyor, which takes the coal as delivered by the crushers at the rate of 100 tons per hour, elevates it and deposits it into the storage pocket. Valves in the bottom of the storage pocket allow coal to flow from it onto steel apron conveyor below, which carries the coal to the south end of the building and there delivers it to a link-belt patented overlapping pivoted bucket carrier. This elevates the coal and carries it the entire length of the power house, delivering it to either one of four overhead conveyors, running above the passageways between the boiler fronts.

These conveyors over the boilers, through suitable valves, deliver the coal into five cylindrical steel tanks with conical bottoms over the boilers. From these tanks the coal passes through spouts having universal movement to the mechanical stokers.

The daily consumption is estimated as a maximum of 500 tons, which can readily be distributed in ten hours by the conveyors through the power house. The object in placing the coal in storage at the rate of 100 tons per hour was to permit the storage bins to be filled during the night hours when the exposition was closed and thus obviate the necessity of switching coal cars through the grounds while the Exposition was open to the public.

The Link-Belt Machinery Co. have purposely employed, as best carrying out the idea of their exhibit, several different types of conveyors. The pivoted bucket carrier, through which all of the coal has to pass to reach the four distributing conveyors over the boilers, has to be in continuous operation through the day. These conveyors are of the pusher type, in which the coal is pushed along a steel-lined trough by steel pushers attached between two strands of roll-

The comparatively short time of the Exposition period it was felt did not warrant the expense of the installation of a system of conveyors for handling the ashes. These are drawn from the ash pits into small push cars on tracks in tunnels beneath the boiler-room floor and when a sufficient number of these cars have been filled they are pushed to the south end of the building, dumped into a steel hopper, from which they are fed to the Link-Belt elevator, this elevator being carried to a considerable height so that by means of a swinging spout the ashes it delivers can be deposited in railroad cars standing on siding.

The utility and economy of this general scheme of handling the fuel in a large power house can readily be appreciated by anyone watching the operation of the carriers for a few minutes and then endeavoring to imagine the number of men that would be required to distribute this coal, if it were possible, through the power house by hand. One cannot fail to be impressed with the entire freedom from noise and dirt with which the fuel is distributed in this power house.

The mixing tank and solution tank connected with the small plunger pump into the suction of the boiler feed pump used by the Dearborn Drug & Chemical Works in introducing their vegetable extracted preparations in their feed water treatment at their exhibit in the boiler house of the Exhibit is a practical demonstration of the great interest taken in the care of steam boilers. The preparation is reduced with forty parts of water to give a large volume of the solution to work with, and this solution is introduced into the feed water going to the boilers in such a manner as to charge every gallon of water with its proper amount of the preparation. In this manner the piping, valves, connections, boilers and all accessories are under constant protection by having the preservative composition of the preparation constantly in the water, and it also enables the engineer to keep his boilers perfectly clear with half the quantity that is needed in putting the daily dose in at one time.

Scientific boiler feed water treatment has been recognized as a necessity, and the old school of mechanically cleaning boilers and the indifferent use of caustic soda and all other injurious substances, without first considering the consequences, results, analysis of the water, the scientific solution of the difficulty, is a thing of the past. To-day it is an accurately well-defined branch of science, and the results can be thoroughly calculated in the laboratory by the analysis of the water and writing a prescription with the proper preparation, knowing exactly how the results will come out before even starting the test.

The A. Leschen & Sons Rope Co. have extensive exhibits and are well represented in Machinery Hall and also in the mining gulch. In the exhibit in the Machinery Hall is shown all of the classes of cable which they furnish and manufacture, as well as aerial wire rope tramways, suspension bridges, haulage outfits and other equipments involving the use of wire rope. The exhibit consists of an elaborate pavilion artistically arranged and built entirely of wire rope and wire rope fittings. In the center of the pavilion is one of the most complete set of samples ever exhibited, arranged in the shape of a cylinder and showing each individual type of cable which they manufacture.

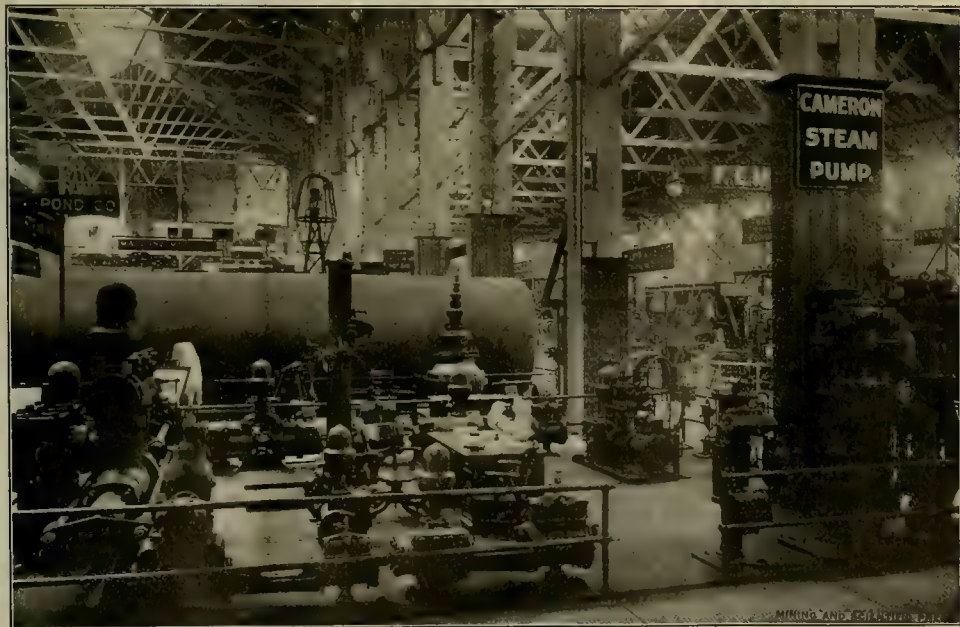
Immediately to the east of this pavilion is extensive mountain scenery with an operating tramway model 16 feet in length, and built to a scale of 1 inch to the foot. This model shows the exact detail of the Leschen Co.'s automatic tramway and is built over a rugged contour representing a typical mountain scene in the Western mining camps.

A complete model of a wire rope suspension bridge is also shown in connection with the scenic effect and spans a wide stream over an extensive waterfall, having one approach at a manufacturing town, all minutely shown.

In addition there is also illustrated other tramways, as the conditions are found in mining camps, carrying the ore from different points to the millsites located below in the gulch.

A coal mine showing the tunnel and the approach is also illustrated, in which a complete haulage plant can be seen in reference to the mine from which the coal is taken. A Washington lumber camp is also illustrated, showing the method of logging heavy timbers in that section and the devices used for handling the immense logs. Other uses to which wire rope is applied is also shown throughout, this effect giving a visitor a vivid idea of the various uses of wire rope. This exhibit is located in Block 13, Aisle F3, in the eastern end of Machinery Hall.

Another fine exhibit in the same line is that of the Broderick & Bascom Rope Co., an enterprising St. Louis firm. The accompanying cut gives a faint idea of the extent and completeness of this splendid showing, which was designed and installed under direction of E. P. Frederick, the general superintendent and mechanical engineer of the Broderick & Bascom Rope Co. The biggest thing in this big display is the great spool of wire rope on their "Jumbo" steel wagon. People who have seen fifty-four horses pulling a new cable through the streets of San Francisco can form an idea of what this looks like when it is stated that this cable wagon has a capacity of 200,000 pounds. The spool holds 33,212 feet of 1½-inch steel wire rope,



Cameron Pump Exhibit at the St. Louis Exposition.

pattern," the regular horizontal outside-packed plunger pump, built in sections for muleback transportation, and the "Sierras" pattern, being the regular vertical plunger sinking pump of the smaller sizes, built in sections for transportation in mountainous countries or any region where small packages are necessary. The maximum weight of one piece is only 300 pounds. The New York office and works of the Cameron steam pump are at the foot of East 23rd St., but they have branch offices in the principal cities of the world.

Worthy of mention is the plant for handling fuel. It is designed to take coal from cars and deliver it into storage at the rate of 100 tons per hour, and to distribute coal taken from storage through the power house at the rate of fifty tons per hour. The Exposition Company has exclusive use during the exposition period of 250 self-cleaning cars to bring the coal from the mines, thus insuring themselves against a possible shortage of cars and also insuring themselves against

ing chain. All of the conveyors are driven by individual motors and by suitable arrangement of signals any one of the elements of the conveying plant may be stopped or started at once.

The supporting structure is for the most part of steel. The 500-ton storage bin, being only a temporary structure and entirely isolated from the boilers, is of timber construction, and the overhead conveyors, being well up under the roof of the power house, are also supported by light wooden trusses. All of the five-ton pockets in front of the boilers, together with all supporting structure, is of steel.

For operating the plant there are employed one overhead man to open and close the valves for distribution to the different boilers, an oiler and general utility man to see that the machinery is in good running order, and a foreman. In deference to the dictates of the labor unions, however, the employment of two electricians to stop and start the motors is necessary.



which weighs 137,000 pounds. In St. Louis, they tell me, it takes fifty-six horses to pull that steel wagon, and I believe it.

A revolving disk on each end of this "Jumbo" dis-

Ind., in Block 9, Electricity Building, exhibit generators and motors for direct and alternating current, switches, arc lamps, meters, regulators, transformers, alternators and other instruments. A handsome

ing and has remarkable ability to resist wear. A No. 7½ gyratory crusher shown in sections and a 2½ cubic yard steam shovel dipper complete is shown, to illustrate the application of manganese steel, and many other specimens of castings are on exhibition—such as toothed and corrugated rolls for crushing coal and coke, roll shells for ordinary Cornish rolls, several styles of gyratory crusher heads and concaves, jaw, check and toggle plates for jaw crushers, mixer blades, elevator buckets, gears, sprocket wheels and chain, also centrifugal pump bodies, liners and flyers for handling sand and gravel. A variety of mine carwheels made of manganese steel is shown, illustrating the toughness and strength of the metal.

In connection with the exhibit of the International Nickel Co., in Block 42A, are a variety of nickel-steel castings made by the Taylor Iron & Steel Co., illustrating the wide range of nickel-steel castings for gears, stamp shoes and dies, tires and die rings for Chilean mills and many other devices. H. A. Johann is in charge.

The American Well Works of Aurora, Ill., in Block 13, Mines and Metallurgy Building, and Block 35, Machinery Hall, have an exhibit which consists of a general line of well drilling machinery, gas engines, air compressors, deep well appliances, portable adamant coring machinery, which is operated by steam or gasoline power, and other interesting appliances of this nature.

The Crawford & McCrimmon Co., Brazil, Ind., Block 14, Mines and Metallurgy Building, and Mining Gulch, show hoisting and haulage engines, ventilating fans and acid proof pumps. They also have a ventilating fan operating at the anthracite mine in the mining gulch.

The Orford Copper Co., New York City, Block 42, Mines and Metallurgy Building, show the process of manufacturing nickel-steel from mines to finished product. This nickel-steel is shown made up in dredge buckets, pan bottom segments for grinding and mixing mill, tires for Chilean mills, roll shells for crushing rolls, shoes and dies for cement mill, nickel-steel rolls and many other devices. As is well known, nickel-steel is especially valuable for these purposes, owing to its ability to resist sudden shocks.

The concentrating mill, built by the Allis-Chalmers Co. for the Utah space in the Mines and Metallurgy Building, has proved to be an attractive exhibit at the Exposition. Under the direction of Prof. Bradford, of the Utah School of Mines, the mill is operated every day, and people crowd around to see it work. The ores worked are sulphide of copper and these, when concentrated, look like gold. As fast as the concentrates gather, they are filled into glass phials and given away to the crowd. Already the first supply of 20,000 phials has been exhausted and 50,000 more have been ordered. Director General Whitaker says that the phials, with their glittering contents, are proving valuable as advertising matter.

The Lanyon Zinc Co. has an exhibit in the Mines and Metallurgy palace to illustrate the present wide field of usefulness of zinc, and the possibilities of its substitution in many lines for more expensive alloys and metals. To this end they have gathered together and placed on view not only their direct product of spelter, sheet zinc, zinc wire, rod, tube and ribbon,

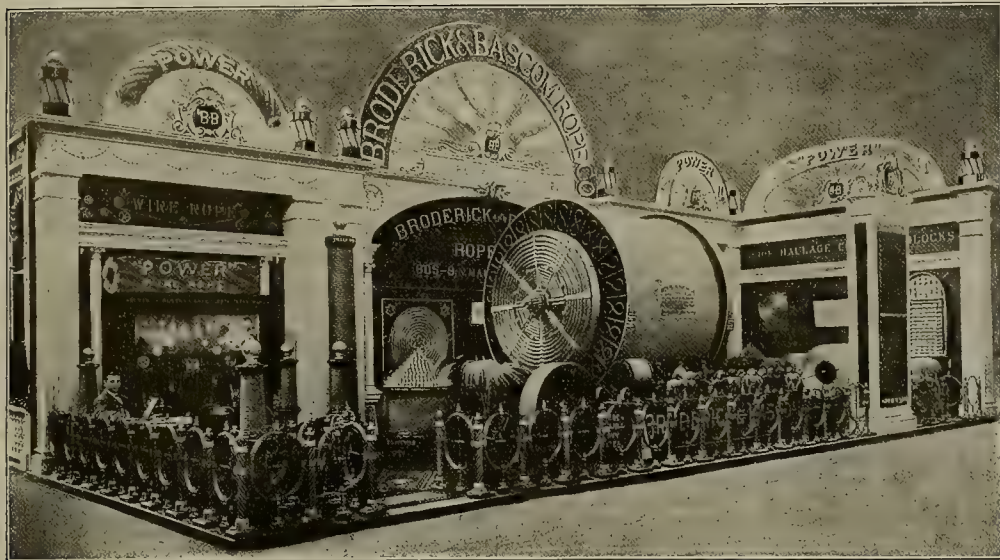


Exhibit of Broderick & Bascom Rope Company at the Worlds' Fair.

play is 8 feet in diameter and has thereon more sizes and shapes and styles of steel wire than one could imagine existed.

The wire rope fence is another thing that attracts universal attention. The display of this firm is one of the finest features of the fair.

The palace of electricity occupies a central position on the exposition grounds. It is a fine exhibit structure, pentagonal in shape, and surrounds a spacious court. Its east front borders on the grand basin, and from its southern exposure the Terrace of States and the cascades are in full view.

The exhibits within this palace cover all of the modern applications of electricity, and each department of education, science and industry, associated with electricity, is represented in about equal measure.

The retrospective exhibit is confined very largely to the fine demonstration made in honor of Thomas Alva Edison, in blocks 26 and 27. This exhibit is arranged in honor of Mr. Edison on account of the fact that 1904 is the twenty-fifth anniversary of the commercial perfection of the incandescent lamp, the agent which has been used so effectively in beautifying the exposition.

The exhibits which show the commercial development of electricity most effectively, in that they present its adaptation in industry, are located in the west end of Machinery Hall and in the northwest section of the Electricity building. In Machinery Hall large direct-connected operating units, ranging in capacity up to 3200 K. W., and of wide variety, are connected up with auxiliary exciting and switchboard appliances, as a part of the exhibitors' service power plant, and present a very imposing and animated picture.

In the Electricity building many exhibits in blocks 3, 4, 5, 6, 7, 8, 9, 14, 16 and 17 show to what perfection electrical appliances have been brought in adapting this force to the requirements of almost every branch of industry, enabling operations to be performed involving large amounts of power with greater certainty, greater regularity and greater delicacy of action than has ever before been possible.

In the southwest section of the building will be found the principal exhibits illustrating the use of the storage battery in connection with lighting plants, railways, telephone exchanges and other uses. All of the exhibits in the building are working exhibits, by which is meant that the machinery is in operation, bringing its adaptability to the work in hand vividly in mind by an actual demonstration.

The application of electricity to medicine is shown by the exhibits in the eastern part of section 4, where all the modern developments for the treatment of diseases by the aid and use of electricity are presented.

In the south and southeast sections are the principal exhibits illustrating the use of electricity in the transmission of intelligence. There are two elaborate working exhibits showing the development in the art of telephony and a number of other working exhibits demonstrating specialties in this field.

The Northern Electrical Manufacturing Co. of Madison, Wis., in Block 14, Electricity Building, show their make of motors direct connected to fans, blowers, machine tools, deep well pumps and other machines. These motors are direct connected, doing away with belting or gearing, and are provided with automatic controllers to start and stop them. They are of variable speeds, varying from 100% to 500%. F. S. Culver is in charge.

The Fort Wayne Electric Works, Fort Wayne,

switchboard is installed. J. W. Hilgeman is in charge.

The Wesco Supply Co., St. Louis, Mo., in Block 8, Electricity Building, have a large exhibit in connection with the Triumph Electric Co., Gardner Electric Drill & Machinery Co., Browning Electric Co., and other manufacturers whom they represent in St. Louis. This collective exhibit consists of motors, lamps, and a general line of electrical appliances of interest. A Gardner electric drill is set up. The whole is in charge of L. M. Zapf.

The Kellogg Switchboard & Supply Co., in Block 17, Electricity Building, show telephone switchboards, telephones, wire, cables, etc., in connection with the Kinloch Telephone Co. of St. Louis. A telephone switchboard is in operation. Mr. Turner is in charge.

The Weston Electrical Instrument Co. of Newark, N. J., in Block 25, Electricity Building, have virtually the only complete exhibit of measuring instruments at the Fair, which comprises portable direct reading voltmeters, circuit testers, ground detectors, ohmmeters, etc. This is in charge of Charles P. Frey.

The Commercial Electric Co., Indianapolis, Ind., in Block 14, Electricity Building, show a line of motors and dynamos.

Turning again to the Mining and Metallurgy Building, the Taylor Iron & Steel Co. of High Bridge, N.



Exhibit of the Lanyon Zinc Company at the St. Louis Exposition.

J., in Block 73, make a noticeable showing. The first exhibit that strikes the eye here is a very large revolving screen; 60 inches internal diameter with 21 feet length of perforated plates, the over-all length of screen being about 30 feet and total weight about 33,000 pounds. In this screen all of the parts subject to wear are of manganese steel. Manganese steel is a metal combining extreme hardness with much malleability and toughness. While it can scarcely be drilled or cut by any tool, it can be forged and bent and twisted cold into shapes without break-

but have shown as well numerous examples of manufactured products from various concerns throughout the country who have already been impressed with the feasibility of employing zinc for their several commodities. The real purpose of the exhibit naturally enough is to extend the consumption of zinc as widely as possible, and they have chosen this manner of exhibiting many zinc articles as one of the avenues towards advancing the interest in the metal and extending a knowledge of its usefulness, well realizing that the more general an acquaintance with its use



becomes, the better will it be applied, and eventually will be employed for a much wider diversity of uses.

The most striking feature of the exhibit, as illustrated herewith, is a zinc facade 66 feet long, of classic proportion, used as a background to the space, showing the application of zinc to architectural work such as doorways, cornices, gables, pediments, etc. It is enriched with stamped zinc ornaments, and various pictures of the company's works decorate the panels of this back wall. Upon the two large columns which are located symmetrically near the corners of the exhibit are displayed handsome stamped zinc lion heads and ornaments, church organ pipes of zinc, a large washboard showing the various styles of ribbing used in standard makes, a section of a flight of stairs, showing in a graphical manner the use of zinc stair tread, nosings and stair corners, white-bronze medallions, as well as the name and location of the company arranged in stamped zinc letters brightly burnished. Piles of spelter, reels of wire, a number of casks of sheet zinc, a box of flat sheets and a table of corrugated zinc, with a large display of wire rods, tubes and bands in the several show cases, display the direct products of the Lanyon Zinc Co.

The exhibit of the J. Geo. Leyner Engineering Works Co., in the palace of mines and metallurgy, is located adjoining one of the main entrances of the

special showings a whole issue of the MINING AND SCIENTIFIC PRESS could be devoted to a description of one of the exhibits here, and then the subject would not be exhausted. This is said to illustrate the extent and wide reaching nature of this great display.

St. Louis, August 20.

### American Mining Congress.

The first day of the seventh annual session of the American Mining Congress, which met at Portland, Or., August 22-27, was occupied with the usual preliminaries of welcoming speeches, appointment of committees and the president's annual address. On the 23rd, the first speaker was F. H. Newell, chief of the reclamation service of the United States Geological Survey, on the "Relation of Irrigation to Mining." In addition to explaining the relation of irrigation to mining, he asked for suggestions on the law of apex. "The connection between irrigation and mining is not obvious," said he. "The old hydraulic flumes of the West have in a number of cases been converted into parts of irrigation systems. Among these are the large systems of California, which have contributed to the progress and prosper-

of the realm." Speaking of the need of a Government assay office in Oregon, he said that as there is none nearer than Boise, Idaho, on the east, Seattle, Wash., on the north and San Francisco, Cal., on the south, and as "a large proportion of the gold product of Oregon is taken directly to smelters outside of the State, that by the time the report reaches Washington some other State than Oregon gets the credit."

This paper was followed by M. D. Leehey of Seattle, Wash., on "Mining Laws," who said that "two important decisions worthy of special mention were rendered by the Supreme Court of the United States during the present year. In re. Clipper Mining Co. v. Eli Mining & Land Co., the court affirmed the Supreme Court of Colorado and held that a valid placer location entitles the locator to the exclusive possession of the surface and that no one may enter thereon to prospect for unknown veins or lodes; that any such entry constitutes a trespass. The court decided in the same case that a placer locator may advertise in the usual manner the conflicting application for patent to a lode claim, thus determining a question of practice heretofore much in doubt. In re. St. Louis M. & M. Co. v. Montana M. Co., Ltd., the supreme court held that the owner of a vein must take his extralateral rights under adjoining territory, by a shaft on the vein and not by means of crosscuts.

"This same law of the apex, or so-called extralateral rights, still continues to be the most perplexing feature of the Western mining laws, and the one producing the most controversy. \* \* \* Naturally this has suggested an amendment abolishing the apex rule and providing for a grant of larger surface with no extralateral right. But a consideration of such amendment involves serious questions. Before any law is changed, two things should be clearly apparent—first, an actual necessity for the change; second, that the one proposed will afford the relief desired. \* \* \* Considering the question, 'Is the present apex rule wrong or unwise?' the theory upon which such rights are granted is that the discoverer of a vein shall be rewarded with its mineral. At the time of discovery he cannot always determine the strike of such vein upon the surface, to say nothing about its dip beneath the surface, and to protect him it is proposed to allow surface ground 1500 feet wide. But this will allow only 750 feet from the center of his vein, even if he is able to locate that center; and then to grant 1500 feet square, or two and one-half times the size of the present claim, simply withdraws that much additional ground from exploration by other prospectors, for usually but one vein at a time is explored by the locator." He argued that the miner will not give much time nor money to development of a vein near the edge of his claim, which gave promise of dipping outside of his lines; nor for the man outside to sink a shaft for an uncertainty. "Of course, such owners of adjoining claims might agree on a plan of joint development and division of profits. We are told that such has been frequently done in British Columbia, which has a similar law." History is cited to show that the modern extralateral right had its precedents in the European mining codes as far back as the fifteenth century. "Even if it had been the part of better wisdom to have adopted the 'plane' system of ownership in the beginning without extralateral rights, is it well to make the change now? A poor law after it has been interpreted and construed by the courts will often operate more equitably than a better law which is yet unsettled and whose terms are in dispute." The present law has now been largely covered by supreme court decisions and the miner knows where he stands, so that the litigation of recent years need not be expected to always continue. Conditions in Alaska were described to show the advisability of a modification in the application of power of attorney privileges in the location of placers.

In "The Mineral Resources of Oregon," by F. V. Drake, the speaker traced the development of Oregon and its camps from the discovery of gold in the Blue mountains in 1845 and on the Santiam river in 1847, giving the geological problems exhibited by the various sections, and enumerating the mineral assets of the State, other than gold; and showing the extent to which modern machinery and processes are being applied.

On the 24th papers were read by J. S. Crawford of Oregon on "The Relation of Electrical Force and Conditions of Geology;" J. W. Abbott of Denver, Colo., on "Mining Men for Better Roads;" F. W. White of Cleveland, Ohio, on "The Inventor of Mines." In the afternoon session El Paso, Texas, was selected as the meeting place for the convention of the American Mining Congress in 1905.

On "The Functions of the State Geological Surveys," E. R. Buckley of Rolla, Mo., speaking in defense of State geological surveys, explained the good these surveys, if properly managed, can do and the need of them in the interest of mining. "The field covered by the State Geological Survey trespasses to no extent on that of the mining engineer or of the field geologist. The State Geological Survey can be of the greatest service to the mining industry. The reports issued by the Survey covers the entire State in regard to minerals, and these reports are generally sought after by mining men. One function of the Survey is to collect specimens for work in colleges



The Leyner Rock Drill Exhibit at St. Louis.

building, opposite the Colorado State mining exhibit, and across the aisle from the exhibit of the Allis-Chalmers Co. It occupies a space of 30 by 62 feet. There is on exhibition a Leyner air compressor of the simple-actuated, two-stage type; also a compound-steam compound-air compressor of their latest pattern; a small belt-driven, single-stage Leyner compressor, operated by 20 H. P. Westinghouse motor, this smaller compressor furnishing the compressed-air power to operate one of the water Leyner rock drills. The drill is operated at stated intervals every day, always surrounded by an interested crowd of spectators. The drill operates in a substantial frame, mounted on double screw column as it would be mounted in mine work, drilling into a huge block of syenitic granite quarried at Iron Mountain, Missouri. The exhibit also includes an exhibition of the working parts of the Leyner drill, as a separate exhibition, and some of the special features of the Leyner compressors; also several of their newly designed hoisting engines. Heavy piling has been driven into the ground to a depth of 24 feet, and the compressors and hoisting engines are substantially mounted on foundations just as they are mounted in actual mine installations.

In mentioning the above the subject has only been touched upon. There are scores of others equally deserving, some of whom have had previous description in your columns and all of whom deserve the widest publicity, for their exhibits go to make up a liberal education in itself. Among those may be mentioned: The Union Steam Pump Co., Battle Creek, Mich., Machinery Hall; the A. S. Cameron Steam Pump Works, Block 33, Machinery Hall; the Fairbanks, Morse & Co.'s exhibit, Machinery Hall; the Crane Co.'s exhibit, in charge of Mr. Parks of Chicago, Machinery Hall; the Westinghouse Electric & Manufacturing Co., Block 7, Electricity Building; the Western Electric Co., Block 17, Electricity Building; the General Electric Co., Block 28, Electricity Building; the Jackson Electric Drill Co., Denver, Colo.; the Colorado Iron Works, Denver, Colo.; the American Concentrator Co. of Joplin, Mo., Block 4, Mines and Metallurgy Building; the F. W. Braun Co., Block 81, Mines and Metallurgy Building; the Watt Mining Car Wheel Co., Block 62, Mines and Metallurgy Building; the Wood Drill Works, Block 30, Mines and Metallurgy Building; the American Diamond Rock Drill Co., Block 10, Mines and Metallurgy Building; the Denver Engineering Works, Block 14, Electricity Building, and a hundred others.

It is a fact that in many of those splendid commer-

ity of the country. The basis for these schemes were the miners' flumes. By the Act of June 17, 1902, the proceeds of the sale of public lands in thirteen States and two Territories has been laid aside for the advancement of irrigation schemes in the West. Many of these schemes are far from completion, but many of them are under way. It is to the interest of the miner to aid the irrigation schemes for the benefit they will give him, when completed, in the way of water supply and if need be water for hydraulic purposes."

Following Mr. Newell, Gifford Pinchot, of the Bureau of Forestry, said: "The President's idea in creating the Public Lands Commission is to get at the best way of using and preserving the public lands of the United States, and particularly of the western part of the country. The question now is, 'How can we give the forested part of the public lands their best use?' The lumbermen want the forests reserved in order that their industry may be preserved. The grazing man wants the forests thrown open to grazing, and also wants the grass as well as the forests themselves preserved. As to the mining industry, you cannot run a mine without timber and water, and both must be near and cheap. The policy of the Government toward the mining man is to get the timber near enough for him to operate his mine at a profit. One of the misconceptions of the law creating forest reserves is that it prevents the location and development of mining lands. You can develop mines in forest reserves the same as you can elsewhere. You can also use the timber on the reserves to assist in developing your mine."

On the subject of "Government Branch Mint or Assay Office," United States Senator J. H. Mitchell, of Oregon, after giving statistics of the growth of the mineral industry of the United States, and particularly as to the production of the precious metals—and also showing the benefits derived by the farming interests of the country from the establishment of the Department of Agriculture, and by the commercial interests from the Department of Commerce and Labor—pointed out that, "the successful miner of the precious metals, while benefiting himself individually, is at the same time contributing to the national wealth and is therefore deserving of the sympathy, aid and support of the National Government. Some of the aids that can be properly extended is the establishment of mints and assay offices, smelting furnaces, etc., located at convenient places, so that the crude metals may be, at the least possible cost of both time and money, converted into the coin



and universities. A well-arranged cabinet of the minerals of the State and maps and charts is one of the most useful things that can be undertaken by the Survey. The Geological Survey is a department to which the citizen may apply for information on any mineral he may discover. The department should be a bureau of reliable information, and every State should have a department under the direction of thoroughly competent men. The State Geological Survey should be instituted to co-operate with the United States Geological Survey, the Bureaus of Forestry, Soils and the Reclamation Service. The field of usefulness of the Survey is in every State where mining is one of the industries and where it is possible to develop mining." John Daggett of California spoke of the growth of the mining industry in that State.

In the morning session of the 25th several resolutions were adopted, one of which asks that "the Government land laws be so modified that the same process shall apply in the patenting of agricultural, stone and coal lands, as in mining claims, and that notices shall be posted in the same manner prior to patenting. It is also required that persons patenting non-mineral lands shall be required to furnish evidence of their non-mineral character as positive as proof of mineral character as that which mining men are obliged to make." Another resolution reviews a late decision of the Secretary of the Interior interpreting the Teller law holding that monuments on the ground shall govern, and not the patent description thereto, in the survey of adjoining mining claims, and that great injury would be worked to the industry and the owners of patented mining claims by the application of this rule by its opening the way to falsified positions of mining claims. The Congress asked that such interpretation be adversed by the Secretary of the Interior, and that the law should be so modified as to prevent such interpretation in the future.

A. E. Borthwick of Idaho spoke on "The Mineral Resources of Thunder Mountain." He said a large part of Idaho is undeveloped, though seventeen out of the twenty-seven counties of the State are ore-producing counties. Owyhee, Idaho and Boise are the gold-producing counties of Idaho. There are good inducements in the camps of these counties and particularly in the Thunder Mountain district. The district has a radius of 30 miles and is on top of a watershed about 7000 or 8000 feet above the sea level. There is snow and plenty of it in the winter time, but by the first of May it is gone. A few of the groups of mines have been developed and have yielded promising results.

On "Copper Production in California," M. E. Dittmar of Redding, Cal., said: "The development of copper in California is not of recent date. The mines at Copperopolis, in Calaveras county, are being reopened, with good results. Shasta county has shown marked development in recent years. The Mountain Copper Co., in Shasta county, is averaging 800 tons daily (its full capacity is 1200 tons). Five furnaces are in operation, and its payroll for wages and supplies is running about \$100,000 per month. The total amount of copper produced since the Mountain Copper Co. began operations is 159,532,850 pounds, and the value of the gold produced is \$3,920,000. In Trinity county the development of copper is proceeding under favorable circumstances. A large amount of ore is ahead of the plants in the northern part of California. The largest bodies of developed sulphide ore are in Shasta county."

The afternoon session was taken up principally with debate on selection of a city for permanent headquarters, which was decided in favor of Denver, Colo.

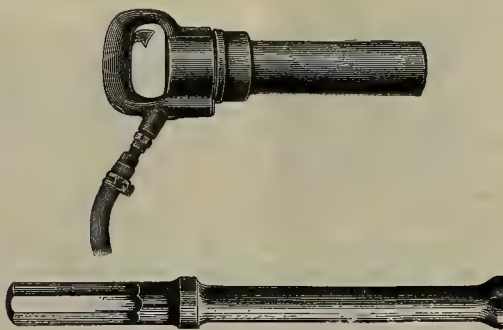
The closing sessions of the convention were held on the 27th. "The Mineral Resources of Maine," by L. M. Lee of Maine, was read by title and ordered printed, as was also "The Theory and the Evolution of the Treatment of River and Beach Sands for the Recovery of Gold and Other Metals," by J. H. Ryan. A number of resolutions were passed, one of which recommended the opening of the south half of the Colville Indian Reservation in Washington on account of the mineral lands therein.

The following board of directors was elected: J. H. Richards, Idaho; T. Ewing, California; E. R. Buckley, Missouri; A. W. Gifford, Texas; J. Dern, Utah; W. Lennox, Colorado; J. F. Watson, Oregon; J. T. Cornforth, Alaska; G. W. E. Dorsey, Nebraska. After adjournment of the convention the board of directors met and elected J. H. Richards president, T. Ewing first vice-president, E. R. Buckley second vice-president and A. W. Gifford third vice-president. The offices of treasurer and secretary were left unfilled till the next meeting of the board.

### Air Hammer Rock Drill.

A recent test of the drilling machine, "The Little Wonder Air Hammer Rock Drill," patented by Martin Harsoeg, Ottumwa, Iowa, was made at the Fulton Engine Works, Los Angeles, Cal., in which it is stated the drill was "able to eat a hole in hard seasoned granite at the rate of 5 inches per minute." The drill is simple in operation, the manufacturer says, and requires about 14 feet of free air per minute, striking 2500 blows per minute, and having

eight cutting edges on the face of the bit. It is also stated that it can be operated by a man in a sling over a ledge, or on a ladder, or wherever it is possible for a man to go, and that it will drill back holes



Air Hammer Rock Drill.

or directly overhead with equal rapidity. Irish, Chandler & Harris, 119½ South Spring street, Los Angeles, Cal., are sole agents for California, Arizona and Mexico.

### Electrical Precipitation in Montana.

#### NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by  
MATT. W. ALDERSON.

Very fair work was done when the plant was first started by zinc precipitation, but after a hundred tons or so had been treated the solution became so foul that successful precipitation could not be made without adding large quantities of fresh zinc daily. Thus the product was always low grade, incessant care was necessary, and, even then, results were uncertain. Electrical precipitation was finally attempted by M. Malm, and has been developed by him into a system with many decidedly advantageous features.

The Butters system is a modification or improvement of the system originated by Siemens & Halske. In the original system iron plates were

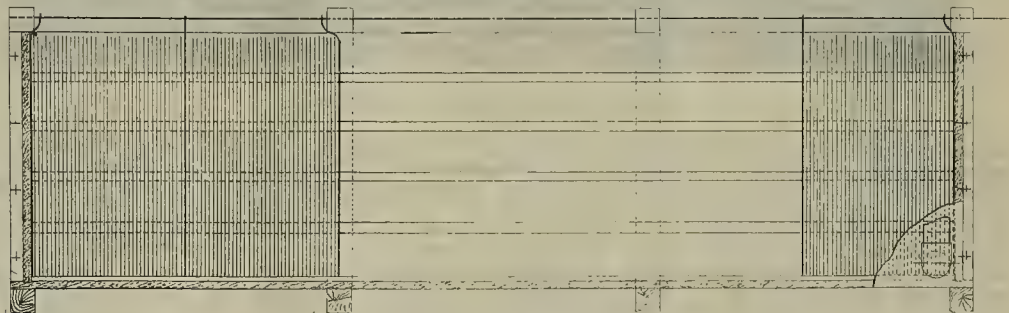
ables any voltage to be used which may be available. The main plates are practically 9 feet by 5. For convenience in handling, they are made in three pieces and are connected by "jumpers" of copper wire. For every inch of solution in the box, therefore, three volts are required, using one-quarter of an ampere to the square foot of anode surface. In the words of M. Malm:

"We happen to have a working current of 110 volts. That gives us 37 inches of solution which we can work on with that voltage, thus allowing thirty-six sub plates. If we had 100 volts we could have used 165 sub plates. You design your precipitation box according to the voltage you have in the existing plant—the greater the voltage the fewer connections necessary."

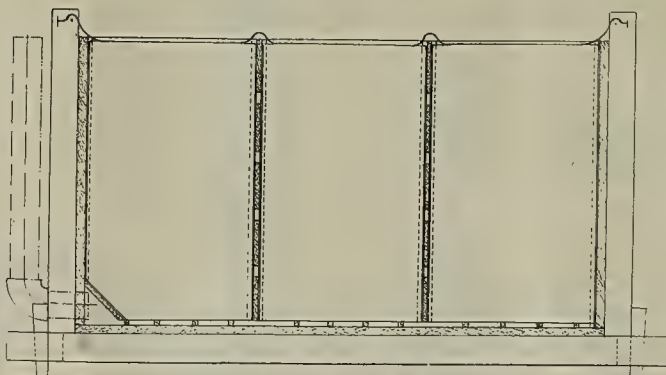
With other systems there is always danger of short circuiting by the buckling of the plates or of a piece of metal connecting one plate with another. In view of this, fuses are used in one way or another to connect the main-current wire with the plates. With the Malm system short circuiting is almost impossible and a fuse has never been blown on that account. In the Malm plant the writer has seen connection made between plates both by a piece of steel and by plates being buckled till opposite surfaces joined without disturbing the even flowing of the electrical current.

As shown by accompanying sketch, the Malm precipitation box is 19 feet by 9 feet in size, 5 feet in depth. The box is divided longitudinally into three sections, thus allowing plates 3 feet by 5 feet in size to be used, a size easily handled. Each plate has a small hole punched in the top into which a hook is inserted when one wishes to pull it out of the slot in which it stands, when necessary in cleaning up, or otherwise.

In the Malm system the plates are connected in series. The main cathodes and anodes have thirty-six plates between them, the plates being an inch apart. The current thus passes through thirty-six plates, or 37 inches of solution, in going from the positive to the negative, and the metal is deposited on the negative side of each plate. There is no flow of the solution. The fluid is run into the precipitation box, where it remains one and one-half to two hours, when it is run out. Precipitation is thus the same throughout the box. As most of the plates have no direct connection with the current, they may be taken out at any time for the purpose of removing the bullion.



Cross Section Malm Plant.



Vertical Longitudinal Section of Malm Plant.

used, which formed prussian blue with the consequent destruction of cyanide. This was finally overcome by using lead plates for cathodes and peroxidized lead plates for anodes. With these there was a large loss of lead, as it came off in the process of precipitation—recovered, to be sure, in the subsequent refining of the bullion, but nevertheless causing expensive renewal of the plates—and a cathode of tin is now used by Butters, at least, in his plant in Mexico. In the Butters system every other plate is positive and the alternates are negative. The deposit is formed on both sides of the cathodes, or negative plates, the positive plates receiving no deposit. The current passes but an inch of solution in going from one pole to the other, with an amperage of 0.2 to 0.25 per square foot of anode surface.

In the system installed by J. L. Malm for the Gold Cord Co. the precipitation box is arranged to conform to the working current of the plant. This en-

There are seven main plates in each box—four anodes and three cathodes—and each section of the box is divided into six compartments, each of which contains thirty-six sub plates. There are thus 225 plates in each section, 675 plates to the box, or 1350 plates in all, giving a total precipitating surface of 20,250 square feet. The plates are of No. 18 iron, and have a total weight of twenty-two tons.

(TO BE CONTINUED.)

PYRITE is usually bought on the basis of the units (20 pounds) of sulphur contained. The imported Spanish ore received at the port of New York contains from 46% to 52% and the domestic (due to impurities) from 42% to 44% sulphur. At New York it is worth about 12½ cents per unit, or \$5@56 per ton of ore. Much of the pyrite on the Pacific coast contains copper.



## Colorado Railway Enterprises.

TO THE EDITOR:—Numerous railroads and tramways have been projected to the sulphide belt of Colorado in Clear Creek and Gilpin counties, which, in connection with the general progress of this great mining section, promise to be of great service in handling a large tonnage of low-grade ore at a minimum cost.

Up to this time but one railroad, the Colorado & Southern, has penetrated this section. The road is a narrow gauge, the main line running through Idaho Springs, Georgetown and intermediate points to Silver Plume along South Clear Creek, and a branch extending from Forks Creek along North Clear Creek to Black Hawk and Central City.

Independent of this was operated the Gilpin tramway, comprising twenty-five miles of track leading to the principal mines lying between Central City, Black Hawk, Nevada and Russell Gulch, representing in a small area the principal producing section of Gilpin county.

The announcement is now made that this tramway has been purchased by the Colorado & Southern, and that an aggressive policy of improvement will be inaugurated at once. The price quoted in connection with the sale is \$150,000. The Colorado & Southern has 3-foot tracks, while those of the tramway are but 2 feet. It is not the intention, therefore, to operate the roads in connection as the term is generally used in railroad circles, but the consolidation will nevertheless afford many opportunities for co-operative operation.

At present the tramway is equipped with ten side-wheel, slow-speed engines, built especially for steep hauls. The road has about 160 of the small cars, and is otherwise equipped in proportion. It is used exclusively for hauling ore from the mines, and for conveying coal and supplies to the mines from the railroad. It is said to be at present handling about 6000 tons of ore per month, and while for a number of years it has been a god-send to the miners of this important section, the announcement of President Trumbull that the new owners will add to and improve the equipment is a timely one.

Besides the improvements of the line already constructed, they have already undertaken the work of projecting extensions. It is their avowed intention to reach every important mine within a radius of many miles.

The most important extension represents a triangular territory just above Central City. The little camps of Apex, Perigo and Gilpin have some producing mines of importance and many promising prospects. They have been kept alive and progressing to an extent by a vigorous set of miners, who have maintained an abiding confidence in the virtues of their section, and a similar belief that it was only a question of time when the problem of transportation would be solved for them. Even under the disadvantageous circumstances some of the properties have been made to pay, and now that the railroad people promise the extension of the Gilpin tramway to these and intermediate points, the mining world may look for important developments from this section.

Railroads generally have grown to look upon the extension of spurs into new mining sections as of doubtful profit. Hence they quite frequently defer these extensions as long as possible. In this case the action of the Colorado & Southern is probably stimulated by the advent of the Moffat line. This new railroad will run near the county line between Gilpin and Boulder county; thus the extension of the Gilpin tramway to the points above Central City will have a decided tendency to attract ore from several promising camps near the Moffat line to the Colorado & Southern.

In this connection it is important that the Colorado & Northwestern, a railroad extending from Boulder to Ward in Boulder county and operated in connection with the Colorado & Southern, has decided to extend a spur to Eldora. This extension will run out from Sunset, and will open a meritorious but hitherto isolated district.

It will thus be seen that the Colorado & Southern seeks to attract all the ore possible from both Gilpin and Boulder counties, as these spurs will reach within a few miles of the Moffat main line on either side. That their action in so doing is wise is generally believed in railroad and mining circles. While the Moffat line is projected principally as a transcontinental line, backed by the Burlington route, it is the avowed intention of those behind the movement to extend branches wherever the opportunity affords for the development of the hitherto isolated mining sections.

Such was the policy of Mr. Moffat when he was in control of the Rio Grande. Several districts were virtually saved from abandonment by his enterprise in this direction, and it is claimed by many that several of these undertakings never did pay the company. But, on the other hand, it is held that the general policy proved successful, and that it is Mr. Moffat's intention to conduct a similar policy with the new road wherever the conditions indicate a justification.

When the Moffat line was first projected it was announced that these auxiliary lines were to be extended. Prior to that time a company headed by R. A. Hall was prospecting the field with a view to

extending roads from Central City or Idaho Springs to the Yankee Hill district, to afford that section an outlet for its ore, and develop the mineral and tourist possibility of an attractive district. No sooner than the main line of the Moffat was determined upon, however, than Mr. Hall altered his plans so as to connect with the Moffat line instead of the Colorado & Southern, thus enabling him to project a standard gauge instead of a narrow gauge road.

The Hall company has incorporated as the Clear Creek & Gilpin District Railroad Co., and a permanent survey has been completed from Pactolus, on the Moffat, to Central City. A branch to Central City from the Moffat was projected at the time the road was first spoken of, but it is not known definitely whether the Hall road has the official co-operation of the big line or not. It is probable, however, that when Moffat gets ready to go to Central City, there will be no differences between him and the Hall people.

Shortly after the announcement that the Colorado & Southern had bought the Gilpin tramway and would extend both this and their northern branch, Mr. Hall came out in a rather spirited newspaper interview, which indicated an open fight for the Gilpin business, reflecting the somewhat unusual condition of a rate war before the railroads are constructed. Such a condition cannot at this stage of the game be considered very seriously, but enough is developing every day to justify a well-based enthusiasm on the part of the miners of Gilpin county. The railroads may finally agree on the division of the spoils, but it is reasonably sure that there will be new sections opened up by the extension of the railroads and tramways.

Over on the Clear Creek side there is another interesting railroad situation. It looks as though Sam Newhouse was at last going to realize his ambition and complete a railroad to connect with the Newhouse tunnel at Idaho Springs. At a recent sale of the Denver, Lakewood & Golden Railroad, it was bought in by Newhouse representatives, and reincorporated under the name of the Denver & Intermountain Railway. The Denver, Lakewood & Golden has led a precarious existence for a number of years, operating between Denver and Golden. This spring the Denver tramway extended their electric line to Golden, which was generally considered as sealing the doom of the Lakewood so far as local business was concerned. There are now three lines to Golden—the two mentioned and the Colorado Southern—so that it is manifest that Newhouse didn't buy it in for its present worth.

It has always been the intention of Newhouse to have a railroad connecting with the mouth of his tunnel at Idaho Springs, to convey the product of the tunnel to the smelters in the valley. The renewal of work in the tunnel, extending it farther into Gilpin county, under a contract with the Saratoga owners, and the purchase of the railroad, certainly may be accepted as justification for the present rumors. There have also been rumors that the tramway (which, by the way, is controlled by the Moffat interests) may extend to Idaho Springs, but it is not reasonable that both these lines will be extended in this day when the "community of interest" is so recognized by capitalists.

Two other independent railroads and tramways are being planned for Clear Creek county. One is to connect with the Colorado & Southern at Dumont, and extend to Lamartine. This will probably be a tramway, as the course projected is a very steep one. There are good men behind this scheme—Lafayette Hanchett, manager of the Newhouse interests; Roscoe B. Morton, owner of the Jo Reynolds mine, and others who are not given to propagating hot-air schemes. If the project is carried to completion it will furnish transportation facilities for a number of shipping mines, including the Jo Reynolds and the Lamartine, besides opening up for the prospectors a promising low-grade section where it is not now possible to work.

Another and more extensive scheme represents an extension from the Colorado & Southern at Silver Plume. This is backed by the owners of Hazelton-Santiago mines, and is projected to extend through the Argentinians and to some of the attractive lakes of that interesting section, thus proving desirable both as a tourist attraction and a mining enterprise. There are also several schemes for crossing the range by rail, but these enterprises have little possible bearing upon the development of the section in question.

That the plans of all these railroads will be altered materially before completion is exceedingly probable. As yet they are mainly on paper. But the circumstances surrounding the instances practically assures the completion of the most of them, or of enterprises as advantageous as those at present outlined.

This will mean the creation of a number of new districts, and a new lease of life for several sections which have simply existed for years, making prosperous mining communities where prospects existed before, as well as adding to the richness of the sections which have already been proven a success. This will unquestionably give a wonderful impetus to the mining industry of this section, and add materially to the production of the State.

W. H. CUNNINGHAM.

Idaho Springs, Colo., Aug. 30.

## The Ignition of Gasoline Engines.

Written for the MINING AND SCIENTIFIC PRESS.

A mining man of Colorado, who purchased a gasoline engine a year ago, recently wrote to the manufacturers of the engine as follows: "My engine generally is a source of satisfaction and profit to me and I would not do without it for twice what it cost. There are times, however, when it seems to have spasms of mulish tantrums, and my list of swear words is entirely too short for satisfactory use when it turns mule and refuses to go. It seems to me that the ignition of a gasoline engine causes me more trouble than all the other parts of the machine together.

"My batteries are the chief source of trouble, as they seem to die out at the most unexpected times, and also when my engine is needed the worst. This sometimes means a delay of half a day, as it is often necessary to send for renewals. Moreover, the cost of renewals is so great that my engine costs more to run than it should. Can you not suggest a remedy?"

The above is probably but one instance of many similar experiences. The gasoline engine is certainly a boon to the miner, as it furnishes power wherever needed and theoretically at a minimum of cost.

It has been but a few years since nearly every gas and gasoline engine was ignited by a hot tube or torch. This means of lighting the charge in the combustion chamber of the engine was uncertain, dirty, expensive and dangerous. To-day there are very few engines that use the hot tube, so the motor builder discarded it in favor of electric ignition, and at present the electric spark is the principal method of ignition on automobile, marine, traction and stationary gasoline engines.

While electric ignition is superior to the old-time means, there have been disclosed a few defects in the new system, and as will be seen from the letter quoted above, the source of current used is the chief cause of trouble.

For this work, liquid primary batteries of many types and storage batteries of various designs have been used.

Salammoniac batteries, bichromate of potash batteries, caustic potash batteries and many other kinds have been tried and are still installed for stationary work. They all give an ample supply of current for a time, but soon become exhausted and need renewing.

This invariably means dirty work, trouble, annoyance and expense for the owner of the engine. Storage batteries are not adapted to use on the mine engine, as the average miner has no immediate means of recharging the same. If a battery at all is used it should be simple, easily renewed and inexpensive.

A battery filling these requirements has never been made, but the dry battery of to-day, thrown upon the market by the millions, has been very generally adopted for automobile work and can be used likewise for stationary engines. It is simple and compact; it gives an ample supply of current when new, but its length of life is short and uncertain. It may last three months or three days; the user never knows how long until his engine stops and he finds his cells dead. They must then be relegated to the scrap heap and new ones installed.

Some manufacturers have followed the lead of the continental makers in the use of dynamo and magneto generators, others have seen and appreciated the sphere of usefulness of mechanical generators and yet have hesitated to adopt the same for their engines, merely because of the additional expense involved.

To the unbiased but experienced user of a gasoline engine, it seems that it can only be a question of time before every maker will equip all machines with a mechanical generator, either as the sole source of current or to be used with an auxiliary set of dry batteries.

The latter combination is a good one, as the batteries can be used for starting, thus getting rid of the necessity of cranking to get the initial spark from the generator. After the engine is started it is an easy matter to throw the switch from the battery to the dynamo and so let the latter do the heavy work of furnishing the current just so long as one wishes to run the engine. If used only for starting, the batteries will last a long time, generally a full season, before they will need to be replaced.

And now a word regarding the kind of generator to buy. It is not necessary to look to France or Germany for a high-priced machine that will do the work and do it effectively. We can find American-made dynamos and magnetos that surpass the foreign-made generators in every respect. If you use the make and break or contact system, a magneto will answer your requirements. A magneto is a generator with permanent magnets and is inexpensive. There are at least a dozen American-made magnetos on the market that will give ample current for successfully working a primary coil. Select one that will give about 10 volts and 1 to 1½ amperes at its established speed, but do not expect a machine of this type to do good work with a jump-spark coil.

The jump-spark system requires higher amperage and this is found in a dynamo only, which should give 10 volts and 4 amperes if used on the average secondary coils found in the American market.

The dynamo is the only practical source of current



yet discovered for electric lighting and electric power work, and it seems absurd for the motor world to depend on uncertain chemical processes for ignition when a small dynamo will mechanically generate current year in and year out at practically no cost after the original expense of installation. Dynamos for this work may be found, and are just as perfectly made and work just as satisfactorily as the dynamos found in central electric light stations.

### Mining in Mineral County, Colo.

[FROM A STAFF CORRESPONDENT.]

For several months past the mining industry has been improving in this county. Between 8000 and 9000 tons of ore and concentrates are shipped each month. Labor difficulties are practically unknown in this district. The union is under control of the conservative element.

The Mollie S. Mining Co., under the management of R. S. Light, is doing development work and shipping some ore. This company is building an 1800-foot tramway from the mine to the wagon road. The company is the owner of four claims.

The Humphrey Tunnel M. Co. is handling 200 tons of ore daily at their mill. This ore comes from the Big Kanawha Leasing Co. The mill contains 10x20 crusher, ten trommels, twelve jigs, two Bartlett and twelve Wilfley tables, three 5-foot Chilean mills and one 200 H. P. compound Corliss engine. The power is transmitted to the mill by a rope drive, which consists of six 1½-inch Manila ropes. Two Pelton water wheels are used to help out the steam plant whenever the water supply is sufficient, and at times the water supply is ample to enable them to run the entire mill with water power for several months. The water depends almost entirely on the accumulation of snow during the winter. When the mill was erected there was ample water to run the year around, but the past few years the snowfall has been light. They are turning out a lead concentrate which carries about 70% lead and one to four ounces in gold. They also make a zinc concentrate which runs about 50% zinc, with gold and silver values. The ore is very hard and refractory. L. H. Norton is superintendent and J. J. Fitzgerald is mill foreman.

About 2 miles from the Humphrey mill is located the old Solomon mill, on East Willow creek, now owned and operated by the East Willow Mining Co., Chas. Loughridge general manager and F. Spurr superintendent. This company are owners of the Ethel-Solomon and Holy Moses group, located on Campbell mountain above the mill. They are treating forty tons of zinc-lead ore at the mill daily. The tunnel through which they are operating is 2700 feet in length. The vein is from 10 to 12 feet wide of low-grade ore, with some rich pockets. In the mill they are turning out a 75% lead concentrate and 60% to 61% zinc product. A 1000-foot shaft will be sunk from the tunnel level, 2500 feet from the tunnel entrance. They are putting in a Rand duplex compressor and pipe line to the shaft. As soon as they open a level from the shaft, they will double the capacity of the mill. At present they are working the Solomon mine through the Ethel tunnel.

A short distance above the Humphrey mill are located the Commodore Nos. 5, 3 and 4 and the Bachelor. Near the Bachelor is the Wooster tunnel, which is now something over 14,000 feet in length, and through which the Big Kanawha Leasing Co. are operating the Delmonte and Happy Thought. Ore from the New York and Last Chance is hauled down by wagon. Ore from the Delmonte goes direct to the smelter.

The engraving herewith shows the Last Chance, Amethyst and Happy Thought, and about 3 miles

away on the hill in the distance is the Captive Inca mine. Considerable work is being done on the Inca and good ore is reported. F. G. Boyle has charge of the work on this property. He also has charge of the Bachelor.

The Amethyst is producing some ore and development work is in progress.

The Commodore ore, from tunnels 3 and 4, is taken down to the railroad by aerial tramway. H. E. Lees is superintendent of the Big Kanawha L. Co. Creede, Colo., Aug. 20.

### A Record Pump.

TO THE EDITOR:—"After having been in acid-water service for eighteen years and then submerged for two years and a half, the Jeanesville pump in the No. 4 slope of the Lehigh Valley Coal Co.'s mines at Jeanesville, Pa., started pumping again as soon as we turned on steam." That statement aroused my curiosity, and I asked the mine superintendent to take me to see the pump.

The little mining town of Jeanesville lies in a valley some 2 miles south of Hazleton. For upward of forty years the Jeanesville mine has been turning out a high grade of anthracite. The principal vein averages from 20 to 40 and in some places as much as 60 feet in thickness. The coal in this vein is practically all taken out. The Buck Mountain vein below has never been worked, but is of an exceedingly high-grade coal, and operations are now under

the pump and the height to which the water rose over it.

Two Jeanesville pumps were put into the No. 4 slope, and after two years and a half the water was lowered to the second level shown on the diagram. When this level was reached, a pump runner swam into the pump room and turned on the steam. The pump, which had been submerged for two years and a half, started instantly, while still submerged, and in a few days had rid the mine of all surplus water. When I saw this pump, a few days after the steam had been turned on, it was still covered with the slimy deposit left by the water. This slime was so acidulous that I was not surprised to find the next morning that it had burned three or four holes through my overalls where it happened to touch them.

When it is considered that the pump was twenty years old and had been pumping water steadily until it was flooded, and then for two years and a half it had been submerged, it seems to me that the pump has established its acid-resisting qualities to a most remarkable degree.

JOHN M. BRUCE.

Jeanesville, Pa., Aug. 25.

### Production of Lithium in 1903.

J. H. Pratt predicts that the production of lithium minerals will be considerably greater in 1904 than it was in 1903. He is the author of a report on the production of lithium in 1903, which appears as an extract of the annual volume "Mineral Resources of

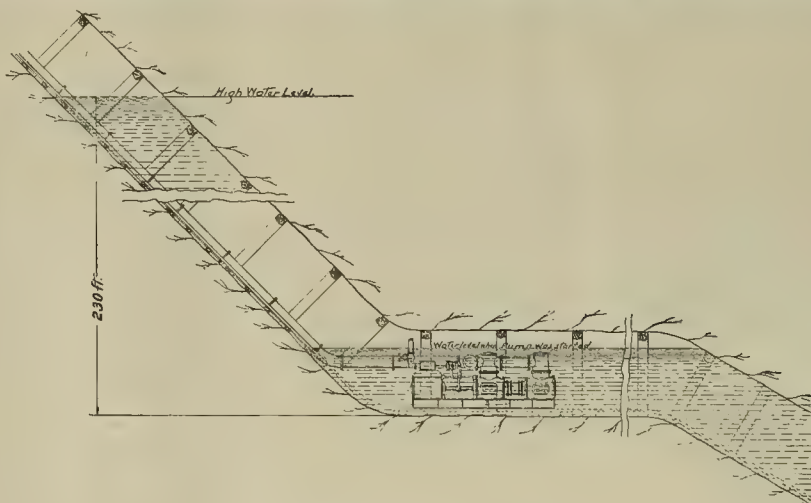


Diagram Showing Submerged Pump.

way for opening it up. Some two years and a half ago, during a tremendously heavy rain storm which flooded the entire valley, there was a "cave-in" opening into the Mammoth vein, near the No. 1 slope of the Jeanesville mine, and the stream, which had overflowed its dikes, poured in torrents into the mine, completely filling it. At the foot of the No. 4 slope, which connects with the No. 1, is a duplex plunger pump with wood-lined water end, which was built by the Jeanesville Iron Works Co., and has been in continuous service since 1884, when it was installed in the mine. The water in this mine is exceedingly acidulous, averaging nearly 120 grains of free sulphuric acid per gallon. This is a remarkable record when it is considered that the pump has been in continuous service up to two years and a half ago, when the flood occurred.

The accompanying diagram shows the position of

the United States, 1903," soon to be published by the United States Geological Survey. The quantity of lithium minerals produced in the United States in 1903 amounted to 1155 short tons, valued at \$23,425. This is a decrease of 905 tons in quantity and of \$2325 in value as compared with the production (1245 short tons) and value (\$25,750) in 1902. The demand for lithium minerals increased considerably, however, toward the close of 1903, and this fact is the basis of the prediction. Owing to orders received from abroad, a number of owners of mines that produced no lithium in 1903 began mining in 1904. As the uses of lithia are limited, there could easily be an overproduction of the crude minerals; but if the cost of these could be reduced, so that they might be used in the manufacture of lithium carbonate or nitrate for red fire in pyrotechnics, there would be an increased demand for these lithium minerals.

The only localities where lithium materials were produced in 1903 were at Pala, San Diego county, Cal., and at the Etta and Bob Ingersoll mines in the Black Hills, South Dakota. Three different minerals are mined at these localities for their lithium contents. They are lepidolite and spodumene, both lithium silicates, and amblygonite, a lithium phosphate. The amblygonite contains the highest percentage of lithia.

Both lepidolite and amblygonite occur at Pala. The deposit of amblygonite was discovered in 1902; since then it has been thoroughly developed. It is estimated that over 400 tons of this mineral are now exposed there. The production of lithium minerals from this locality in 1903 was, however, restricted by litigation. Lepidolite has been recently discovered in two new localities, one 7 miles northwest of Julian, San Diego county, Cal., and the other near Banner, San Diego county, Cal.

All of the spodumene is obtained from the mines in Custer and Pennington counties, Black Hills, South Dakota, and principally from the Etta mine.

The lithium minerals mined are shipped to New York, where a part is exported and the remainder is reduced by chemical companies.

It has been estimated that about 55,000 pounds of lithium salts are used in the United States each year, of which usually about one-third are imported. In 1903 these imports amounted to 5596 pounds, valued at \$3669. In 1902 the imports were 5530 pounds of lithium, valued at \$8038, and 15,686 pounds of other lithium salts, valued at \$14,913.



The Last Chance, Amethyst and Others Mines, Creede, Colo.



# Assay Maps.

Written for the MINING AND SCIENTIFIC PRESS by  
ALGERNON DEL MAR.

I mentioned in a previous article that a mine should be mapped in regard to assays as well as to the workings. Since then I have been asked what an assay map was, and thinking perhaps some of your readers may like a few ideas upon the subject the accompanying sketches may prove of interest. An assay map is a graphic illustration, plotted to scale, of the amount and value of ore in a mine. There are many ways of accomplishing this, the simplest perhaps being as shown. In both examples the drifts and adits are represented as being straight; the uneven line above the levels and to the right of the vertical connections represents the widths of the ledge at the respective places, while the line under the levels and to the left of the raises represents the values. These lines may both be on the same side, one dotted and the other red, or both red, on different sides. In

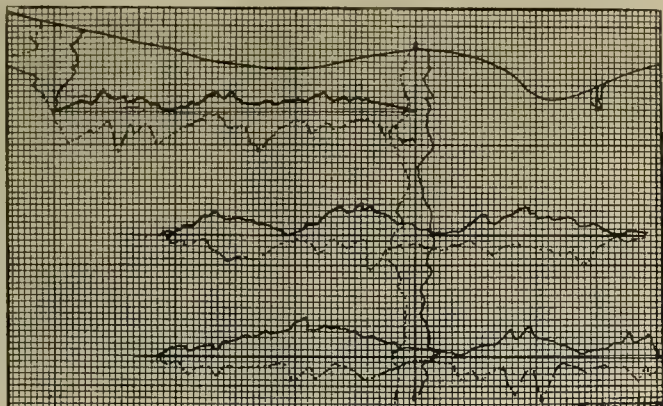


FIG. 1.

Fig. 2 double lines are used for connections between levels. The question may be asked what these maps show. It simply puts before one's eyes the mine in its commercial dress, for it shows the figures of a mine's value and the chances of future bodies of ore. It may prevent the pernicious habit of averaging, where one high assay will bring up unpayable ore sufficient to deceive one not familiar with mining and the vagaries of formations. Now, look at Fig. 1. This shows a ledge uneven as to widths and values, but continuous as far as developed. In this ore shoot, which trends to the right as we go down, are three different swells, which appear to be well defined. It shows a small ledge with high values, a proposition for a 5 or 10-stamp mill. Now, where one is informed that this ledge is on a contact of granite and a diorite dike, the mine and its chances form a clearer picture than a mere list of assays. These assays were taken between walls at every 5 feet, and where the formation was at all broken or soft a proportionate quantity of waste was allowed in the sample to offset the difference between theoretical and actual mining. It is needless to say that this mine was developed before any milling was done.

If we wish to theorize, it is possible by this map to form a conception of the original fissure, a line of weakness into which was intruded this hanging wall dike. For example, if we draw a line comprising three curves, Fig. 3 to represent the original fissure, and

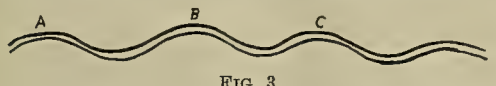


FIG. 3.



FIG. 4.

imagine the foot wall to have slipped to the right, or the hanging wall to have been thrust up and to the left, we then have a fissure represented by Fig. 4, the places of contact (A B C D) forming arches which hold the fissure open for the deposition of minerals and at the same time throws the shoot of ore to the right in depth.

In Fig. 1 the dotted and straight line over the workings (A B) shows width and values of outcrop.

Fig. 2 shows a mine with irregular bodies of ore irregularly distributed, but with some uniformity in this irregularity, for these bodies or lenses occupy certain planes, and one is led to expect ore at M and also by continuing the adit E. It also shows that, these bodies of ore being small and limited, the levels should be run correspondingly close. It indicates a mine with a ledge in all the workings, presumably a fissure vein, the swellings only containing ore of sufficiently high grade to pay. It also shows at F, in adit C, how one can be deceived by taking assays at random, for here is an \$80 assay, while on either side is ore too low to pay. To make sure of this a raise

was put up, showing it to be a "freak" only, or, at best, an isolated spot of enrichment.

One would be surprised to know what a great help a map like this is to a mine superintendent or to the directors, for it pictures at a glance the whole aspect of the mine.

## Treatment of Stagnant Waters With Copper Sulphate.

In many mining towns situated in mountainous regions, as well as in the cities located in the valleys, the domestic water supply is one of great importance, particularly during the summer, when the supply diminishes and the reservoirs become stagnant. In a great many cases much sickness results from the continued use of this stagnant water. It is a question of great importance to every community, and in view of this fact the following extract from a paper read by Eugene Carroll before the American Society of Civil Engineers is of interest, and the suggestions it carries with it may be acted upon at any

the experiment. Samples of the scum were also examined and found to contain 11 1/2% of metallic copper, showing that a large amount of the copper was taken up by the anabaena and other organisms and thereby removed from the water.

During the first twenty-four hours the water in the reservoir exhaled a more pronounced and disagreeable grassy odor than before treatment. Its color at the end of the first twenty-four hours was a decidedly dirty green, with comparatively little scum floating on the surface, and upon testing 1000 cu. cm. of the water for copper at this time a very faint reaction was obtained. The sulphates in the water were slightly higher and the odor was considerably less.

At the end of the second and third days very slight changes were noticed in the color and taste of the top water, but it was greatly improved in taste, color and smell below 20 feet in depth.

At the end of the fourth day a continued improvement was noticed in the taste, color and odor, and at the end of the fifth day there was a very decided change for the better in color, the water assuming a

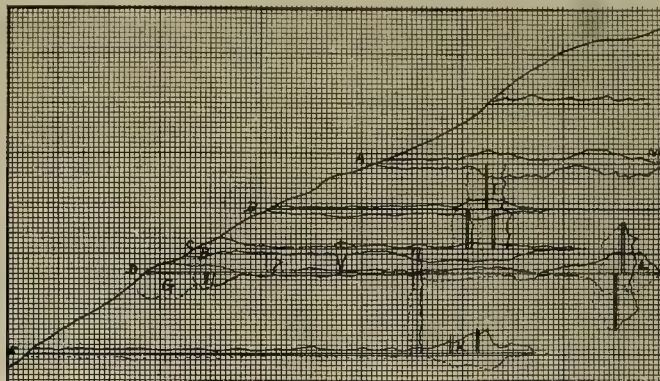


FIG. 2.

place where the stagnant water of reservoirs threatens all with illness who are obliged to use it.

In 1892 the Butte City, Mont., Water Co. began the construction of a large impounding reservoir about 13 miles south of Butte on a mountain stream having its source in the summit of the Rocky mountains. The plans called for a masonry dam 120 feet high, with its crest at an elevation of 6000 feet above sea level.

During the summer of 1893, the dam being only partially constructed and then impounding about 40,000,000 gallons of water, the stored water became unfit for domestic use on account of the disagreeable odor and taste.

In 1894 the dam was increased in height to an elevation of 5960, giving a reservoir capacity of 180,000,000 gallons of water. The same trouble was experienced during this summer as the previous year and further work was stopped on the dam until some remedy could be discovered.

Correspondence was opened with G. T. Moore of the Department of Agriculture, with a view of treating the Basin Creek reservoir and eliminating the vegetable organisms in that body of water. After some correspondence and investigations, the reservoir was treated as described.

The Basin Creek reservoir has two forks—one extending about 1/2 mile in a southerly direction and the other about 1/2 mile in a southwesterly direction. Distribution of the copper sulphate was started at 2 p. m. on July 7, using three boats—one boat distributed in the southern fork, another in the southwestern fork and the third boat in the main body of the reservoir in front of the dam. The quantity used was one pound of copper sulphate per 1,000,000 gallons of water, thus requiring 180 pounds of sulphate. One boat distributed forty pounds per hour in the short arm. The second distributed sixty pounds in one hour and ten minutes in the main body of the reservoir around the dam, and the third boat distributed eighty pounds in the long arm of the reservoir in one hour and fifty minutes. In each boat two men were used—one to row and one to hold the gunnysack containing the sulphate over the stern of the boat.

There was a heavy wind blowing down-stream, which made it extremely difficult to row; but the boats were kept in continual motion from the time the copper sulphate was dropped into the water until it had entirely dissolved.

During the first ten minutes of the distribution of the sulphate nothing peculiar could be noticed in the water; but after fifteen minutes fine light-green threads began to float in it, growing steadily in number, until about thirty-five minutes after starting there had formed a yellowish-green scum over the entire surface of the reservoir. The phenomenon was similar to the formation of a very flocculent precipitate.

In about two hours the scum assumed a dark-green color, the borders turning slightly brown. At that time a sample of water was taken and carefully examined and a small trace of copper was shown by

natural color and only a slight odor and taste being noticeable on the surface. At 20 feet below the surface, at the end of the fifth day, the water was tasteless and odorless and of a bright, natural color. Very slight changes for the better were noticed on the seventh, eighth and ninth days, and on the tenth day the water apparently had assumed its normal condition.

Microscopical examinations of the water, however, during this period, revealed the fact that there were a few spores of the anabaena left in the water and that the asterionella had begun to increase again.

Owing to these conditions, it was deemed advisable to give the reservoir a second treatment of the copper sulphate, and on the morning of July 19, twelve days after the first treatment, a second treatment was given in exactly the same manner and with the same quantity as the first treatment.

After the second treatment very little change was noticed in the water on the surface of the reservoir and hardly any scum formed. Twenty-four hours after the second treatment the water showed a very decided improvement in color, with absolutely no taste or odor. On the third day the water was in an absolutely normal condition and entirely free from the vegetable organisms which had given us so much trouble in the past.

During the progress of these treatments the reservoir was entirely cut out from the city's supply and no flow through it was permitted, the overflow being closed and the water allowed to slowly rise. With the exception of occasionally opening the overflow to remove the scum which had blown down against the dam, and occasionally opening the blow-off pipe, there was no current running through the reservoir during the period.

On Sunday, July 24, the water in the reservoir being absolutely pure, for the first time in ten years, during the month of July, it was turned onto the city mains.

## Modern Metallurgy.

Dr. J. Douglas, in a recent address, remarked, says the American Manufacturer, that a significant example of the recovery of all the valuable constituents of an ore is afforded by the present treatment of that complex mineral, franklinite, by the New Jersey Zinc Co. The mineral consists of iron, zinc and manganese. Every attempt to extract its zinc by the Belgian method was futile, since the iron melted the retorts, but when the Wetherill process of magnetic separation was applied a pure zinc ore—similar to willemite—was recovered, and the iron and manganese could then be converted into spiegeleisen.

Thus by the co-operation of a modern method—electrical separation—to meet a demand for spiegeleisen, used in the manufacture of Bessemer steel, a mineral described by Birkinbine as late as 1899 as "generally included among the iron ores of New Jersey," which was substantially valueless a few years ago, has been rendered the reverse. As an



iron ore it was of little or no value because associated with so much zinc. As a zinc ore it was worthless because of its iron contents, and 10% of manganese added nothing to its attractiveness. Each of these metals was simply a deleterious waste product to the others. Now each adds value to its associate.

## The Desert Dry Lakes of California.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by  
G. E. BAILEY, E. M.

**DRY LAKES DESCRIBED.**—These dry lakes are described by scientists under the name of Playa lakes. Prof. Russell defines them as follows:

The name Playa lake has been applied to inclosed water bodies of dry climates which have little depth and frequently evaporate to dryness, leaving mud plains, or playas. In the typical examples found throughout the Great Basin their waters are almost alkaline and saline and almost turbid with fine salt, and probably chemical precipitates. Lakes of this class exhibit great variety and are the most irregular of water bodies. In many instances they hold their integrity for a number of years and only evaporate to dryness during exceptionally arid seasons. Again, desiccation is apparently the normal condition, and the basins are only flooded during times of unusual humidity.

The report on "The Saline Deposits of California" defines them as follows:

The places where soda, salt and borax are found have been called many names, such as dry lakes, alkali marshes, etc., and the term marsh has been especially misleading, because they differ so greatly from the Eastern marshes. They are desiccated lake beds, in which the more soluble salts, derived from the rocks of their watersheds, have concentrated for ages and now form fields of common salt that are in some cases many square miles in area, and hold brine in all stages of saturation in the deep ooze beneath their surfaces. They are not necessarily watery or soft. They are generally dry lagoons, with a surface incrustation of the salines in some form, such as soda, salt or borax, and the surface is variable in color. The appearance is often that of a bowl of a valley surrounded by barren mountains. At the

first fresh water lakes, as they were glacier fed; but, being without outlet, as they evaporated they became saline. Bulletin 24 says:

The glacier-fed lakes were at first fresh water lakes; but rivers take up a certain amount of saline matter from the rocks and soils, and such rivers emptying into lakes having no outlet make the water saline at last, as the saline matter leached from the earth accumulates in the lakes without limit. At the end of Paleozoic the portion of the Great Basin covered by Lakes Aubury and Le Conte subsided and was covered by shallow inland seas (not connected with the Pacific ocean), in which salt, gypsum and other salines were deposited by evaporation.

And in speaking of the origin of the sodas, it says:

Natural soda is the residue obtained by the evaporation of the waters of an alkali lake, or the sodas dug up from the dry lakes of the desert. It is composed of sodium carbonate and bicarbonate in varying proportions, mixed with impurities, the impurities consisting of three classes: First, when mixed with sodium chlorate and sulphate; second, with sodium chloride and bichlorate; third, with sodium chlorate and nitrate. The first class is known as soda, or salt beds, the second as borax beds, and the third as niter beds.

Dr. Gilbert in his monograph on Lake Bonneville says:

Most of the small closed basins are without permanent creek or lake, containing at the lowest point a playa or alkali flat—a bare, level floor of fine saline earth, or perhaps of salt, over which a few inches of water gather in time of storm. \* \* \* The playas are bare of all vegetation and are usually margined by a growth of salt loving shrubs and grasses.

Prof. Russell in his monograph on Lake Lahontan says:

When the heat of summer drives every drop of moisture from these deserts and white saline efflorescence appears, which is formed by the crystallization of various salts brought to the surface in solution by the action of capillary attraction, and left as the water that dissolved them is evaporated, incrustations of this nature sometimes cover areas many miles in extent, in the borders of the playas, and render the surface as dazzling as if covered by snow.

In 1883, H. G. Hanks, State Mineralogist of California, published a "Report on the Borax Deposits of

the salines of the desert forming large and most valuable deposits.

**THE SALINES ARE INCREASING.**—In studying these dry lakes, it is well also to note the fact that their saline contents are slowly but surely increasing. Each of the rare storms that sweep the desert leaches out more of the salt, soda, borax or niter from the sands of the ancient ocean bed and carry them down to the lowest pools, down to the dry lakes, where the hot sun soon evaporates the water, leaving their contents of salines. How large these accessions must be is well indicated in the description of the Armagosa river, in the ninth annual report of the State Mineralogist of California, which is as follows:

The Armagosa has its source in the State of Nevada, about 30 miles southeasterly of the State Line gold mines in Gold Mountain, and makes its first appearance at the northerly end of the oasis of Nye county of that State. Its general course is southerly until after passing through the Armagosa borax fields, near Resting Springs, down through a deep canyon, close to Salt Springs gold mine. There it suddenly changes to a direction almost due north, and is finally lost sight of near Saratoga Springs, Death Valley. The length of the Armagosa is about 140 miles. It repeatedly comes to the surface, flows a short distance and then sinks—its waters being absorbed by the sand until a higher plane of bed-rock is reached, when they emerge again to view. During its flow the river takes up to its full capacity the alkaline salts in the soil through which it courses. When it comes to the surface the water is charged with them and forms a dense, briny solution, so perilous that, though to the eye it appears pure and wholesome, death falls to the man or beast that may chance to drink of the stream. When the action of the sun evaporates these fatal waters, the residue is soda, borax and other alkaline substances.

It should be remembered that Death Valley is really the sink of the Armagosa river. What is true of Death Valley is also true of Soda Lake, the sink of the Mojave river, of Salton sea, which is the sink of Salton river, New river and several other streams. It is true of every dry lake, for they have no outlets and are all local sinks, differing only in the size of their watersheds.

**THE SALINE CRUSTS RENEWED.**—It is an interest-



Ivanpah Dry Lake, Fifteen Miles North of Vanderbilt, San Bernardino County, Cal.

bottom of the flat bowl is a vast deposit that looks like water, salt, dirty snow or chalk, according to local circumstances. Some of these bowls have a hard, yellow-brown floor of clay, forming excellent roads for heavy teams; but generally, on trying to walk across the bottom, one finds it covered with a sandy-looking crust, through which the feet may break or through which the traveler may suddenly drop out of sight, for below this crust there may be solid clay or there may be water and slime too deep to probe. After local storms, there may be real lakes for a short time. They have been formed, first, by the isolation of a portion of the ancient lakes in the elevations of their bottoms into land, or, second, by the indefinite concentration of river or creek water in a bowl or lake that has no outlet. In general, they are pools that are the remains of Lake Aubury and Lake Le Conte, Death Valley and Salton Sea being simply the largest and deepest of such pools. They are enclosed water basins, which have little depth of water on the surface and often evaporate to dryness, leaving mud plains, or playas. They may be miles in extent after a storm, but disappear as soon as the hot breath of summer touches them, becoming once more soda lakes, river sinks, etc. These ephemeral lakes exert a curious effect upon the scenery of these arid lands, with their smooth and cream-colored plains stretching often to the horizon, without even a shrub or spear of grass to break the monotony of the glossy surface. They are the playground of mirage and optical illusions; the heated air is filled with fairy cities, fanciful forms of mountains and grotesque caravans, that divert the attention of the experienced traveler from the fatigues of the journey and from the profound and oppressive stillness of these solitudes. They are perilous, however, to the thirsty or lost wanderer, for to him they are the Lakes of Tantalus, whose ever-receding waters are magical visions that cause Reason to topple from her throne and lure him to a cruel death. If the valleys look forbidding, yellow with sand and greasewood and spotted with dismal black lava buttes, yet they are brightened with beds of soda, salt and borax that gleam snow-white to the eye.

**POOLS IN THE BED OF A DEAD OCEAN.**—The history of the Great Basin, as pictured by geologists, shows that the arid deserts of to-day are but the dry beds of former oceans, and that the dry saline lakes of to-day are but the pools or depressions in the bottom or bed of the ancient oceans, where the saline contents of vast areas have been concentrated. Lakes Aubury, Le Conte, Lahontan and Bonneville were at

California and Nevada" as Part 2 of the third annual report of the California State Mining Bureau. In this report he says:

There are a multitude of lesser sinks, as they are called, which are subject to great vicissitudes. During a season of unusual rainfall, or a phenomenal winter accumulation of snow on the mountains, great sheets of water are formed in natural depressions on the alkaline plains, which, when the conditions vary, appear as extensive fields of dry, white, efflorescent salts, consisting wholly of soluble matters gathered by the water in its passage from the melting snows, which is left in a state of almost absolute purity.

In 1892, J. R. Spears of New York, the historian and writer, published the results of his trip to Death Valley under the title of "Illustrated Sketches of Death Valley and Other Borax Deserts of the Pacific Coast." His work is recognized as an accurate record of his personal observations. Mr. Spears says:

Moreover, they are all the sinks of mountain streams—there was no communication between them and the sea, because of changes in the climate and in the amount of rainfall, the water supply grew less and less and eventually each lake became a marsh.

Prof. Hanks also says:

Streams, generally small, which head in the snowy mountains, if they do not sink in the sandy desert soil, or wholly evaporate, give birth to alkaline lakes, of which Mono, Owens, Walker, Carson and Humboldt are the most important.

It is unnecessary to multiply quotations. Dr. Gilbert, the author of the monograph on Lake Bonneville, was for a number of years at the head of the United States Geological Survey. Professor Russell was Dr. Gilbert's assistant in the work on Lake Bonneville, before he took up his great work on Lake Lahontan. Their ability and authority are unquestioned. Henry G. Hanks was formerly in charge of the State Mining Bureau of California, and has for years been a recognized authority on the Pacific coast. The testimony of John R. Spears, and others who have visited the deserts, only corroborates the fact that even the casual observer cannot fail to note the fact that all the dry lakes are concentrations of

ing fact that the removal of the surface crusts does not exhaust the saline resources of these lakes. This fact is noted in Bulletin No. 24, describing the effect of the sandstorms as follows:

At the Searles borax lake it was found that, after a crust had been removed from one part of the marsh, it filled with water that soon deposited crystals of borax, and in six months the waters were blown so full of fine sand that the new crust contained 50% of sand.

At Searles lake, in San Bernardino county, the method of working was simple, consisting of scraping the crust into windrows and then gathering by carts and taking it to the works, 2 miles distant. It was noted here, in digging the crystals out of the mud, that the crystals grew. The holes left soon filled with water containing boric acid in solution—this, coming into contact with soda, formed crystals of borate of soda (borax), which were deposited in the mud. Large vats were dug in the mud and brush thrown in for the crystals to form on. On ground that had been worked over a new crust formed also, that was thick enough to remove in three or four years. Such growths give the following analysis:

	Six Months.	Two Years.	Three Years.	Four Years.
Sand, per cent. ....	58.0	55.4	52.4	53.3
Soda carbonate, per cent. .	5.2	5.0	8.1	8.0
Soda sulphate, per cent. .	11.7	16.7	16.6	16.0
Soda chloride, per cent. .	10.9	10.0	11.1	11.8
Borax, per cent. ....	14.2	12.9	11.8	10.9

It will be noted that the borax is richest at first, and that the sodas increase faster than the borax. The effect of the Æolian sands is especially noticeable. These analyses throw considerable light upon the genesis of the deposits.

(TO BE CONTINUED.)

A NEW ALLOY for anti-friction metal and for brushes for dynamos, says the Elektrotechnischer Anzeiger of Berlin, consists of copper intersected with particles of graphite. A plate sprinkled with graphite is dipped into a copper bath, when the copper is deposited on the plate and surrounds the graphite. The plate is then withdrawn and again treated with graphite, after which it is reinserted into the bath, and the two actions are repeated until the diameter required is reached. It is said that the friction on metal so treated slowly releases the particles of graphite, which then act as a lubricant.



Electric Drills.\*

Written for the MINING AND SCIENTIFIC PRESS.

The object of this article is to place the actual results obtained in operating an electric drill plant, which has been in constant operation for over two years, before the mining fraternity for their information and criticism. The writer will make no excuses for the many errors made in his efforts to make this type of electric drill a success. If he had realized the expense and effort required to get results, it is very likely this article would never have been written. When the Miami Mining Co. opened the Phoenix mine it became apparent that the most difficult problem to be solved was drilling in the hanging and foot wall rock. This rock is a metamorphosed diabase, dark green in color, very fine texture; hardness, 4.5; specific gravity, 2.921 to 2.9744. The composition of the diabase when taken 50 feet from vein is:

	Per Cent.	Per Cent.
SiO <sub>2</sub> .....	59.21	51.31
Fe <sub>2</sub> O <sub>3</sub> .....	2.96	3.72
Mn O .....	0.67	0.22
Al <sup>2</sup> O <sup>3</sup> .....	23.26	21.75
Mg O .....	2.75	3.69
Ca O .....	5.17	8.25
K <sub>2</sub> O .....	4.24	
Na <sub>2</sub> O .....	3.69	
Loss by ignition.	1.07	1.70
	102.42	100.20

Analyses of samples of the diabase taken from the foot and hanging walls close to the vein contact give:

	Per Cent.	Per Cent.
Si O <sup>3</sup> .....	87.10	89.00
Fe <sup>2</sup> O <sup>3</sup> .....	2.37	2.24
Mn O .....	0.22	0.18
Al <sup>2</sup> O <sup>3</sup> .....	3.60	3.73
Mg O .....	1.60	1.90
Ignition and alkalis by difference.	5.11	2.95

This metamorphic replacement of alumina and lime by silica has produced a difficult drilling rock. The ore is an iron pyrite, carrying gold values and from 1% to 2% chalcopyrite. The gangue is heavy spar and quartz, the heavy spar predominating. The average width of vein is from 16 inches to 20 inches. The drills which had been used in the mine averaged 10 feet to 15 feet of holes per shift. Labor at this mine is 75 cents per day—hand drillers, \$1.25. It seemed to be a case of hand drilling, or some more economical kind than the style of drilling used, if speed with economy were to be obtained. This view of the situation led the writer to seriously consider electric drills.

When this decision was made, many of the mines in Colorado which were or had been using electric drills were visited and different types of drills were examined from the constructive and mechanical standpoint. Five electric drills were put into service April 1, 1902, and have been in continuous use ever since. The mine is electrically equipped throughout with a 220-volt direct current. Therefore only the drills and motors were purchased. We have added two more drills to this equipment. The motors, flexible shafts, etc., were all purchased direct from the manufacturers. The drills were purchased outright and not on a guarantee.

The first serious difficulty met with was shafts. Several kinds of shafts were either tried or examined. The Stow flexible shaft, made in Philadelphia, was accepted as best. J. A. Roebing Sons Co. were asked if they ever furnished steel rope for cores. They replied that they had, but the purchasers gave them scant information as to results. An agreement was made by which they were to furnish rope, we to test it and give them test results. It was found that a 1-inch left-laid iron tiller rope with tiller wire-rope center was satisfactory. To make a core, one end of the rope is tied with wire about 2 or 3 inches from the end. The hemp was removed from the end and the wires then soldered into the terminal socket. One end of a soft iron ribbon-wire  $\frac{3}{8} \times \frac{1}{8}$  inch is also soldered into the socket with the rope. The piece of rope is then wound with this ribbon wire under a few pounds tension. The edges of the ribbon wire should be spaced about  $\frac{1}{8}$  inch apart when winding. The other terminal is then attached in the same way.

After experimenting it was realized that anything as water-proof as leather was not the right thing for a casing in this service. Different kinds of cloth were tried with encouraging results. The ordinary extra heavy cloth belting was tested. This made a satisfactory casing cover. This is always protected by winding with ribbon wire, using the same kind as that used to wind the cores. This casing is stiff enough, and does not burn out because it is or can be kept saturated with water. The Stow Flexible Shaft Co. of Philadelphia has developed an all-steel flexible casing which has been tested and retested here. It is now practically successful, and is the writer's opinion that this will replace the cloth casing and be satisfactory in every way. The present shaft is a distinct advance in the art of making flexible shaft for drilling purposes. Messrs. Roebing Sons Co. and Mr. Schoff, proprietor of the Stow Flexible Shaft Co., have not hesitated to spend money and time in assisting to arrive at this satisfactory result. The credit of the present shaft is in a large measure due to their assistance.

\* Condensed.

DRILL NO. 1.

PHOENIX MINE, MONTH OF AUGUST, 1903, MIAMI MINING CO.

Place.	Level.	Hours.	Actual Hours.	Feet.	Shifts.	Labor.	Oil and Grease.	Breakage.
Fur'	60		39	64'	6	\$1 00 \$ 6 00		20 Big springs. 15 D. B. springs. 1 Ratchet wheel. 1 Gear case bushing 4 Gear case bolts. 3 Nat. L. washers. 2 Crank shafts. 4 Flywheel keys. 6 Cover lid bolts. 1 Piston key. 2 Piston springs. 2 Draw bar guides. 9 Pounds waste. 1 Chuck bolt and washer. 1 Gear case bushing. 3 Chuck bolt gibs. 1 Cotter & Lock washer. 2 Sheets sandpaper 2 Clamp bolts. 2 Gear case bolts. 8 Pawl springs. 1 Draw bar. 1 Ratchet wheel case.
Fur'	100		59	87' 11"	10	1 00 10 00 1 25 12 50		
350'	20		18	24'	2	1 00 2 00 1 50 3 00		
350'	20		12½	22'	2	1 00 2 00 1 50 3 00	6 pounds S. grease.	
Fur'	30		17½	18' 8"	3	1 00 3 00 1 50 4 50	1 gallon M. oil.	
Total cost.		230	146	226' 7"	23	\$55.00	\$0.94	\$163.33

DRILL NO. 2.

PHOENIX MINE, MONTH OF DECEMBER, 1903, MIAMI MINING CO.

Place.	Level.	Hours.	Actual Hours.	Feet.	Shifts.	Labor.	Oil and Grease.	Breakage.
350'	72		55½	81' 11"	8	\$1 00 \$ 8 00 1 50 12 00	2 pounds M. grease.	
Fur'	10		5	7' 7"	1	1 00 1 00 1 50 1 25		1 Center bolt. 1 Nose bushing. 13 Big springs. 10 D. B. springs. 1 Dozen fuse links. 2 Flywheel keys. 2 Draw bar guides. 5 Big springs. 11 D. B. springs. 1 Cover lid. 1 Chuck bolt. 4 Handy oilers. 8 Fuse links. 1 Nose bushing spring. 2 Ratchet wheels 1 Ratchet wheel case. 1 Flywheel key. 1 Crank shaft. 1 Flywheel nut. 1 Flanged bushing.
Fur'	86		53½	87' 8"	9	1 00 9 00 1 50 13 50		
Fur'	56		41½	76' 5"	6	1 00 6 00 1 50 9 00		
350'	20		17	26' 6"	2	1 00 2 00 1 50 2 50		
Fur'	30		21	32' 8"	3	1 00 3 00 1 50 4 50		
Total cost.		274	193½	312' 9"	29	\$71.75	\$0.12	\$108.44

DRILL NO. 3.

PHOENIX MINE, MONTH OF JULY, 1903, MIAMI MINING CO.

Place.	Level.	Hours.	Actual Hours.	Feet.	Shifts.	Labor.	Oil and Grease.	Breakage.
Fur'	160		112	239' 7"	16	1 00 16 00 1 50 24 00	2 gallons M. oil.	18 Draw bar springs. 16 Big springs. 2 Thimbles in chuck head. 1 Chuck bolt. 1 Cotter pins. 1 Nose bushing. 1 Chuck bolt. 2 Ratchet wheels. 1 Ratchet wheel case. 1 Draw bar guide. 1 Piston key. 1 Chuck bolt. 4 R. W. pawls. 1 Piston collar. 8 Pawl springs. 2 Ratchet wheel cases. 2 Ratchet wheels. 8 Pawl springs. 1 Piston spring. 3 Cover lid bolts. 2 Cotter pins.
Fur'	150		68½	212' 9"	15	1 00 15 00 1 50 22 50	5 pounds S. grease.	
Total cost.		310	180½	452' 4"	31	77.50	\$1.00	\$117.45

The next difficulty to deal with was springs. The time in changing was one great difficulty. After much testing, a larger spring was used, with fewer coils and a washer at either end with internal extension sleeves, so that the spring could not compress beyond a certain point. This reduced the spring breakage to a moderate cost.

A comparison with double hand drilling is the only thing that will give an idea as to the difficulties encountered in cutting this ground. The men average about the same number of feet per week. From Oct. 18, 1902, to Oct. 10, 1903, the double hand drillers drilled 9098 hours, drilling 4591 feet 9 inches, or an average of .51 foot per hour.

From Jan. 3, 1903, to Oct. 3, 1903, an average of 3.12 electric machines were running, giving a service as follows:

Weeks.	Shifts.	Actual Hours.	Feet Drilled.	Cost of Repairs.
41	9,932	7,902	10,535 ft. 3 in.	\$2,182.62

Drills each cut per shift hour, 1.06 foot; drills each cut per actual hour drilling, 1.33 foot; repairs cost 20.71 cents per foot of holes drilled.

A watt meter placed on one of the drills gave the following readings and results:

Date.	Hours Actually Drilled.	Feet Drilled.	Watt Hours.
Sept. 25, 1902	1½	3 ft.	1,700
Sept. 26, 1902	3	7 ft.	3,400
Sept. 30, 1902	3	6 ft.	3,800
Sept. 30, 1902	4½	10 ft.	4,600
Oct. 7, 1902	4	10 ft.	2,500
Oct. 7, 1902	1	1 ft.	1,300
Oct. 7, 1902	2½	1 ft.	1,500
Oct. 10, 1902	3½	5 ft. 6 in.	2,200
Oct. 10, 1902	6½	9 ft.	4,500
Oct. 10, 1902	5	8 ft.	3,600
Totals	33½	60 ft. 6 in.	29,400

Horse power hours, 39.4; horse power hour consumed per hour actual running, 1.17; horse power hour consumed per foot drilled, 0.65.

These results were checked with a milli-ammeter. The drill motor consumed from 2.5 to 3.5 amperes when running in a hole not over 1 foot deep. Variation .2 to .3 amperes, with holes 4 feet deep, the motor consumed from 3.5 to 4.6 amperes. Variation .3 to .5 ampere. Voltage in all the tests read between 200 and 215.

The regular 2 H. P. iron-clad motor made by the General Electric Co. is a satisfactory machine. The cost of repairs and maintenances from April 1, 1902, to Dec. 31, 1903, has been \$163.87, three motors being in service practically all the time.

After the usual number of experiments the following sizes and shapes of steel were found the most satisfactory:

	Steel Diameter.	Bit Cross.	Length Grooved.
1	1½ in.	3½ in.	1 ft. 6 in.
2	1½ in.	2¾ in.	3 ft.
3	1½ in.	2½ in.	2 ft. 6 in.
4	1½ in.	2 in.	3 ft.
5	1½ in.	1½ in.	3 ft. 6 in.
6	1½ in.	1¼ in.	4 ft.
7	1½ in.	1½ in.	4 ft. 6 in.
8	1½ in.	1½ in.	5 ft.
9	1½ in.	1½ in.	5 ft. 6 in.
10	1 in.	1½ in.	6 ft.

Perhaps the best way to give a clear insight into the detailed performance of the drills is to give a few monthly sheets chosen at random from the monthly drill reports.

These selected are not the best or poorest, but are a good high and low average.

Power cost here approximately 1.2 cent per horse power hour.

Below is given the entire record of one drill. These with the above give a very good idea of



the condition and cost of operating this type of electric drill in hard drilling ground:

	Shifts.	Hours.	Hours. Actual	Drilled. Feet	Repairs, etc.
1902.					
December.....	26	260	135	189 ft.	\$44 00
1903.					
January.....	6	48	14½	23 ft.	1 75
February.....	21	152	84	97 ft. 6 in.	17 94
March.....	10	100	70	51 ft. 6 in.	9 50
April.....	16	160	118	198 ft. 6 in.	18 85
April.....	11	110	83	119 ft. 6 in.	7 88
May.....	12	120	77	76 ft.	21 70
June.....	49	490	355½	373 ft. 6 in.	62 33
July.....	16	160	113½	96 ft. 6 in.	15 74
August.....	3	30	20½	36 ft. 6 in.	00
September.....	12	120	83	134 ft. 6 in.	11 91
October.....	23	230	150½	354 ft.	26 70
November.....	26	253	177	262 ft.	44 73
December.....	43	418	293	470 ft.	62 76
1904.					
January.....	12	114	80½	100 ft.	67 00
February.....	24	228	162	196 ft.	34 76
March.....	8	80	59½	81 ft.	58 01
	318	3,063	2,076½	2,759 ft.	\$505 53

Drill running.....67.79% of total time  
 Feet drilled per shift.....8.7  
 Feet drilled per hour actual running time.....1.33  
 Cost of repair per foot drilled.....18.3c

Drill runners will soon prefer to run an electric drill. The usual difficulties—ignorance and prejudice—were of course encountered at the commencement. These were soon changed to intelligence and preference.

F. L. SLOCUM.

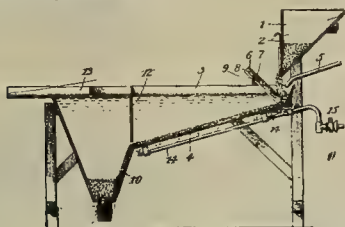
Concord, N. C.

## Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 23, 1904.

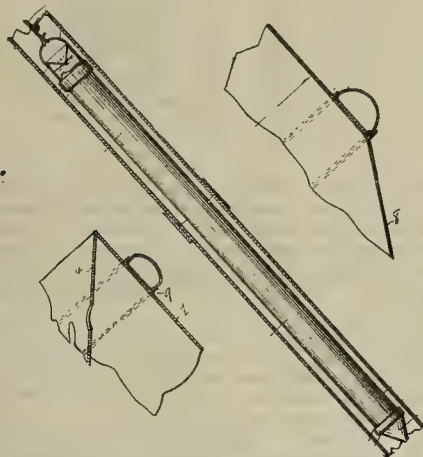
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

EXTRACTING ZINC OR OTHER SULPHIDES FROM THEIR ORES.—No. 768,035; G. D. Delprat, Broken Hill, New South Wales, Australia.



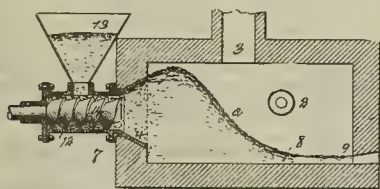
Method of separating ores from their gangue by forming an aqueous solution of acid capable of reacting with ore to form gas and increasing density of solution by adding thereto suitable substance, then feeding mixture of ore and gangue to solution, decreasing density of gas as it is formed on ore particles, and removing ore particles to surface.

SAFETY DEVICE FOR OIL-WELL TORPEDO SHELLS.—No. 768,564; W. H. Ernst, Marietta, Ohio, and A. Cupler, Jr., Titusville, Pa.



Torpedo comprising shell, spaced-apart flanges upon opposite ends of shell, and cushioning means expansively held between flanges and having its interior surface engaging shell throughout, flanges preventing longitudinal movement of cushioning means.

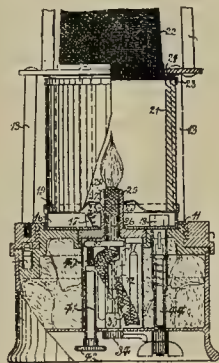
ELECTRIC FURNACE.—No. 768,054; C. G. P. deLaval, Stockholm, Sweden.



Electric-furnace chamber having horizontal feed opening, escape opening and focus of electric heat within chamber and opposite feed opening; escape opening being located above feed opening and between feed opening and focus.

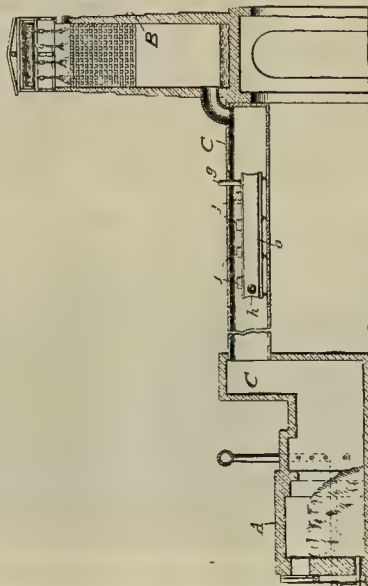
opening being located above feed opening and between feed opening and focus.

MINER'S SAFETY LAMP.—No. 768,497; A. Wiedenfeld, Bochum, Germany.



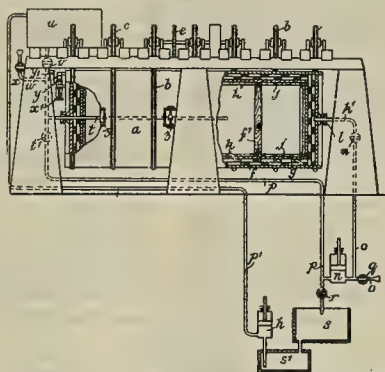
In miner's safety lamp burner containing wick tube, both burner and tube being each provided with slot, two slots being adjustable to form conduit reaching to top of burner; igniter, compartment composed of cover of lamp vessel, and cap or hood covering compartment and separating it from outside, compartment containing igniter and match in compartment.

SULPHURIC ACID PLANT.—No. 768,108; A. Zanner, Brussels, Belgium.



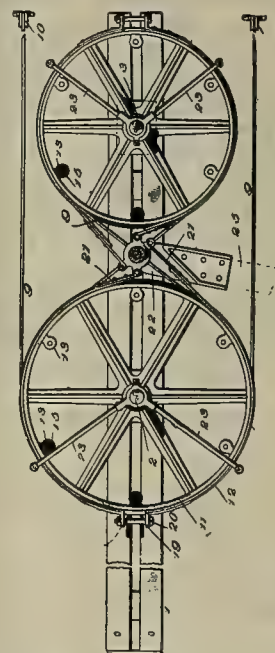
Plant for manufacture of sulphuric acid, comprising roasting furnace, Glover tower, heating flue for passage of sulphur fumes and gases from furnace to tower, and vessels for concentration of sulphuric acid located within flue and adapted to be inserted and withdrawn therefrom, vessels being provided with inlet or supply pipe extending through wall of flue so as to receive supply from without, and discharge pipe likewise extending through wall of flue, and vapor exit openings discharging into flue; inlet or supply pipe being located at end proximate to tower and discharge pipe being located at end proximate to furnace.

EXTRACTION OF METAL FROM ORES.—No. 768,319; C. H. Webb, Dorking, Eng.



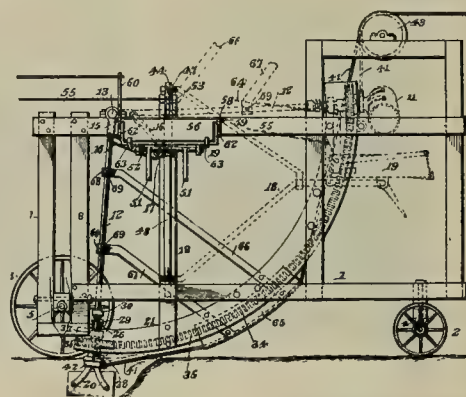
Process for treatment of solid material by liquid and final separation of solid and liquid particles consisting of mixing of liquid and solid material in closed revolving filter, assisting and maintaining continued deposit and support, by constant vacuum on delivery side of filter, of solid residue upon filtering support so as to withdraw moisture therefrom, discontinuing vacuum to allow fall by gravity of dry residue from filtering support and removing residue from vat practically dry through suitable apertures.

GRAVITY INCLINE MACHINE.—No. 768,235; H. C. O'Brien, Athens, O.



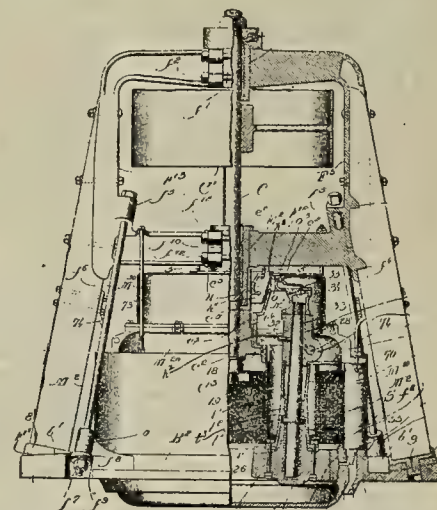
In controlling mechanism of character described, combination of post, sheave journaled thereon, brake rim in connection with sheave, arms extended from post and adapted to support brake band, brake actuator and means connecting opposite ends of brake band to brake actuator.

EXCAVATING MACHINE.—No. 768,362; J. P. Gordon, Florence, Colo.



Combination of frame, scoop or shovel carried by same, and combined hoisting and draft rope or cable connected with shovel and adapted to operate same and advance frame.

CRUSHING OR PULVERIZING MILL.—No. 768,221; E. C. Griffin, Newton, Mass.



In crushing mill, metallic bed, composite frame thereon comprising upright timber standards supported at their lower ends on bed, metallic crosshead interposed between upper ends of standards and provided with check pieces to receive latter, intermediate crosshead forming integral part of crosshead, bolts rigidly connecting standards and crosshead, and lateral tension braces diverging from opposite sides of standards and attached at lower ends to bed, upper ends of braces being attached to crosshead.



# Mining Summary.

SPECIALY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

## ALASKA.

The Alaska gold output for the fiscal year ending June 30, 1904, according to the Department of Commerce and Labor, amounted to \$6,328,524, while in the fiscal year 1903 Alaska shipped to the United States gold ore and bullion to value of \$4,754,578. These figures refer only to Alaskan gold, however. The same statistics noted an even larger quantity of Canadian gold shipped to the United States, through Alaska, though less than during the preceding year. In 1903 the aggregate shipment of Canadian gold to the United States through Alaska amounted to \$10,979,285, while during the year just closed the Canadian shipment aggregated \$8,555,600.

## ARIZONA.

### Cochise County.

It is reported the Copper Queen Co. will enlarge its smelter at Douglas. Four or five more furnaces will be added. The smelter is working nearly to its full capacity of 1500 tons a day. Increased ore production in the Phelps-Dodge properties in the southwest make it necessary to enlarge. W. Douglas is manager of the company.

### Gila County.

Gibson & Gibson, near Globe, have curtailed shipments of ore to the Old Dominion until the new smelter blows in. The upper tunnel is being driven to connect with the Gibson shaft, and this work will be finished by the time the hoisting machinery is set up at the shaft. A steam hoist will be put in.

D. P. Fuller, superintendent of the Pinto Creek M. & S. Co., operating near Globe, says a compressor and three air drills will be put in to drive the lower tunnel on the Yo Tambien mine to cut the main ledge. The lower tunnel is in 400 feet. The ore is said to carry 12% copper.

### Graham County.

The Arizona M. Co. has started operations on its mines near Clifton. Additional tracks and ore cars have been put in.

J. Tanner, manager of the Santa Rosa C. Co. of Metcalf, is developing and equipping the company's mines.

### Santa Cruz County.

T. T. Harding, manager of the Gladstone M. Co., operating the Macedonia mines near Nogales, says first-class ore is being mined for shipment to El Paso, Tex. The ore is being hauled to Nogales.

### Yavapai County.

F. C. Smith, superintendent of the Socorro mine near Martinez, says arrangements are made to reopen the mine and increase developments. The mill will not be operated until sufficient development work has been done to insure a supply of ore for the mill. Fifteen men have been put on under Foreman B. Quinn.

The New Idea G. M. & M. Co. has been organized by E. Cosgrove as president, A. S. Goodell, J. Ages, W. F. Lorenz, W. R. Orr and T. N. Childers of Silver City, N. M., to develop a group of gold claims near Prescott. T. N. Childers is manager.

### Yuma County.

W. R. Russell of the Amalgamated G. M. Co., operating near Quartzsite, says the roads are in bad shape from the recent rains. A traction engine and freight wagons will be used by the company in taking out its freight. A 120-stamp mill will be built at Quartzsite. The traction outfit will consist of a 100 H. P. motor car and four 15-ton capacity freight cars. The motor car is said to generate electricity which it supplies to the other cars, and each car has its own motor.

## ARKANSAS.

### Marion County.

The Crystal M. Co. will start development of its property near the Denison mine on Crooked creek, near Dodd City. The Cincinnati Belle mine at Yellville will be reopened. The mines about Dodd City have begun shipping ore from Foster, manager of the Rising Sun mine, will resume development work.

### Searcy County.

The Excelsior mine at St. Joe is sinking a shaft on the east drill hole. Two other drill holes are being sunk.

## CALIFORNIA.

### Amador County.

W. W. Worthing, manager of the Bay State mine, north of Plymouth, says the

shaft has been sunk 200 feet to the 1000-foot level; that he is drifting north and south on two veins on the 1000 level and is keeping ten stamps dropping on rock taken out in development work. The crosscut from the shaft to the ledges on the 1000-foot level is 520 feet in length. Worthing says he will have 300 feet of backs, and that the ore being worked, though of low grade, pays for milling.

### Butte County.

The New York & California Dredging Co. has bought the Marigold dredgers and mining land 6 miles from Oroville. J. W. Goodwin of San Francisco is president of the company, and K. Krug, superintendent of the Lava Beds Dredging Co., will have charge of the New York & California's dredging operations as well. Equipment will be increased.

### Calaveras County.

(Special Correspondence).—The Melones M. Co. is dropping sixty stamps steadily on ore from the 300-foot and 400-foot levels. The open cut on the top of Carson hill is no longer being used as a source of ore. Stopping and development work are progressing underground. Preparations are being made to add forty stamps to the mill, which will make 100 stamps under one roof. When the present sixty stamps were put in foundations were provided for 120 stamps, divided into two sections, with the power plant in the center. To allow the power to be used for the additional forty stamps it is proposed to remove the two compressors from the mill. Power for the compressors will be obtained by a turbine installation, reusing the waste water from the mill turbine wheel. The cyanide plant is reported in satisfactory operation and is using the bromo-cyanide process. F. Langford is superintendent of the Melones M. Co.

Melones, Aug. 31.

Machinery for the Live Oak No. 2 M. Co. at Railroad Flat, consisting of a 10-stamp mill complete, is being put on the Swiss mine, says E. L. Holder, superintendent.

The Union C. Co. of Copperopolis is making preparations to open its mines on a larger scale and, it is reported, will build an oil tank at Milton and improve the roads between that town and the mines and put on traction engines to do its hauling. G. McM. Ross is manager. The work of removing the mill and hoist at the Marshall mine, near San Andreas, is progressing and is expected to be in running order this month. Much of the works is being rebuilt.

The Lightner M. Co. at Angels reports, including the forty-first dividend paid out last month, a total of \$212,000 paid. The directors are considering increasing the mill from forty to sixty stamps. A. Chalmers is superintendent.

### Kern County.

The closing down of oil properties at Kern river, in consequence of the Standard's cutting off the market, has begun, says the Californian. The Piedmont and the Linda Vista companies, under same management, were the first. Superintendent Saginette has received orders to shut down the wells and quit all business for an indefinite period. These companies have five wells on their properties. Orders have also been received by the Nevada County and Columbian Cos. to the effect that no oil should be shipped at the price of 11½ cents, announced by the Standard. The Columbian, it is said, has a contract with the Santa Fe for the sale of oil at a satisfactory price, so that it will not be obliged to shut down. The Potomac will shut down until the outlook improves. This company has ten wells. The Associated's offer to pay 15 cents for oil is for long-time contracts only, not for spot oil. The Standard has further announced that it will refuse to handle any Kern River oil not already contracted for, at any price, according to orders received by Superintendent Page at Bakersfield.

### Nevada County.

The hoist at the Charonnette mine, at Canada Hill, near Nevada City, has been completed and has capacity to sink to 2000 feet.

The Last Chance and Hidden Treasure mines (the Eureka drift mines) have been bonded to a Sacramento company for \$35,000. The mines will be worked by drift and a tunnel will be run. T. Carroll of Grass Valley, superintendent, will start work next week.

At the Brunswick mine at Grass Valley another ledge has been cut in the 1250-foot level. It is 8 feet wide. Work is also progressing on the 4-foot ledge on north side. The pumps are handling 60 miners' inches of water.

The tailings of the Petitjean chlorination works, below the North Star mine, near Grass Valley, are being shipped to the Selby Smelting Works.

The 4-stamp mill at the Siberian mine

at Badger hill, near North Columbia, is ready to crush ore, says Superintendent A. S. Bigelow. The Siberian has a shoot of ore tapped in a lower tunnel.

### Placer County.

Superintendent G. Foster of the Big Pine mine, near Auburn, says a mill will be built.

### Shasta County.

A Huntington mill, with a 6-foot Frue concentrator and provision made to save the tailings with a view to cyaniding them, is being put on his mine on the Shasta county side of the Deadwood divide by G. R. Simmons, of French Gulch.

The Bully Hill C. & S. Co. at De Lamar is sinking the shaft in No. 3 tunnel to 770 feet. Last year the work of sinking was stopped when the 670-foot level was reached. When the 770-foot level is reached crosscuts will be run.—H. C. McClure, owner of the McClure group of mines on Bully hill, is preparing for further work.—A few men are working on the Shasta May Blossom group of claims.

### Siskiyou County.

H. M. LeBaron of Valley Ford, Sonoma county, part owner of the Gold Dike M. & M. Co., operating in the Salmon river district, says a milling plant with a capacity for handling 30 tons of ore daily will be built at the mine. Preparations are being made for increased development.

Yreka reports say Phillips & Harrison, developing a mine on the Deadwood, uncovered a pocket last week from which they took out \$500.—The Fernandez hydraulic mine, on Cherry creek, has made its season's clean-up, from which \$5000 was realized. C. Paige of San Francisco has an option on the mine for thirty days for \$25,000.

The Mount Vernon mine on divide between Greenhorn and Cherry creeks, south of Yreka, reports taking out payable quartz. The saw mill is cutting lumber for the mine. The foundation for the 10-stamp mill is ready for erection of frame work and putting in machinery. The Cherry Hill mine is on same lode down Cherry creek.

The Morrison & Carlock mine at Quartz valley, near Fort Jones, continues to yield values. A 10-stamp mill is about completed in place of the 5-stamp mill and an air-compressing plant is being put in, all run by steam power. About fifty men are at work.—Superintendent Bryant at Deadwood has men at work putting up a quartz mill on his mine.

T. J. Nilton, superintendent of the Minetti B. hydraulic mine at Nilton, reports an \$1800 cleanup, the product of thirty days' mining and made since the other mines on the river have closed for the season. In addition to the cleanup from the sluice boxes Nilton reports \$1000 remaining in low places on bedrock, too low to be bottomed by the present line of sluice boxes, and that the gold will be taken out by shoveling into a short line of boxes.

### Trinity County.

A cyanide plant will be built at the Yellow Rose mine, on the headwaters of Coffee creek, near Dedrick, says Superintendent J. C. Boddiker. A working tunnel on a level with the Yellow Rose mill—a 4-foot Huntington—was being run when a ledge 10 feet wide on the average was cut. This ledge was not found in the upper workings of the mine, and assays \$8 free gold, with sulphurets. In the upper workings the ledge runs 1 foot in width and carries free gold. The working tunnel being run is to tap that ledge at a depth of 340 feet below the upper workings. On account of the expense of pumping and mining in the upper workings of the Yellow Rose, the work of taking out ore was discontinued and the mill closed down. There are six men on development work.

Further improvements are planned by the Dorleska M. Co., operating the Dorleska mine, on Union creek, near the head of Coffee creek, near Dedrick. The company proposes to install an electrical generating plant on Union creek to furnish power and lights for the operation of the Dorleska mine and mill. Considerable preparatory work must be done, such as building dams, ditches and flumes. The mine and 10-stamp mill are in full operation and sixteen men are on the payroll. H. Z. Osborne of Los Angeles, Cal., is president and manager.

P. Bouery, manager of the La Grange hydraulic mine near Weaverville, says the reports that the entire flume will be rebuilt are in error, for it does not need rebuilding. The company will increase its water supply.

### Tuolumne County.

At the Hy-a-poo mine on South Fork of Stanislaus river, 3 miles northeast from Columbia, a gravity tramway has been built, 1200 feet in length, on the south side to the bridge at the river. A ¾-inch steel cable operates the trolley that conveys supplies, timber, etc., to the river

where are located buildings and air compressor. A flume, 3000 feet in length, carries 600 inches of water, giving with a low head 80 H. P. for the air compressor. Eventually the quartz will be sent down to the proposed millsite at the river, says Superintendent R. Fulcher.

It is reported the Sullivan mine near Black Oak mine, near Soulsbyville, will be again started up by J. Mason, of San Francisco.

The Confidence mine and mill at Confidence are again in full operation. Over seventy-five men are employed. N. Carmichael is superintendent.

E. J. Olsen, superintendent at the Star mine, near Columbia, says he will put in a compressor and the mine will be further developed.

## COLORADO.

(Special Correspondence).—The fact that in Denver the American Mining Congress will establish permanent headquarters is learned with much satisfaction.

The report that the Guggenheims had an option and secured a lease on the Smuggler-Union mine at Telluride is denied by the management, it being impossible to sell or lease to them on account of several outstanding leases to other parties.

A serious accident was averted at the Portland mine, at Victor, the past week, when the cage was drawn into the sheave wheel, but owing to safety devices the cage did not drop back into the shaft.

Governor Peabody has issued a proclamation designating Sept. 5th as labor day for Colorado. It is understood that labor organizations from different parts of the State will participate in the parade at Denver simply to show their strength.

The several letters written by Walter Wellman, the newspaper correspondent, on the labor conditions in Colorado, have brought forth severe criticism from people who are unable to look at the situation as he did. It is understood he came here prejudiced in favor of the Federation of Miners, but before leaving had changed his mind.

The past week has seen several deportations from the Cripple Creek district by an organized mob. It was stated during the early part of this week that troops would again be sent to the district, but the sheriff of the county claims he is able to handle the situation without the troops. Several of the most prominent citizens of the district have been arrested and released on bonds for participating in the recent deportations.

Reports from different parts of the State indicate that the mining industry is improving each week.

Denver, Aug. 29.

### Chaffee County.

Buena Vista reports say near timber line on Mount Princeton, Shephard of Leadville is driving the Latchaw tunnel to cut the Dandy Butler vein. The work is under supervision of C. I. N. Sharpe. Already the tunnel has cut several small veins. New pipe and machinery have been put in at the power house and mine. As soon as the vein is cut the company will erect a mill.

The Washington mine on Yankee Blade hill, ½ mile northeast of Granite, operated under lease by Martin brothers, is working two shifts and keeping its mill running steadily. The ore is milling \$16 per ton. The miners are working in 6 feet of free milling ore.

The Saguache Hydraulic M. Co., operating the Ball placer on Lake creek, near Granite, is placing its machinery and will be ready to start operations this winter. It is prospecting its ground by drifts and has two Keystone drills running. Drift mining is under way. Two dredges are nearly completed.

### Clear Creek County.

At the Kemp-Calhoun mine in Leavenworth gulch, near Central City, machinery has been put in and they are hoisting water. The main shaft is down 430 feet. The mine is owned by J. Kemp of Boulder.

The Black Lion Con. G. M. & T. Co. has been incorporated by W. McEniry, president and treasurer, Rock Island, Ill.; J. S. Burns, A. L. Laycock, J. W. Jacques, managing director, Idaho Springs, and R. D. McCreery, C. Dye, directors. The company was organized to take over the holdings of the Black Lion M. Co. and adjoining claims in the Ute creek section, near Idaho Springs, and has a group of lodes, which will be opened at depth by driving a crosscut tunnel. In the group are the Big Flat and the Black Lion lodes.—Hickson & Co., having a lease on Block No. 10 in the sixth level, east on the Edgar mine, are shipping concentrates and smelting ore.—Another battery of ten rapid-drop stamps is being added to the Ward mill on Jackson bar which will give the capacity of the mill sixty tons daily. Grading out below the mill for the cyanide section is finished and the steel tanks are on the ground. The



shaft on the Ward mine is down 140 feet and a crosscut is being driven to reach the hanging wall and the shaft is getting water. A pump will be installed before sinking is resumed.

J. T. Johnson of Denver, manager of the Arapahoe group of claims in the Argentine district, says the Arapahoe group is being developed by a crosscut tunnel which is showing silver and lead ore. Another tunnel will be started to cut the vein lower down. Machine drills will be used.

Machinery is being put in at the mines of the East Argentine M. Co. near Georgetown, says Manager Sidney. The Sidney tunnel will be driven with power drills.

Work of driving the Empire tunnel, near Georgetown, was resumed this week. Shipments of milling and smelting ore are being continued from the Gold Dirt and Tenth Legion properties of the company.

Work will be started this week on the new tunnel of the St. Paul M. Co., near Georgetown. A power plant will be put in before stormy weather sets in and machine drills will be used, says Manager Teagarden.

#### Dolores County.

(Special Correspondence). — The Durango Leasing Co. is operating on the dump of the Enterprise Lease and also operating in the old stopes and low-grade veins in the mine. This property is on Enterprise hill and is equipped with a 100-ton mill. The mill has been overhauled and put in shape to treat the ore. In the mill they use crusher, rolls, Huntington mill and ten Wilfleys. The power consists of two 80 H. P. boilers and 100 H. P. engine. They have recently added water power which can be used for several months during the year. C. D. Hopper is manager and J. Krantz mine superintendent.

The San Juan Ore Co. is working the Pro Patria mine and mill. They have added magnetic separators to the mill which are said to be satisfactory work. S. W. Osgood and W. C. Brace are consulting engineers and R. Lyman, Jr., manager of the company.

Rico, Aug. 28.

(Special Correspondence). — R. Keller, manager of the Emma Gold M. Co., is doing considerable development work blocking out large bodies of ore preparatory to doubling the capacity of his mill. The main tunnel is 3000 feet in length on the vein. They have 5 feet of ore that averages \$15. The mill is handling about forty tons per day. They have started a second tunnel 300 feet above the other one to block out a piece of ground 300 feet by 1500 feet which will give them ample working ground. They are also shipping some high-grade ore.

Dunton, Aug. 29.

#### Fremont County.

T. G. McCarthy, part owner of the Rocky Mountain S. Co., in Florence, says the company intends to repair and again operate the smelter.

#### Gilpin County.

The Con. Investment Co. is operating the Vassar group in Graham gulch. The main tunnel has been driven 650 feet. The ore contains copper-iron sulphides carrying gold values. C. B. Rhodes of Kansas City, Mo., president and manager, says he will arrange to install an electric plant for development of the group, which will include drills, power and lighting.

Operations have been resumed at the Gauntlet mine, on Quartz hill, in Illinois-Central district, near Central City, which is owned by Iowa men and under the management of L. D. Hobson. Arrangements are made to sink the main shaft 200 feet more. Its depth is 400 feet. Stopping operations are being carried on at a depth of 375 feet.

At the Lutz mine, near Russell Gulch, operated under lease and bond by G. K. Kimball Jr. of Idaho Springs, the workings are being unwatered and retimbered. The shaft is down 530 feet. Work is being done by Superintendent J. H. Bawden.

The Cashier G. M. & R. Co. will this month put in a 60 H. P. hoisting engine and make additions to its shaft building on the Pittsburg mine. Arrangements are being made to sink the main shaft, now 600 feet deep, 200 feet more. The company has forty men working on company and leasing account, the company working the 500-foot and 600-foot levels, while all work above the fifth level is being done by leasers. B. L. Campbell is superintendent.

H. Butler and G. W. Thatcher of Denver, owning the Tigress group of claims, in Illinois-Central district, near Central City, have resumed development and will put in a steam hoisting plant. — H. Stevens and J. Jones of Russell Gulch have started work on the Perrin mine, between the Topeka and Hillhouse mines, in Russell district. They are repairing the shaft and expect to take out free milling ores.

#### Gunnison County.

The Golden Eyelet group, near Pitkin, has been sold to a Kansas City, Mo., company under management of G. Brant of Pitkin. He is increasing development, also building a concentrator to handle entire ore production.

The Farley group of mining claims in the Gold Brick district, near Pitkin, has been sold to G. Brant et al. The Farley group is near the Golden Islet mine, which is operated by Brant.

#### Hinsdale County.

At Burrows Park, near Lake City, are three groups of mines under development — in American basin the Oneida and Gnome mines, the first named owned by J. H. Sloan.

At the Contention mine near Lake City last week connections were made between the Mayflower tunnel and the old workings of the mine, says Engineer W. B. Colwell. The ore continues to hold out, says Manager Kazar, and the mill has been started.

#### Lake County.

On Sugar Loaf mountain, near Leadville, development of the Dinero vein will be resumed, says the Leadville Herald-Democrat. A. H. Boyd will resume work on the Fanchon G. M. Co. mines. The Fanchon shaft was sunk to 245 feet last year. The shaft struck the apex of the Dinero vein. A hoisting plant is on the ground, but other machinery is being added, including an air compressor and machine drills. It is intended to sink the shaft to 450 feet.

#### La Plata County.

(Special Correspondence). — The Small Hopes mine, on Small Hopes mountain, about 3 miles north of La Plata City, is being operated by the Empire Gold Mines Co. The main tunnel is in 550 feet and still driving. They are doing only development work and have opened up ore west of the tunnel which runs from \$20 to \$57 per ton, but has not been developed enough to know how much they have. The object of the tunnel is to cut the Small Hopes vein, and will cut several smaller ones as the tunnel progresses. The ore is telluride carrying gold. The property consists of twenty-nine patented claims and is equipped with air compressor, power drills and other machinery. W. R. Price is superintendent and manager.

About 1 mile above La Plata is the property of the Bonnie Girl M. & M. Co. The company is getting its mill ready to receive machinery. The mill will contain, when completed, fifty stamps and other machinery, besides cyanide process. A pipe line and flume has been built to carry water to the mill for power purposes. This property is also known as the Baker Contact and has a small testing mill on the ground containing ten stamps. The company owns 426 acres in placer and lode claims. An aerial tramway 5000 feet in length leads from the mine to the mill. A. H. Phelps is manager.

On the Comstock mine operations will begin Sept. 1st. The property has one shaft 160 feet deep and vein averages about 4 feet wide, of \$20 per ton value. The mine is owned by Calumet, Mich., parties and it is their intention to increase development work under Superintendent J. B. Truitt.

H. C. Deming, acting geologist of Pennsylvania, has charge of the Boren Gulch M. Co. property and is doing development work. They have gold, silver and copper ore in paying quantities, and have ore on the dump ready to ship.

La Plata, Aug. 28.

(Special Correspondence). — Four miles south from La Plata is the May Day Gold M. & M. Co. At the base of the hill on which the mine is located they have a power plant on La Plata river. Boiler and 4-drill compressor comprise the plant. The company has a shaft down 150 feet and a tunnel in 625 feet. The ore is packed to the bottom of the hill and then hauled by wagon to Hesperus. T. Kelly is superintendent.

Hesperus, Aug. 28.

#### Larimer County.

P. J. Moynahan and J. Hahn of Cripple Creek have leased the Empire copper mine, 10 miles northwest of Fort Collins, and will increase equipment and development.

#### Ouray County.

The Tempest-Apex M. Co.'s mine and mill, near Ouray, are running full handed. The mill is handling twenty tons of Tempest ore per day and turning out concentrates assaying \$70. Development is also in progress. Manager F. M. Jackson says the Breen crosscut, which is 2000 feet long, is being extended and within 300 to 500 feet will cut the Consort vein at a depth of 1500 feet.

#### San Juan County.

D. B. Smith is working men on his

Silver Queen mine, 3 miles from Animas Forks, near Silverton, stripping the vein and leaving the ore for future extraction. By spring sufficient ore will be in sight to warrant starting the mill.

The Ruby Basin M. & M. Co., near Silverton, is building a concentrating plant. The mill is expected to be running Nov. 10th. Underground work in the tunnel and veins intersected consists in retimbering and development.

#### San Miguel County.

At the Alta mines, in Gold King basin, near Telluride, the 20-stamp mill is turning out average of two carloads of concentrates daily. High grade ore is also being shipped to the smelters. — Development at the mines of the Ophir Con. M. Co., at Ophir, continues. Three levels are being opened on the Ida vein, and the pay streak is 6 feet wide, of free milling gold ore. In those levels the Butler vein has also been cut. Thirty stamps of the mill are crushing Ida ore. The major portion of values are recovered on plates by amalgamation. — For several months the Tomboy and Liberty Bell companies, at Telluride, have been operating with reduced number of miners. The Tomboy company's 60-stamp mill has been treating 200 tons of mineral per day (the other mill being idle). The Liberty Bell is increasing output and has eighty stamps dropping.

#### Summit County.

Breckenridge reports say in Blue River district the Quandary Mountain M. & M. Co. has its concentration mill running on ore from blanket vein of the Monte Cristo mine, one of the group owned by the company, on Mount Quandary. The ore is quarried. Additional concentrating tables are being put in. — The Hoosier Gulch M. Co. is working the Bemrose placers with satisfactory results. A double compartment shaft has been started on one of the iron veins of the lode included in the group. It will be put down 200 feet. Machinery will be put in. The property is 12 miles south of Breckenridge on Hoosier pass. W. Bemrose is manager. — The Senator G. M. and M. Co., operating a group of gold bearing lodes on Star mountain, in Blue River district, is having main lower tunnel driven by contract 600 feet more. A compressor and air drill plant have been placed near mouth of tunnel.

#### Teller County.

Manager Franklin of the Eagle sampler, at Cripple Creek, has completed installation of a plant of machinery. The crusher has a capacity of 60 tons per hour. The sampler has had 30 men at work, which number will be increased.

Several plants of machinery are being installed at Cripple Creek mines. The Granite mine on Battle mountain is putting in a fifteen-drill air compressor and a 150 H. P. boiler. The mine's tonnage will be increased to 1000 tons a month. Lessee Shreeder, operating on the Golden Cycle on Bull hill, is putting in a hoist, engine and boiler and expects to start development work next week. — Russell & Sharpe have put in two compressors, one on the Lonaconing property on Beacon hill, another with a hoist on the Colorado Boss on Raven hill. Another Beacon hill lessee who will install machinery is Manager Burke on the Henry Adney, which adjoins the Lonaconing.

The El Paso Gold King, up Poverty gulch, on Womack hill, Cripple Creek, is producing one car of ore per day running \$25 in gold per ton. The ore is being broken down on the 900-foot level and fifty men are employed.

The cyanide plant of the Brotherhood G. M. Co., north of Gillett, has been put in operation. It has capacity to treat fifty tons of ore daily. The ore is oxidized and is taken from the shaft sunk 500 feet. Assays give \$4 in gold.

Superintendent Murray of the Peggy G. M. Co., operating under lease on the Mabel M. property, on Beacon hill, Cripple Creek, reports opening up ore. The leasing company has 5 feet of ore, from which the screenings are returning \$60 per ton. — In the 325-foot level of the W. P. H. mine of the United G. M. Co., on Ironclad hill, Cripple Creek, Lessee Seaver & Harrison are breaking 18 feet of ore. One-half of the rock broken is making screenings that give returns of \$100 per ton. The coarse ore shipped bears two ounces per ton.

Cripple Creek reports say it is proposed to consolidate the Findley G. M. Co. with the Valley City G. M. Co. The Findley company owns the Findley claim, estimated value \$625,000, on Bull hill. The Valley City G. M. Co. owns the Shurtloff No. 2, the Happy Thought and a fraction of the Pauper claim, having a total estimated value of \$625,000. The property adjoins the Findley on Bull hill. The name of the new company will be the Findley Con. M. Co., and its principal office will be in Cripple Creek.

The cyanide mill of the Anaconda mine

on Gold hill, Cripple Creek, is nearing completion. The mill will start with capacity of 100 tons daily. King & Craig have a lease on certain blocks of ground and will also treat the dumps. It is expected to start the mill next week. — Lessee W. J. Merrifield, working the dumps of the Stratton's Independence, Ltd., is putting in another ore washer. Merrifield is shipping from the other dumps. He will put in additional equipment.

#### IDAHO.

##### Elmore County.

F. J. Conroy, at Atlanta, manager of the New Century E. & I. Co., says he is putting in a 50-ton mill. A road was built 16 miles. The ore values are in free gold. It is intended to have the mill in operation by October 1.

##### Idaho County.

W. B. Moore of Walla Walla, Wash., part owner of the Wisdom and Big Dipper mines, adjoining the Sunnyside mine, Thunder mountain, says he will put in a mill.

##### Lemhi County.

H. Harker of Salt Lake City, Utah, manager of the Gold Dust mines at Leesburg, reports the stamp mill completed and in operation.

At the Copper Queen mine near Salmon City, leased by T. and H. Poindexter and T. Haw, the lessees have increased development work and have completed a 5-stamp concentrating mill. The ore is said to assay 9% copper and \$6 gold.

##### Shoshone County.

The Tamarack & Chesapeake M. Co. will ship ore from its mines below the Custer mine, near Wallace, under management of D. H. Brien. The main tunnel is in 1250 feet and showing lead values in carbonates and galena.

The total production of shipping ore and concentrates of the Cœur d'Alene mines for the first six months of 1904, as estimated by the railroads operating in the district, was 114,442 tons, an increase of 15,411 tons over the corresponding period of 1903. The estimate of the mine managers showed a difference, in the estimate of the railroads, of but 247 tons. It is expected the total production for 1904 will reach 245,000 tons.

#### MONTANA.

##### Fergus County.

G. H. Stanton and H. Armstrong, of Great Falls, have a bond and will develop the Handicap mine, adjoining the Barnes-King property at Kendall. A diamond drill will be put to work. A company will be organized for development work and a 100-ton mill will be built.

A 200-ton tank has been added to the Barnes-King mill in Kendall. The Barnes-King group is being prospected with diamond drills.

##### Madison County.

The Conroy Placer M. Co. at Ruby, N. S. Shaler, president, proposes to build a third dredge, to be finished for running next season, equipped with electric motors. Electric power will be obtained from the power plant of the Bismarck-Nugget Gulch Co. near Sheridan, or generated in an engine-driven power plant to be built at Alder. It is thought the third dredge will be constructed on nearly the same plans as dredge No. 2.

#### NEVADA.

##### Elko County.

S. Newhouse of Salt Lake City, Utah, has bought the Greenback mine at Mountain City for \$40,000, and will resume working the silver-bearing lodes. M. M. Johnson for Newhouse has begun work on the Kunz group, which joins the Nelson mine. Johnson has also a bond and option on the Mountain City mine and has begun development with fifteen men.

##### Esmeralda County.

High-grade ore is reported struck in the Sandstorm mine, 1 mile north of Goldfield, owned by T. L. Oddie et al. The Sandstorm is between the Kruger and the Stimler claims and M. J. Gardner is superintendent. A stampede to the district is under way from other Nevada camps.

##### Eureka County.

The West M. Co. of Salt Lake City, Utah, operating iron properties near Palisade, is shipping 130 tons of iron ore daily to the American smelter in Salt Lake valley, where it is used for fluxing purposes. R. Watson of Salt Lake City is superintendent. Output will be increased.

##### Humboldt County.

(Special Correspondence). — The Pine Forest Gold Co., J. H. Ashdown of Denio, Or., president and manager, is developing a group in Humboldt county, about 15 miles south of the Oregon line, south of Denio, Or., and on the west slope of the



Pine Forest range of mountains. The ore is free-milling gold, soft and easily reduced. The veins are in granite and porphyry, the prevailing formation of the district. At a depth of 700 feet they have cut a body of ore which carries satisfactory values. The present plant is of twenty tons capacity, and work is being pushed on the lower crosscut, at the portal of which a 100-ton plant will be erected in the spring. This will give a depth on the dip of the vein of 1100 feet.

The Vicksburg-Denio G. Co. and Kentucky M., M. & Dev. Co. are also operating in the same camp, both of which have promising prospects and surface indications.

Denio, Or., Aug. 29.

Lincoln County.

Manager F. J. Spare, of the Pompeii M. Co., near Searchlight, says ore bodies are being opened up on the second and third levels. Hoisting is done by a whim, but when the present work on the third level is completed a gasoline hoist and a pump will be put in and sinking resumed.

The Cyrus Noble mine at Searchlight has resumed operations. Manager G. E. Otis of Redlands, Cal., says the company will make a practical test of the property before erecting a plant of its own, and with this end in view has secured a lease on the Duplex mill, which will be started this week.

C. McWerthy and J. T. Chiblers of Los Vegas report opening up free gold-bearing quartz on their Moonlight group of claims, 28 miles south of Los Vegas. They have five claims near the Colorado river, 6 miles from Salt Springs, and have water for milling ore, and as soon as the road is completed to Los Vegas will put up a hoist.

Nye County.

Oddie & Overbury, contractors building the water works system for Tonopah, have given a bond to have the water piped to Tonopah and ready for distribution by December 1st. A reservoir will be built at Mount Ararat and the water will come from Rye Patch, 15 miles from Tonopah. The engines will have pumping capacity of 1,000,000 gallons per day.

Manager O. K. Reed of Reveille says he is putting on more men in the Last Chance mine and is opening bodies of lead ore. The wagon road to Tonopah from Reveille is finished, and is 55 miles long. Eight teams are hauling ore to Tonopah at \$15 a ton, and the same rate is paid on back freight.

White Pine County.

It is reported the Eureka & Palisade Railroad, running between Palisade on the line of the Southern Pacific Co. to Eureka, is to be extended to Ely. Surveyors are at work in the field between Eureka and Ely. The work, it is understood, is being done under the direction of the White Pine Co. M. L. Regua president. He is also president of the Eureka & Palisade Co. This is said to be due to the copper company having opened up a body of ore and that the road is to be extended to afford a more economical method of handling the ore. In the event that the line is extended, it will result in opening up other mines.

The Conklin-Kunze holdings in the Dolores Turquoise & G. M. Co. at Ray have been sold to L. G. Wheeler and Chicago, Ill., and Milwaukee, Wis., men. The group comprises six claims adjoining the Ray Con. on the north and east and the Mogul on the southwest. The turquoise discovery was made on the Gold Crown claim at a depth of 10 feet. A number of the gems have been cut. The company also has a ledge 4 feet in width carrying values in gold and silver.

J. A. Black of Salt Lake City, Utah, says he has an option on the Mayflower group, between Cherry Creek and Ely, on which he will begin development this month.—At the Star and Grey Eagle mines at Cherry Creek, owned by the Glasgow & Western Exploration Co., the hoist has been put in operation. The hoist has a capacity for a depth of 1000 feet. J. Farren is superintendent. The mill will be started this month, the product to go to the company's furnaces at Golconda. At the reduction works in Golconda, Manager O. Stalman reports the electrical separators giving satisfactory results.

NEW MEXICO.

Luna County.

Site has been surveyed for the smelter of the Luna Lead Co., near Cooke, and the work of construction will be started this week. W. Clubb of Alma, Mich., will superintend the company's mines in the Cooke Peak district.

San Juan County.

Due to requirements of the low-grade mines of New Mexico and of Arizona for coal and coke at a low price, the Southern Pacific Railway Co. will build a line from

Clifton, Ariz., through the northern part of New Mexico to Durango, Colo. The branch will connect at Clifton with the Arizona & New Mexico Railway, owned by the Southern Pacific. The road will give the coal mines of the southern part of the Territory another outlet to El Paso, Galveston and New Orleans.

OREGON.

Baker County.

East of the Morning Star group in Mormon Basin, near Huntington, is the Summit M. Co., five claims and a mill site on South Dixie creek. The company is composed of Oregon City men, and P. G. Wells is superintendent. Wells says over 600 feet of tunnel work have been completed and a mill will be erected.—The Commercial M. Co., of Portland men, which owns the Commercial group, on the Mormon Basin side of the divide, 1 mile east of the Morning Star, is building a mill, says Manager W. E. King.

The Golden Gate mill, near Huntington, is crushing steadily. The plant is 3 miles down South Dixie creek from the Morning Star, and is owned by R. G. Dunn of Salt Lake City, Utah, and M. Connelly of Mormon Basin.—The Colts Co. will start its mill on the Humboldt group, which adjoins the Tabell property.—The Uncle Sam M. & M. Co., of Michigan, owns nine claims near the Morning Star, and will sink the shaft 300 feet, which is down 85 feet. It will also build a 20-stamp mill, says President J. Newbury.

Sumpter reports say McEwan, Arthur & McEwan, of Sumpter, for the Imperial M. & Dev. Co., composed of Detroit, Mich., men, has a bond and lease on the Imperial mine in Cable Cove district and expect to put in a small concentration plant, besides which ore will be shipped to the smelter. So far 4000 feet of work has been done in the development of the mine, the most important of which consists of a 1200-foot tunnel on the vein, and a new tunnel is to be driven on the vein at a point 400 feet lower. The richest of the galena will be sacked for shipment, while the second class will be piled on the dump to be treated by the new mill as soon as ready.

M. E. Bain, manager of the Overland group of claims in Cable Cove district, near Sumpter, will place 500 feet of air piping in the main tunnel. Ore is being sacked and shipped.

Grant County.

The Badger M. Co. at Susanville is putting ten stamps in its concentrating mill to work ore from the Bull of the Woods, an adjoining mine which it owns. The Bull of the Woods is opened by a shaft 250 feet deep. Ore is also sacked and shipped to the smelter. The company is installing an air compressor plant to be run by the water furnishing power for the mill. A flume and a ditch are nearly completed, which will convey the water 1/2 mile to a point where enough fall will be obtained to run compressor. The air will be piped back to the mine to run hoist and drills.

Jackson County.

Superintendent T. Kahler, at Tolo, says he will superintend prospect work for Ray & Co. on the McDonough place. An ancient channel of Willow creek runs through the land and is said to be payable placer ground. Should there be gold sufficient to justify, Ray will put in a dredger similar to that operated on Foothills creek by Champlain & Co. If there is not sufficient water caught in the basin to float the dredger and wash the gravel in the sluice boxes on the scow, water from Rogue river will be pumped to the basin.

Josephine County.

Grants Pass reports say 4 feet of ore running \$40 per ton is being opened at the Golden Wedge mine of Galice district, owned by G. W. Kirkley of Wilmington, Del., and W. J. Cleland of Philadelphia, Pa. Drifting on the vein is being done at the 300-foot level. A tunnel is being driven to cut the ledge 150 feet below the shaft. They will increase the mill battery to twenty stamps and add other equipment, including an electric lighting and power plant. Water power will generate the electricity and electric drills will be used underground. A sawmill will be built.

At Takilma the smelter is completed and will be blown in this week. The smelter has a capacity of 100 tons of ore per day. Three engines will supply power for the ore crusher, dynamo, blower, elevator, etc., and water for the boilers and for the smelter will be supplied by a 6-inch pipe under 160-foot pressure. Charcoal and coke will be used for fuel. The company is having charcoal burned on its timber land near the smelter. The coke will be hauled from Grants Pass—42 miles—by wagon. These teams will haul out copper matte. Bins at the smelter are filled with ore and 2000 tons are on the dump at the mine. The company expects

to put in a railroad to connect the mine with the smelter, and it is expected that next year a railroad will be built from Grants Pass to Takilma and on to the ocean at Crescent City, Cal. C. L. Tutt of Colorado City, Colo., is president of the United States R. & R. Co., owning the Takilma smelter.

Machinery is being put in at the Hamersley mine, in the Jump-off Joe district, near Grants Pass, including a boiler and 5-stamp mill.—The Albright mines on Rancheria creek, near Kerby, have been bonded to T. F. Hopkins et al. for \$20,000. The ore is of low grade. They intend to put in a mill of 100 stamps.

The Golden Drift M. Co., operating 5 miles from Grants Pass, on the Dry Diggings group, on Rogue river, has put in five 400 H. P. turbines. The power is to be connected with a single shaft and will be used in the operation of a centrifugal pump which has a capacity of 9000 gallons of water per minute under a 430-foot head. The dam is being built to accommodate eleven more of the turbines. There are fifty men employed at the dam. The Golden Drift Co. bought this property from H. A. Corliss three years ago for \$15,000. This year their cleanup was in the neighborhood of \$20,000, and it has never fallen below the purchase price equivalent in either year of operation since.—J. M. Layman, superintendent of the Lewis and Clarke mine on Canyon creek, reports taking out telluride ore.

Manager Kirkley of the Golden Wedge quartz mine, near Merlin, says a reduction plant will be built.

Lane County.

The Great Northern Dev. Co. has been incorporated by W. S. Standish, H. C. Mahon and A. O. Waller, principal place of business at Eugene, to develop the Great Northern mine, in Blue River district. A 2-stamp mill has been in operation on the mine for several months, turning out \$2500 in bullion per month. A Huntington mill will be added to the equipment. Two concentrators will be put in to save the sulphurets, said to assay \$100. An overhead tramway, 1000 feet long, will be built. The mine is bonded to the company for \$50,000.

Marion County.

The Ogle Creek M. Co. has struck a ledge 8 feet wide in its mine on Ogle creek, where it has been sinking shafts and driving tunnels, says J. V. Harless, of Molalla, part owner. Harless et al are also doing development work on Henline creek, a tributary of the Santiam river, 3 miles from Ogle creek. There are no wagon roads to those mining sections, and Harless states they have let contracts to pack in 7000 pounds of supplies and steel.

SOUTH DAKOTA.

Custer County.

The Custer Chronicle reports the Leroy M. Co. will resume work on its mines near Custer.

A 10-stamp mill is being built by the Ruberta M. Co., near Custer, to have cyanide tanks in connection.

Lawrence County.

C. Y. Smith of Lincoln, Neb., president of the Gold Eagle M. Co., says development work has shown ore in both the Archean and Cambrian formations. The principal showing is in the quartzite, which is 30 feet thick and heavily mineralized, carrying gold and silver values. As soon as sufficient ore is blocked out a mill will be built. The company owns eighty-five acres of mineral land adjoining the Penobscot group (Alexander Maitland M. Co.) at Maitland.

The Capital G. M. & M. Co. will develop its group at Texana station, along Deadwood gulch, 5 miles westerly from Deadwood. The openings consist of several tunnels, from which winzes have been sunk. A shaft will be started on one of the principal veins on Middle Fork of Deadwood creek. A whim will be used to depth of 75 feet, when a steam hoist will be put on. The formation is slate and schist cut by porphyry dikes. The Capital holdings are near the Golden Reward and the Horseshoe mines. R. W. McGinnis of Lincoln, Neb., is president, and A. H. Simpson of Deadwood vice-president.

G. L. Allen, of Hamburg, Iowa, president of the Big Four M. Co., is resuming work on the company's mines near Deadwood. The Big Four shaft is 175 feet deep, and it is intended to continue to 500 feet. The shaft is equipped with machinery, taking the place of the plant destroyed by fire last winter.

Crosscutting has started from bottom of shaft of the Minnesota M. Co. at Maitland. The shaft has been sunk to quartzite. The company will build a reduction plant. F. E. Little, of Minneapolis, Minn., is president.

J. G. La Sarre, of Chicago, Ill., is opening up the Lida group of Box Elder creek

near Greenwood, owned by A. W. Coe et al., of Deadwood.

The Star group of mining claims along the Spearfish canyon, near Maurice station, west of Lead, has been sold to the Victoria G. M. Co. There are in the group 100 acres. There are bodies of cyaniding ore, much of which may be mined by quarrying. Last spring the company bought the Spearfish group, consisting of sixty acres. The Victoria G. M. Co. is arranging to build a dry crushing cyanide plant in the Ragged Top country. J. Hartgering, of Deadwood, is interested.

It is reported the Golden Crest M. Co. is preparing to resume operations during September. R. L. Bailie, of Detroit, Mich., is president of the company. The Golden Crest Co. owns a group on Two Bit gulch, 4 miles from Deadwood, and has a 10-stamp wet crushing cyanide plant.

Last week forty tons of tin concentrates were shipped to Wales from the Tinton Tin Co. mine at Tinton, in the Bear Gulch district, being the second shipment from that mine to Wales. One of the largest veins in the Black Hills that carries tin minerals is found in the Tinton group. It is 50 feet in width.

W. E. Fritts of Chicago, Ill., part owner of the Bear Gulch G. M. & M. Co., operating in Bear gulch section, near Tinton, says development work is being increased and ore bodies are being opened. In addition to its gold holdings the company owns the tin properties formerly of the Niagara Tin Co.

Manager E. P. Farnham of the Queen of the Hills G. M. Co., operating 1 mile from Deadwood, says development work will be continued until sufficient ore is blocked to justify building a mill. The company owns water rights which will supply a 100-ton mill.

The Reliance G. M. Co., F. W. Medbery of Deadwood manager, has begun ore shipments and is preparing to build a mill and cyanide plant at its mine.

Pennington County.

The Canton G. M. Co., operating near Hill City, proposes building a mill at its property.

H. Von Gunter of Findlay, Ohio, of the Grand G. M. Co., operating on Burnt Fork creek, near Hill City, reports they suspended operations on the property last month owing to more water than could be bailed. A larger hoist with pumps is to be put in and work will be resumed. The main opening is a shaft 60 feet deep following a ledge of ore with a width of 4 feet.

The Dakota-Calumet C. M. Co. is sinking a shaft on its group near Hill City, for development of its copper veins. The company's 100-ton smelter is completed.

The Empire State M. Co. has unwatered the Golden Slipper mine near Hill City and operations will be resumed. It has been working the Golden Slipper several years, under lease and bond.

UTAH.

Beaver County.

Work is progressing in the Reciprocity mine near Frisco. In the development of the Reciprocity, which adjoins the holdings of the Imperial Co., a tunnel has been driven following a vein. A winze has been sunk and an ore body 8 inches wide opened showing galena with value of \$25 per ton. The Reciprocity group is near the Horn Silver mine.

Box Elder County.

H. R. Ellis of Salt Lake City reports making experimental tests on ores of the Sunrise mine of Park valley, preparatory to mill construction.

Cache County.

La Plata M. Co. reports progress in the development of its group at La Plata near Ogden. A tunnel has been driven 1200 feet and has vertical depth of 900 feet. J. Heid, treasurer of the company, says a mill will be built.

Grand County.

Near Basin, in La Sal mountains, arrangements will be made by the Welsh-Lofftus Rare Metals Co. of Niagara, N. Y., for building a plant in the Grand river, for reduction of the ores of the Welsh-Lofftus uranium-radium mines. J. H. Lofftus, who has charge of the property, has started operations. Copper values are being obtained in the ore. The plant will be located at the new townsite of Radium, where water power is afforded.

—Wolf Bros. of the Skylark Co. are preparing to start systematical operations on the Skylark property, on Mineral mountain, near Basin. With their recent acquisitions of property near the Skylark, they are able to start work whereby they can tunnel into Mineral mountain on one of its largest veins and drift toward the Skylark vein, says E. Wolf, manager.

The American Asphalt Association, near Moab, reports increasing output on its Norville mine, and thirty-four four and six-horse teams are hauling the product to Fruita, over the Utah line in Colo-



rado. The freighters receive \$14 a ton and more teams are being put on.

#### Iron County.

At the Johnny mine at Stateline, Superintendent R. Francis reports opening additional ore bodies. The 10-stamp mill will be started next week, and ten more stamps will be put into the mill. F. Wilson of Salt Lake City is manager.

#### Juab County.

The Mammoth M. Co. at Eureka expects the output for August to reach \$100,000, particularly as reports from the mine show the high-grade ore bodies are increasing, says Superintendent S. McIntyre, Jr. The total operating expenses run from \$10,000 to \$13,000 per month, as 130 men are employed. On the 1900-foot level a body of quartz running 9 ounces in gold per ton is being opened up. On the 800-foot level a donkey hoist has just been set up to facilitate sinking in the lead-silver vein.

The Grand Central M. Co. at Eureka has made preparations to go deeper. The air compressor plant has had its capacity doubled, and the hoisting machinery has been placed in first-class trim. During the period of new development the output of the mine will be decreased, as sinking the shaft will interfere in ore raising.

#### Plata County.

P. W. Madsen of Salt Lake City says at the Trapper's Pride mine on Gold Mountain, near Marysville, he will put more men to work and erect a mill.

#### Salt Lake County.

Work on the mill with which the second-class ore of the Columbus Con. of Alta are to be concentrated is progressing, says Manager C. K. McCormick. It is expected to be in operation September 15.

A second furnace will be added to the equipment of the Yampa smelter at Bingham, which will increase the capacity to 400 tons per day, says Superintendent Craig.

Manager Crowther of the Continental-Alta mines at Alta, says metallurgical experiments on their ores are progressing, and projected mill for their reduction will be completed next season. A tramway between the camp and the valley smelters will also be built.

The Bingham and New Haven Co. has bonded a group of 12 claims covering the southerly portion of the Davis-Gebhardt group near Bingham.

To prepare for transmission of its lead ores at Bingham, the United States M. Co. reports it will build a reversible aerial tramway between the Galena shaft and the receiving station at Old Jordan terminal on the main line, the equipment to span a distance of 1700 feet. At the same time bins to receive the ores will be built at the depot at Bingham, the ores of this class to be handled separately and to be forwarded to the lead-blast furnaces of the smelter that are approaching completion. In operation of the Galena tram the loaded buckets will be made to furnish the required energy, the empties going back as the former go down. The cost of transportation is expected to be reduced to 15 cents per ton. E. E. Allen of Salt Lake City is general superintendent of the United States M. Co.

The Cornish pump in Bingham canyon, near Bingham, by which the Utah C. Co. concentrator is supplied with water, is again in full operation. Of the new battery of vanners, fifteen of the thirty have been set, with the four additional tables being set up. The management is reducing 450 tons of copper, gold and silver-bearing ore daily, says President MacNeill.

The mines of the Ohio C. Co. at Bingham are exceeding the capacity of the mill and will put in additional tables, increasing the battery to eight, says Manager Catrow. The ore is maintaining average of 4% copper, with gold values.

The mill of the Butterfield M. Co. at Bingham is ready for operations, with R. B. Whitmore as superintendent. The management has bodies of milling ore exposed.

#### Summit County.

Pumping is under way at the West Quincy or J. I. C. mine, near Park City, and development work will be resumed, says Superintendent Turner.

The hoisting plant on the Ontario mine, disabled by fire two months ago, has been replaced and was put in operation last week, says Manager Rood. At the Daly mine, also under supervision of Rood, work on the ledge opened up in Mazeppa ground continues.

#### Tooele County.

The Don Pedro mine at Stockton has been sold to W. C. Alexander, J. Dederichs et al. of the Black Diamond M. Co., operating in same camp.

E. J. Kaddatz of Stockton, superintendent of the Honerine mine and mill, says progress is being made in operation at

both mine and mill. The shaft is being sunk from the 800 to the 1000-foot level. In the drain tunnel the water is 2½ feet deep at its face and the flow is 8000 gallons a minute. The mill is treating 300 tons of ore daily.

### WASHINGTON.

#### Ferry County.

The Iron Mountain G. M. Co., says President J. Stack of Republic, is preparing to reopen and develop its property at Republic.

H. B. Dennis and J. Fielding of Spokane have started work on the Meteor mine at Meteor. The hoist, pump and other machinery will be overhauled.—The main tunnel on the Washington Meteor M. Co. ground is being driven, says Superintendent C. Vader.

The Manilla mine, near Keller, will be put in operation this month by J. L. Harper et al. It is reported a consolidation is proposed which will unite two of the largest base-ore properties on the Colville reservation, which will include building a smelting plant at West Fork, where water power is already secured. The Manilla is a copper mine carrying sufficient silver and gold values.

The Syndicate M. & M. Co., D. S. Prescott of Spokane secretary, is increasing development on a group of eleven claims in Meteor camp, in Beulah mining district, west of Daisy, and equipment will be put in. The ores show silver, lead and gold values.

#### Okanogan County.

Mining work is increasing in the Palmer Mountain mining district, around Loomis, says J. Wentworth. The Palmer Mountain Tunnel Co. is excavating and grading for a power plant for the operation of air drills and reduction works. The Copper World Co., which owns the ground on Palmer mountain joining the tunnel company, is also at work, and proposes extensive developments. Work is being done on the Six Eagle mine under the management of J. Haggerty, and the workings are in an ore body. The Copper World Extension is being developed by Ohio men and arrangements made for the erection and equipment of a hoisting plant this season. High-grade ore is being extracted from the Ruby mine. A mill is nearing completion at the Prize mine, at the lower end of Palmer lake. It is a combination of rolls and pulverizer. Arrangements have been made to resume operations on the Night Hawk mine, on the lake opposite the Six Eagle mine.—J. Wentworth is developing the Lone Pine group, north of the properties of the Palmer Mountain Tunnel Co. Developments consist of open cuts and shafts ranging from 20 to 60 feet in depth. The leads carry ores running in gold, silver and copper, the values being \$27 per ton. A crosscut tunnel is being run, which at 200 feet will tap the lead 150 feet below the apex. In development they have opened concentrating ores, besides several shoots carrying sufficient values to warrant shipment.—Machinery for a 10-stamp mill for the Grand View mine is at Riverside, on the Okanogan river. The property is on Palmer lake, opposite the Palmer Mountain Tunnel Co. The ore is free milling gold. The road is being graded from Riverside to the mine, and the millsite is also being graded and the mill is expected to be dropping stamps before winter. A sawmill is being installed near Loomis, which will prove of convenience to the mines. There are prospects of a railroad being built into the district.

After remodeling the plant and changing the process of concentration from dry to wet, the concentrator of the Interstate M. Co., south of Chesaw, was put in operation last week, says Superintendent H. Thompson. The Interstate has let contracts for hauling ores from the Interstate group and the Delate mine to the mill.

Manager Harman of the Ruby mine, on Mount Chapaca, west of Republic, Ferry county, reports increased production of ore carrying silver, lead, copper and gold values. The Ruby Co. will build a mill to treat the ore by electro-chemical process, the main feature of which is said to be the decomposition of ore by electrolysis.

#### Stevens County.

H. Rohwer, of Moline, Ill., part owner of the Double Standard mine near Frontier, says he will increase development, for which equipment will be put in. A 600-foot tunnel, a 150-foot shaft and several crosscut tunnels are driven. The ledge is 22 feet wide and carries gold, copper and silver.

Chevelah reports says the Copper King mine continues shipping ore to the smelter.—D. F. Strobeck, receiver for the Jay Gould mine, is starting development.

#### Whatcom County.

Barron reports state that forest fires have destroyed the stamp mill of the Goat

mine and all of the development improvements on the Whistler mine in Slate Creek district. The property loss is estimated at \$200,000.

### WYOMING.

#### Albany County.

Laramie reports say R. N. Lefe of Pueblo, Colo., president, W. N. McNeel manager and F. A. Twitchell of Canon City, Colo., trustees of the Ideal M. Co., owning a group of claims near Laramie, are preparing to put in \$10,000 worth of mining machinery and \$80,000 worth of machinery to establish a 100-stamp mill, a 500-ton cyanide process, an electric light plant and a sawmill. The company will put men to work developing the properties of the company.

At Douglas the Golden Edge M. & M. Co. will open up its vein with a tunnel, and additional machinery will be put in.—The steam plant for the Evening Star group has been set up on the shaft of the Lucky Penny claim, where a vein carrying values in copper has been cut.

#### Carbon County.

A plant of steam-operated machinery has been put in at the What Cheer, on Dunkard's creek, near Encampment, and mining of copper ore resumed, says Superintendent O. S. Alers. Sinking will continue in the two-compartment shaft.

The discovery of a vein carrying telluride ore is reported made on Billy creek, southeast of Purgatory gulch, 12 miles from Encampment, by J. Wagoner, J. Culleton, L. D. Morrison and C. Forney. The vein is 4 feet in width and fluorite accompanies the telluride. There are no croppings of the lead on the surface, but the vein was uncovered by trenching. To develop the property, consisting of five claims—three on the lead—they have organized the Amethyst G. M. Co.—A tunnel house has been built on El Rey mine, in Purgatory gulch, where the tunnel is exploring the strike made last month. The tunnel is in 60 feet and is being driven on the vein.—The King of the Camp tunnel, in 700 feet, is thought to be near the main vein for which the tunnel was started. In driving 700 feet the King tunnel has cut six leads, showing quartz and iron, the last two leads cut being free milling gold propositions. The other leads show sulphide ore, carrying gold.

### FOREIGN.

#### BRITISH COLUMBIA.

W. F. Robertson, Provincial Mineralogist, has issued figures giving approximate mineral production for British Columbia for the first six months of 1904. An increase is shown over same period of 1903, particularly in silver-lead ores. The Dominion lead bounty is assisting that class of mines. By districts, the following figures are given:

District.	Tons.	Gold. Ozs.	Silver. Ozs.
Rossland.....	183,111	78,487	127,689
Boundary.....	399,119	27,752	182,372
Nelson.....	40,000	11,000	105,000
Slocan.....	8,000	.....	968,000
Ainsworth.....	13,000	.....	120,000
East Kootenay.....	16,000	50	150,000
Coast.....	30,000	3,600	84,000
Miscellaneous.....	8,000	2,500	300,000
Totals.....	697,230	123,339	2,037,061

Total production for 12 months of 1903.....1,286,176 232,831 2,996,204

District.	Copper. Lbs.	Lead. Lbs.
Rossland.....	4,377,900	.....
Boundary.....	10,307,966	.....
Nelson.....	120,000	700,000
Slocan.....	.....	5,000,000
Ainsworth.....	.....	5,000,000
East Kootenay.....	8,000	4,000,000
Coast.....	2,700,000	.....
Miscellaneous.....	5,000	800,000
Totals.....	17,513,886	16,500,000

Total production for 12 months of 1903.....34,359,921 18,089,283

The production from Rossland district was as follows:

Mine.	Tons.
Le Roi.....	88,250
Center Star.....	35,900
War Eagle.....	27,676
Le Roi No. 2.....	20,870
Kootenay.....	3,784
Jumbo.....	4,745
L. X. L.....	682
White Bear.....	905
Spitzee.....	720
Iron Mask.....	70
Total.....	183,111

The principal shipping mines in the Boundary were:

Granby Co.	Tons.
Mother Lode.....	87,986
Emma.....	15,054
Senator.....	1,750
Oro Denoro.....	13,313
Athelstan.....	2,955
Providence.....	436
Elkhorn.....	285
Others.....	400
Total.....	399,119

The Slocan district output reached 8000 tons for the six months, while tonnage for entire year 1903 was 12,412.

#### Boundary District.

There are 1000 men employed in the mines and smelters of the Boundary district.

H. H. Bishop of Chicago, Ill., part owner of the Hesperus G. M. Co., Ltd., owning the Betts & Hesperus group on Hardy mountain, 4 miles from the Granby smelter at Grand Forks, says development work will be started as soon as a compressor plant is installed. He will work thirty men. C. J. McGee of Chicago, Ill., is president of the company. Bishop says they will spend \$40,000 for a plant and for development.

#### Cariboo District.

At the Rambler-Cariboo mine at Kaslo President A. F. McClaine of Tacoma, Wash., says they are only working the upper 300 feet of the mine because of water. Men are driving a 4300-foot tunnel to tap the 1400-foot level and drain the upper levels. It is a silver-lead property.

#### East Kootenay District.

As a result of work on the Kootenay Central Railway, the owners of the Chickamun Stone mine will resume development. The mine is on Bull river, near Fort Steele. The Chickamun Stone M. Co. is incorporated by Spokane, Wash., men. Ore shipments will resume.

#### Rossland District.

Mining operations are under way at the Homestake and Gold King properties, near Rossland, says T. S. Gilmour, secretary of the companies. The Gold King is south of and adjoining the Jumbo mine. Both will be equipped.—It is expected the owners of the High Ore Co. will start work on their mine, which adjoins the Jumbo to the west.

#### Slocan District.

Work will be resumed on the new shaft at the Last Chance mine, near Sandon.—The Payne mine's aerial tram from the mill to the C. P. R. is being remodeled.—McLeod & Thompson have taken up the bond on the Mountain Con. and have sixteen men at work. Assays show silver and lead values. It is intended to drive a tunnel to reach the lead.

#### West Kootenay District.

A. J. G. Sweeney, manager of the Great Western mines, says by Oct. 1st the Five Mile mill at Five Mile, near Trout Lake, will be turning out 2000 ounces of silver per day.

### BRITISH GUIANA.

The Custom House at Georgetown reports exports from January 1 to July 12 were:

	Gold. Ozs.	dwt.	grs.	
1904.....	39,248	11	17	at \$690,354 83
1903.....	44,248	16	17	at 771,646 13
DIAMONDS.				
1904.....	5,011½	carats;	value \$40,951 77	
1903.....	4,306½	.....	36,458 69	

### CANADA.

#### Yukon Territory.

Material for the cyanide plant to be built at the Violet mines, near Dawson City, has arrived, says the Yukon World. The equipment includes redwood tanks and forty iron vats for zinc shavings. The air compressor and drills for the Violet are being put in at the mine. The plant is going up under the supervision of B. S. Revett.

### MEXICO.

#### Agua Calientes.

Agua Calientes reports say the two additional furnaces of the smelter of the American S. & R. Co. will be blown in this week. About 200 carloads of ore arrive at the smelter daily. Copper matte is said to have almost superseded lead smelting there. Copper ores are shipped to the plant from as far away as Sonora, the ores being freighted in bond through the United States via El Paso, Texas.

#### Chihuahua.

At Parral the Rayo mine, near the Adela, owned by Johnson, Crowell & Peterson, is said to be opening a ledge with 3 feet of three ounce gold ore. A survey is being made for the wagon road from Parral to the camp of Guadalupe-y-Calvo, the cost to be divided between the Federal government, the State of Chihuahua and the citizens of the camp. The owners of the Pinos Altos mines are preparing to increase the reduction plant from 60 to 250 tons and put in a cyanide plant.

R. S. Towne reports satisfactory results in the magnetic zinc separation at the mill of the Montezuma Lead Co., the sub-company of the Mexican Metallurgical Co., at Santa Barbara.

P. Ginther, manager of the Encinillas Mines, Ltd. of Santa Rosalia, owning mines and smelter at that place, says the company will buy ores and the 100-ton smelter will be started up as a custom plant.

G. E. Voorhees, Jr., of Santa Barbara,



Cal., has paid the balance of \$85,000 gold on the Las Vegas copper mine, near Coyame, in eastern Chihuahua. Development work continues under Superintendent C. P. Halter. Reports from the mine say bodies of high-grade copper ore are being developed.

A copper property is being taken up west of Santa Barbara by T. M. Hecker et al., who have formed a company in Butte, Mont., for development.—W. K. Ryan of Denver, Colo., has bought 160 pertenencias in Santa Eulalia, covering La Isla, La Iba and El Continente mines.

**Colima.**

(Special Correspondence).—The Cerro Grande Lumber Co. of Chicago, Ill., capital \$1,500,000 gold, will build a railroad 11 miles in length to connect the tract which the company proposes to exploit and the road from Colima to Manzanillo. A bridge will be built across the San Pedro river. The tract lies in the States of Jalisco and Colima, and the timber is estimated to include 360,000,000 feet of oak. W. T. Thornton, former Governor of New Mexico, now of Guadalajara, Jalisco, is president.

Guadalajara, Aug. 19.

**Durango.**

The Penoles Co. of Mapimi is said to have struck 45% lead ore, with gold values, on the Chona vein, which is dipping into ground owned by Monterey people, and on which the latter are preparing to sink a shaft.—The Vivasilas of San Dimas has been sold, says L. M. Raines, to Chicago, Ill., and Cleveland, O., men, for \$500,000 gold.—J. A. Coram of Boston, Mass., has bought a group of mines in Guanacavi, known as the Nueva Australia, Soto and Nuevo Porvenir, containing 150 pertenencias, for \$1,000,000 gold.

It is reported the 100-ton smelter of the Amazon G. M. Co., at Chacala, has been blown in. At the Animas mines of Laveaga Brothers & V. Gomez, the old pan amalgamation plant is being replaced by a 30-ton cyanide plant.

**Guerrero.**

(Special Correspondence).—In La Union district Carrizal parties are preparing to take over the gold property of C. Ruiz at Barranca Hondo. The ore is being worked by arrastras.—Americans have been taking out pay in the placers near Aquino.—J. Luna has been granted an exploration concession covering the Arroya de la Barranca Blanca.

At Los Posos, in the Arroya de la Barranca Blanca, and along the Rio de la Chuta, native gambucinos in the placers are taking out an adarme (1.8 grams) of gold to the man per day. At Los Posos the gold is coarse and associated with white quartz. Flour or float gold is not found.

La Union, Aug. 26.

**Jalisco.**

(Special Correspondence).—Arrangements are made to invest \$300,000 in a water power plant on the Tuxpan river, in the southern part of the State. A concession is given Odilon Villanueva of Hacienda Esperanza; Enrique Schondube and Carlos Landero y Cos, electrical engineers of the City of Mexico, are interested in the plans. The electric current generated will be transmitted to towns, sugar mills and mines in that section of Jalisco.

Guadalajara, Aug. 19.

(Special Correspondence).—The Bautista M. Co., operating three mines near Ayutla, will put in a concentrating plant. Bryant McLellan is manager, address Ameca, Jalisco.

Ayutla, Aug. 24.

Guadalajara reports say the company which holds the Perez concession, which permits of utilization of water power from the Santiago river, proposes to transmit electricity to Aguas Calientes, a distance of 110 miles. The length of river covered by the franchise is 30 miles. The available fall is 670 feet. It is estimated that 30,000 H. P. can be developed. W. A. Rogers of New York is part owner of the concession, and J. M. Garcia, L. Lepetich and L. de Vasquez of Guadalajara are interested.

**Michoacan.**

(Special Correspondence).—An electric plant will be put in at the Inguaran copper mines. Surveys are being made for a railroad to connect the mines with the Uruapan branch of the National Railroad of Mexico.

Inguaran, Aug. 19.

(Special Correspondence).—In Arrio district, owing to strikes of ore in the mines of the Carrizal G. M. Co., the number of men at work in the mines is being increased. A whim has been placed at the mouth of the Bella Vista shaft and the mill will be run on ores from that working. In the main shaft of the Fortuna No. 1, and the crosscut of the Fortuna No. 6, development work will be increased. The mill tailings are being tested as to their availability for cyaniding. The daily clean-up at the mill averages about a pound of gold.

Carrizal, Aug. 26.

At the Maria Louisa mine on the Tacambaro river, the Maria Louisa y Anexas M. Co., with offices in Mexico City, will build a reduction plant.

**Sinaloa.**

(Special Correspondence).—Several carloads of American machinery are being shipped from the Pacific port of Altata to San Fernando, for the San Fernando M. Co. C. W. Pritchett is general manager. The machinery is for the enlargement and improvement of the reduction works at the mines.

A power plant is to be installed on the Plaxtla river by the Guadalupe de los Reyes M. Co. for operating machinery at the mines of the company, and for the town of San Ignacio for lighting and power.

Altata, Aug. 20.

(Special Correspondence).—At the Dura mine, Cosala district, considerable American machinery is to be installed, including a concentrating plant. The mine is the property of Francisco Aragon of Cosala.

Cosala, Aug. 21.

(Special Correspondence).—Harold Miller, secretary of the Occidental Construction Co., is securing right of way for the railroad between Mazatlan and Culiacan, capital of the State. The government of Sinaloa will aid the enterprise.

Culiacan, Aug. 24.

(Special Correspondence).—The Mexican Government proposes to give the Pacific port of Mazatlan a system of water works and sewers. The contract will probably go to Colonel E. K. Smoot, the contractor in charge of the harbor improvements at Manzanillo. Colonel Smoot has offered to do the work for \$1,800,000, Mexican money.

Manzanillo, Aug. 25.

**Sonora.**

It is reported J. C. Bothin of Mexico City will build a salt refinery at Guaymas. He has a government concession for use of machinery for making high-grade salt. He has a lease on Carmen Island on the Pacific coast, with its salt lake, and also a concession for a salt deposit 3½ miles east of Guaymas, near the Sonora railroad. La Providencia is another deposit on the coast of the Altar district which he proposes to exploit.

R. A. Huron, superintendent of the Cochise mine, being opened up by New York men, says machinery and other equipment will be put in.

**Zacatecas.**

(Special Correspondence).—The 50-stamp mill at Mesquite del Oro has been remodeled and will treat 100 tons of ore daily. The mines are owned by an English syndicate, the Mesquite Gold Mines, Ltd. Maurice Cockerill is the general manager. It is estimated that the ore will return a net profit of \$5 per ton.

Mesquite, Aug. 20.

**PHILIPPINE ISLANDS.**

(Special Correspondence).—The Orion M. Co. has ordered a 10-stamp mill which will be erected at its mines on the Island of Masbate, Gillibatin river, 20 miles from the City of Masbate. The ore is low grade and free milling. Water power will run the mill.

The Masbate Placer Co. is preparing to put in a bucket dredger for the placer claims on the Gillibatin river near Masbate. It will have 3000 cubic yards daily capacity.

Masbate, July 20.

(Special Correspondence).—Manila men have organized a company to develop the coal mines on the Island of Mindora. The vein is 6 feet wide. There are 125 men at work developing. J. Kelly is preparing to put in two 3-stamp batteries for his cyanide plant at Antinook, Benguet Province. The ore is base, but high grade, assaying \$36, and the ledge is 3 feet to 10 feet wide. A 375-foot tunnel has been driven.

A small but high-grade body of coal has been struck on the Benguet road, under construction by the Government.

A. Clark is preparing to put in a 10-stamp mill for his mines in Benguet Province, at Antinook.

The Philippine G. M. Co. mill has been shipped from Manila to its mines in Benguet Province, being the first stamp mill in the islands since the war. There were two before the war, but were destroyed. The mining laws are unsatisfactory, but, it is hoped, will be amended soon. They allow an individual or company to own only one claim on the same ledge. Also the high duties on mining machinery are detrimental to the development and operation of mining property.

Banguio, Benguet Province, July 20.

**Personal.**

N. YOUNGBERG is now with the Butterfield M. Co. at Bingham, Utah.

M. McDONALD is manager of the Guanajuato M. Co. at Guanajuato, Mex.

ROSCOE CHANNING is manager of the Utah C. Co., operating at Bingham, Utah.

F. SUSTERSE is manager of the Amparo M. Co., at Etzatlan, Jalisco, Mexico.

J. T. BEEN is chief mining engineer for the Tamarack M. Co., at Calumet, Mich.

R. B. LAMB has returned to Rowena, Boulder county, Colo., from St. Louis, Mo.

C. A. WECK is at Yerington, Nev., on mining examinations from Jamestown, Cal.

T. BRENNAN has resigned as manager of the Della Mountain M. Co., at Hailey, Idaho.

A. L. MORRIS, formerly of Salt Lake City, Utah, is operating mines at Grants Pass, Or.

C. TIMMONS has returned to Los Angeles, Cal., from an examination of mines in Mexico.

T. MILAN of Laredo, Tex., is president of the Vera Cruz & Pacific Railway Co. of Mexico.

R. B. WHITMORE is mill superintendent of the Butterfield M. Co., at Bingham, Utah.

J. R. WILLIAMS of Guanajuato, Mexico, has returned from mining business in Chicago, Ill.

T. KAHLER is superintending dredging operations for Ray & Co., at Tolo, Jackson county, Or.

J. F. KELLEY is superintendent of the West Gold Hill M. & M. Co. mines, at Gunnison, Colo.

P. M. MCCREA is underground superintendent for the Utah-Apex mines at Bingham, Utah.

G. H. CLEVINGER has resigned as mill superintendent of the Horseshoe M. Co., near Deadwood, S. D.

F. G. FRINK is assistant professor of civil engineering in the University of Illinois, at Champaign, Ill.

T. CARROLL of Grass Valley, Cal., is superintendent of the Eureka drift mines in Nevada county, Cal.

P. L. WILLIAMS, JR., superintendent of the Highland Boy mine at Bingham, Utah, is in St. Louis, Mo.

J. M. HILLYER is investigating the iron deposits near the mouth of the Rio Balsas, State of Guerrero, Mexico.

I. E. ROCKWELL is manager of the Della Mountain M. Co., at Hailey, Idaho, vice T. Brennan, resigned.

BERNARD MACDONALD of Spokane, Wash., is at Guanajuato, Mex., where he is erecting a cyanide plant.

L. C. DOTY, formerly superintendent of the mines of the Giroux M. Co. at Ely, Nev., is in Salt Lake City, Utah.

J. W. PROUT, JR., is engineer and metallurgist for the Old Mowry mine in Harshaw district, near Nogales, Ariz.

P. O. WELES is assistant superintendent of the Lake Superior copper smelter at Dollar Bay, Houghton county, Mich.

F. W. MEDBERY of Deadwood, S. D., is secretary and manager of the Reliance G. M. Co., operating in the Black Hills.

J. B. COATS of Atlantic City, Iowa, president of the Oxbow M. Co., is at the company's mine, near Idaho City, Idaho.

W. JENKINS, superintendent of the Home C. Co., returned to Tucson, Ariz., last week from an Eastern business trip.

C. S. ROBINSON, a mine owner of Chihuahua, Mex., has returned to Chihuahua City from Denver, Colo., on mining business.

H. ROHWER of Moline, Ill., is in Rossland, B. C., in the interests of the Eureka, Good Enough and Standard mining companies.

SUPERINTENDENT TURNER, of the West Quincy (J. I. C.) mine at Park City, Utah, has returned there from a European trip.

J. S. STONE, C. E., of the American Bridge Co.'s Chicago, Ill., office, has been transferred to the Toledo, Ohio, office of the company.

G. B. MANSON has been appointed as assistant instructor in mechanical drawing at the Colorado School of Mines, Golden, Colo.

R. E. COLEMAN of Salt Lake City, Utah, part owner of the Lluvia de Oro mine in Urique district, Chihuahua, Mex., is at the mine.

P. SHEAN has resigned as superintendent of the Johnny M. Co. of Stateline, Utah, and has gone to the Groom mines, near Pioche, Nev.

W. W. VAN BAUN of Philadelphia, Pa., of the Granby M. S. & P. Co. at Phoenix, B. C., is examining mining interests in British Columbia.

W. H. BRAY, formerly superintendent and manager of the Posey mine of Nevada City, Cal., will make Reno, Nev., his headquarters hereafter.

W. F. SNYDER, president and manager of the Western Exploration Co., returned last week to Salt Lake City, Utah, from an extended Eastern visit.

P. GINTHER, manager of the Encinillas Mines, Ltd., of Santa Rosalia, Chihuahua, Mex., has returned from London, Eng., on company business.

W. CLUBB, of Alma, Mich., has gone to Cooke, Luna county, N. Mex., as superintendent of the mines of the Luna Lead Co., in Cooke Peak district.

G. E. NELSON, O. STRANDBURG AND C. FORSGREN, interested in the Empire G. M. Co., La Plata, Colo., have returned from there to Jamestown, N. Y.

J. K. TURNER, formerly of the Copper Hill M. Co., near Rinconada, N. M., is manager of the San Cristobal C. Co., near Arroyo Seco, Taos county, N. M.

S. S. RAYMOND, formerly with the Copper King S. Co., in California, is smelter superintendent of the North American C. Co., at Grand Encampment, Wyo.

C. HAMBUECHEN, recently of the University of Wisconsin, engaged in electrochemical researches, is with the Pittsburgh Reduction Co. at East St. Louis, Ill.

J. GROSS, recently with the Alexander Maitland M. Co., at Maitland, S. D., is mill superintendent of the Horseshoe M. Co., near Deadwood, vice G. H. Clevinger, resigned.

L. P. HAMMOND, late Denver manager of the Crocker-Wheeler Co., assumes charge of the sales agency department of the Denver Engineering Works Co., Denver, Colo.

R. E. WARRINER has resigned the general managership of the Bonanza, Ltd., Johannesburg, South Africa, and taken charge in a similar capacity at the French Rand G. M. Co.

H. S. EMLAW, for several years manager of the Steamboat mine, at Park City, Utah, has accepted a position with the McCune mining interests, near Cerro de Pasco, Peru.

KARL KRUG, superintendent of the Lava Beds Dredging Co., has been put in charge of dredging operations for the New York & California Dredging Co. also, 6 miles from Oroville, Cal.

ERNEST W. CLARKE, C. E., of New York City, N. Y., has been appointed by the Panama Canal Commission as engineer in charge of the sewerage and water works to be built at Colon, Panama.

H. HAWGOOD, recently chief engineer of the San Pedro, Los Angeles & Salt Lake R. R. Co., is now consulting engineer for the same company, with offices at Salt Lake City, Utah, and Los Angeles, Cal.

E. W. DUFFEE, superintendent of the Sedalia C. Co., at Salida, Colo., is in San Francisco, Cal., from an examination of Tuolumne county mines for Detroit, Mich., men, and will return to Colorado next week.

W. H. CLARK of Salt Lake City, Utah, treasurer of the Trade Dollar Extension M. Co., is at Silver City, Idaho, superintending operations at the Trade Dollar Extension mine during the absence of Superintendent F. G. Clark.

W. R. WHITNEY has resigned as professor of theoretical chemistry at the Massachusetts Institute of Technology at Boston, Mass., to take charge of the research laboratories of the General Electric Co. at Schenectady, N. Y.

B. E. JAMES has resigned as mill superintendent and metallurgist for the Athabasca-Venus group of mines, near Nelson, B. C., and has gone to Papasquairo, Durango, Mexico, to take a similar position with the Papanton G. M. Co. His former position has been assumed by J. S. Colbath.

H. M. PFLAGER has resigned from the American Steel Foundries to go with the Commonwealth Steel Co., of which company he was elected vice-president at the last meeting. He will have charge of the sales department of the Commonwealth



Steel Co.'s offices, Bank of Commerce Building, St. Louis, Mo.

JAMES ANNAND, for a number of years with the Tomboy mill near Telluride, Colo., left Denver last week on his way to Obuassi, via Sekondi Gold Coast Colony, West Africa, to have charge of the Ashanti Goldfields Corporation, Ltd., mill. Mr. Annand has been with this company the past year and has been spending his vacation in the United States the past few months.

## Obituary.

C. A. ROUSSAN, a pioneer mining man of Alleghany, Sierra county, Cal., died at Alleghany, Aug. 22d.

W. W. MORRIS, principal owner in the Montana-Tonopah mine, of Tonopah, Nev., died in a mine at Reveille, Nev., August 21st, while inspecting the property.

ROBERT PARROTT, discoverer of the Parrott mine at Butte, Mont., died at Des Moines, Ia., August 26th, at the age of 75 years. As a young man Parrott went West, and while prospecting discovered the Parrott copper mine which he later sold to Marcus Daly.

J. W. BEST of Denver, Colo., manager and treasurer of the Northern C. & C. Co., died at Denver August 20th. Deceased was born at Central City, Colo., April, 1875, and was a graduate of the Sheffield Scientific School, Yale University. From 1899 to 1901 he was assistant geologist for the Colorado F. & I. Co.

## Commercial Paragraphs.

THE Mine & Smelter Supply Co., of Denver, Salt Lake and Mexico, has an order from the Southwestern Smelting & Refining Co., for a 200-ton sampling plant at Benson, Arizona.

THE Chilean government has placed a large order for equipment with the Ingersoll-Sergeant Drill Co., including a large Corliss compound compressor and a full complement of pneumatic tools for one of its largest ship yards.

THE Homestake M. Co., Lead, S. Dakota, after having a thorough trial extending over a period of nearly a year, have placed an order with the Stromberg-Carlson Telephone Manufacturing Co., of Chicago, for a number of telephones.

## Books Received.

"The Industrial and Artistic Technology of Paint and Varnish" is the title of a handsome volume by Alvah Horton Sabin, M. S. The book gives the history of varnish and of the various paints, and enters largely into the ingredients, manner of preparing and using these decorative substances. It not only treats of house paints, for both exterior and interior, of furniture polishing, etc., but finds for it and describes many other important industrial uses for paints, etc. A chapter is devoted to painting pipes, structural iron and other objects subjected to corrosive influences. Painting ships' bottoms is another interesting subject. It is handsomely illustrated; 372+VI pages; cloth, \$3. John Wiley & Sons, New York; Chapman & Hall, London.

## Trade Treatises.

In cardinal red, comes finely illustrated description of the machines made by the Gisholt Machine Co., Madison, Wis.

The catalogue of the Lane slow speed roller quartz mill, Los Angeles, Cal., illustrates and describes that device in detail.

Bulletin L607 from the Laidlaw-Dunn-Gordon Co., Cincinnati, O., is devoted to the Meyer gear pumping engines; cross-compound, triplex-compound, fork frames and rolling mill frames.

"The Book of the Four Powers," a sumptuous treatise from the Allis-Chalmers Co., portrays in all the perfection of typography the scope of that company's manufactures, embracing motive power devices actuated by steam, gas, water or electricity. It deserves a place on the reference desk of every mining engineer.

## Latest Market Reports.

SAN FRANCISCO, September 2, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 57c, refined (1000 fine); San Francisco, 57c; Mexican dollars, 47½c San Francisco, 45½c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.75; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £57 6s 3d spot per ton.

Copper shows a little sign of strengthening price. As the consumption is fully up to the production, if not exceeding it, the present price is likely to be maintained, if it goes no higher.

The following United States copper exports for first six months of 1904 compared with 1903 are in long tons. Values in matte and ore exported are reduced to fine copper:

	1904.	1903.
January.....	29,085	10,478
February.....	17,073	8,985
March.....	23,852	12,941
April.....	13,983	12,670
May.....	14,772	9,207
June.....	16,279	8,606
July.....	10,688	8,405
August.....	10,688	10,688
September.....	13,000	13,000
October.....	14,597	14,597
November.....	15,887	15,887
December.....	15,887	15,887
Totals.....	114,044	138,495

LEAD.—New York, \$4.30; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 12s 6d per long ton.

SPELTER.—New York, \$5.12½; St. Louis, \$5.00; London, £22 16s 3d per ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$27.10@27.30; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, 30c @ 32½c. London, £123 17s 6d spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, 3½c; 50c; dust, 3½c; sulphate, 3½c, .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.85 @13.20; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c per lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, 3c per lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, 4c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

WIRE.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for car-load lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton,

11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg. CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chloride of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, 3½c; 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

MOLYBDENUM.—Best, \$2.00 per lb.

CHROMIUM.—90% and over, 80c per lb.

PHOSPHORUS.—American, 70c per lb.

SILVER.—Chloride, 3½ oz., 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride, 77c per lb.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—3½c per lb.

SODIUM.—Metal, 3½c per lb.

BISMUTH.—Subnitrate, 3½c per lb.

URANIUM.—Oxide, 3½c per lb.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING AUGUST 23, 1904.

- 768,267.—DISK HARROW—G. H. Adams, Phoenix, Ariz.
- 768,167.—COLLAR BUTTON—L. Blake, S. F.
- 768,420.—CARD CASE—W. S. Brackley, Oakland, Cal.
- 768,509.—COIN CONTROLLED APPARATUS—A. F. Bradshaw, Bieber, Cal.
- 768,519.—BOX LID SUPPORT—A. E. Cox, Ashland, Or.
- 768,122.—LAMP BRACKET—E. D. Hamilton, Vancouver, Wash.
- 768,393.—CLOTHES RACK—J. H. Harrell, Seattle, Wash.
- 768,280.—OIL BURNER—Hitchings & Ellsworth, Corralitos, Cal.
- 768,366.—SURFACING MACHINE—N. Hughes, Portland, Or.
- 768,367.—OIL BURNER—Hunt & Mirk, S. F.
- 768,368.—OIL BURNER—Hunt & Mirk, S. F.
- 768,369.—GAS WASHER—Hunt & Mirk, S. F.
- 768,185.—TELEPHONE—J. W. Kutz, S. F.
- 768,471.—HARVESTER—L. B. Mack, Walla Walla, Wash.
- 768,472.—THRESHER—L. B. Mack, Walla Walla, Wash.
- 768,292.—ANIMAL TRAP—G. J. Miller, Walla Walla, Wash.
- 768,473.—STOOL—P. Nash, Salem, Or.
- 768,139.—CONVERTING MOTION—E. C. Northrup, Riverside, Cal.
- 768,474.—ELECTRIC LAMP—D. O'Brien, S. F.
- 768,463.—COPY HOLDER—J. L. Rivers, Seattle, Wash.
- 768,155.—OIL BURNER—T. Simon, S. F.
- 768,156.—TIE PLATE—J. Snider, Buckley, Wash.
- 768,164.—MATCH SCRATCHER—C. R. Wilson, Bossburg, Wash.

THAT INCESSANT SPRAYING and dripping of water and oil from the exhaust pipe, which rots, rusts and does other damage to roofs and walls, CAN BE STOPPED BY THE



## BURT Exhaust Head.

It is the most perfect head made. Sent anywhere on approval.

"The Burt Exhaust Head have fully come up to our expectations; these expectations were very high."—S. E. Selma (Ala.) Water Co.

THE BURT MFG. CO., Largest Manufacturers of Oil Filters in the World, 221 Main St., Akron, Ohio, U. S. A. Supplied also by Engine Builders, Dealers and Power Contractors.

## ASSESSMENT NOTICES.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of August, 1904, an assessment (No. 39) of five (5) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 207 Battery street, Room 15, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 31st day of September, 1904, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 31st day of October, 1904, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
CHAS. BOVONE, Secretary.  
Office—207 Battery street, Room 15, San Francisco, California.

ORLEANS CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of August, 1904, an assessment (No. 2) of seven and a half (7½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 10, No. 324 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of September, 1904, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 31st day of October, 1904, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

By order of the Board of Directors.  
GEO. P. THURSTON, Secretary.  
Office—Room 10, No. 324 Pine street, San Francisco, California.

## AUCTION SALE

—OF THE—

200-Ton Capacity Cyaniding Mill, Machinery and Property

—OF THE—

REPUBLIC POWER & CYANIDING CO.,  
At REPUBLIC, WASH.

OCTOBER 8, 1904, AT 10 O'CLOCK A. M.

—CONSISTING OF—

1—No. 5 Style "D" Gates Crusher; Revolving Trommel; Gates High Grade Rolls size 15x36; 1—Style "H" Gates Crusher; 3—Brunton Automatic Samplers; Roll Crushers; Sample Hopper; 2—Revolving Dryers 8 ft. x 26 ft.; Hexagonal Screens 8 ft. x 48 in.; Jeffrey Columns; 2—Columbian Corliss Light Dynamometers; Elevators; 1—Columbian Corliss Engine made by Lane & Bodley Co., cylinder 18" dia. x 42" stroke, weighs about 13,800 lbs.; 1—Corliss Engine 14" cylinder, 36" stroke; 2—Small Engines; necessary shafting, pulleys and bearings for complete equipment of any plant using any or all of this machinery. Blacksmith Shop and Machine Shop Machinery and Appliances Lathes, etc. Assay Furnaces, Balances, Assay and Laboratory Supplies, Stores and Supplies including Pipe and Fittings, Belting, Tools, Electric Supplies, Packing, Oils, Chemicals, Crucibles, Hardware, Crusher and Roaster Parts, Iron, Steel, etc.

The Lands and Buildings of the Company including Five Patented Mineral Claims. The Granite Creek Water Rights, Ditches and Flumes. 28,217 shares of stock in the Tuesday Development Co.

The above named Machinery and Property will be offered for sale in parcels to suit purchasers.

For further particulars, write

W. J. C. WAKEFIELD, Master in Chancery,  
Spokane, Wash.

or, W. G. C. LANSKAIL, Trustee,  
Republic, Wash.



# MINING AND SCIENTIFIC PRESS

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SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 10, 1904.

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## Mines and Works of Cananea, Mexico.

Cananea is over the international boundary in the State of Sonora, Mexico, about 45 miles southwest-erly from Bisbee, Arizona. The mines are developed in limestone, quartzite and porphyry, and the devel-opment of the district proves these ore deposits to be very extensive and valuable. The district is con-nected by railroad with the Southern Pacific at Dem-ing and Benson. The mines are situated in the Cananea mountains, a range about 25 miles in length and 6 to 10 miles wide. The rocks of the region are limestones, both normal and altered, quartzite, quartz-porphyry, granite and a variety of lavas—rhyolites, andesites, etc.

The copper ores are confined chiefly to the porphyries and silicified limestones. They are chalcopryite and copper glance, malachite, red oxide (cuprite), etc., and metallic copper. The ore bodies occur in irregular masses, as beds following certain bedding planes, and to some extent in fissures, resem-bling somewhat those of the Bisbee district, Arizona. The outcropping ore bodies have been oxidized and weathered to great outcrops of iron gossan contain-ing little copper. Some of the porphyry has been altered to a soft, clayey rock throughout which is scattered crystals of copper glance and chalcopryite. Some of the ore bodies are of large size—over 100 feet in width and 300 feet long.

The ores of the several mines, which are scattered over a wide area, vary greatly in character. The greater bulk of the ore is quartzose, occurring in siliceous limestone, in quartzite, and in quartz-porphyry. In some of the mines the gangue is calcite and garnet, the silica being relatively low. Some ore bodies carry considerable gold and silver, others are low grade in the precious metals. The copper contents range in large amounts, from about 2% to 15% and over. In addition to the standard-gauge railroad connecting with the Southern Pacific rail-road, the company has built about 12 miles of narrow-gauge tramway connecting the various mines with the concentration works and smelter.

The mines are in the Ronquillo district, and the general offices, etc., are located there. (See accom-panying engraving.) Another engraving shows the large concentrating plants, and a third shows the smelting plant, with the brick dust chambers, steel stacks, etc. The old concentrator is built in two divisions, each having a capacity of 300 tons per twenty-four hours. It is equipped with several sets of rolls of various make, trommels, jigs, tables, van-ners, slimers, etc., with rotary mills for regrinding.



Cananea Con. Power House and Dust Chamber, Cananea, Mex.



Ronquillo (Old Cananea), Mex; Smelter and Works of the Cananea Con. Copper Co.

The concentration is effected by water in the usual manner. In the ore manipulation in this concentra-tor about 2000 gallons of water are used per ton of ore. The new concentrator is situated near the old one and has four times the capacity of the latter. The new concentrator is said to be one of the best arranged in the West for treating the miscellaneous ores of this district.

The smelter building has a steel frame, with side<sup>s</sup> and roof of corrugated iron. The furnaces are all of the water-jacketed type, the largest being 42x210 inches at the tuyeres. The former losses in flue dust were very large, but these have been greatly reduced by the large brick dust chamber shown in the engraving, and also by other devices between the smelters and this large chamber.



The Concentrators of the Cananea Con. Copper Co., Cananea, Mex.



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J. F. HALLORAN.....Publisher

SAN FRANCISCO, SEPTEMBER 10, 1904.

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IT may truthfully be said no mining investment is without its risk, nor is any other commercial enterprise, but with the knowledge of mining and metallurgy possessed by trained and experienced men engaged in the mining industry to-day, mining can be, and is, robbed of its risks to a very great extent. There are always those, however, who are willing to take large risks for what they believe to be large possible gains, and it is due to this class of people—the plungers, who risk desperately and frequently lose—that it is generally thought mining presents too great risks for legitimate investment. The reverse is the case, however, for no business or line of investment offers as splendid opportunities for the legitimate investment of capital as a carefully considered mining proposition possessing the elements of success when placed in the hands of a competent and honest management.

A FEW years ago the gold mill foreman made it his business, if he understood it, to make as close a saving as possible in the mortars, on the plates and on the concentrators. The cyanide man was then unheard of, though eventually he came, and at first an auxiliary to the metallurgical plant, he has, in some instances at least, come to dominate the entire proposition. He assumes charge of the mill, dictates what screens shall be employed, fixes the height of discharge and gauges the amount of water which the battery man shall feed. He objects in some cases to amalgamation inside the battery, and otherwise has caused many changes, more or less important, to be made in mill practice. As the best results, from an economic standpoint, are the real object of operating mine and mill, the manager should possess sufficient practical knowledge to determine for himself whether the cyanide operations or the amalgamating and concentration process are of the greatest importance to the largest economic success.

## Hoisting Ropes.

In shaft mining there is no factor upon which the safety of men depends to so great an extent as the hoisting rope. For this reason ropes of only the best materials should be used, allowing always a sufficient factor for safety. In all catalogues of rope manufacturers it will be noticed that there is a wide variance between the "breaking strain" of the ropes described and the "allowable working strain or load." This is known as the "factor for safety" and is placed at from one-fifth to one-sixth of the maximum breaking strain. This is essential for the reason that when the load is in motion—as a skip filled with ore, or a cage carrying loaded cars—and is suddenly stopped, or if at rest is suddenly started, the strain upon the rope often approximates its breaking limit and occasionally exceeds it. Moreover, a rope is new but once, and from the moment it is wound on the reel it begins to deteriorate. If a rope could be used for hoisting without winding over a sheave, or upon a reel or drum, it would in all probability last a long time if thoroughly lubricated so as to prevent rusting of the inner strands. In stage winding, where the hoisting plant is situated on the surface, that part of the rope reaching from the lower station to the intermediate one would not wind on either sheave or drum, if in a vertical shaft, and this portion of the rope would, no doubt, last much longer than that portion passing over the sheave and onto the hoisting reel or drum. Still, it is usually considered expedient or advisable to remove the rope from the skip or cage at intervals and to cut off 10 to 15 feet—sometimes more—from the lower end, for the reason that in wet mines the lower end of the rope is constantly saturated with water, and oxidation of the strands in that part of the rope progresses with comparative rapidity. If mine waters are acid, this cutting of the lower end of the rope is more frequently necessary. The greatest wear upon a rope is due to abrasion of the strands upon each other in winding on the reel. Another reason for deterioration is the stresses within the rope itself, due to the slightly unequal length of wires and the shifting of the strain from one part of the rope to another, when it is passing over a sheave, or winding on the drum or reel. For this reason sheaves and winding drums should be of large size. Heavy ropes—that is, those of large diameter—should have much larger sheaves than smaller ropes. For instance, it is figured theoretically that a 2-inch hoisting rope should not be wound over a sheave nor onto a drum smaller than 12 feet diameter, and a 1-inch rope should not be wound on a sheave less than 5½ feet diameter, and a larger diameter is advisable in either case. The strength of the rope depends primarily upon the material from which the rope is made. In testing sections of rope it is difficult to obtain more than 80% to 90% of the aggregate strength of all the wires of the rope, by means of the testing machine, due to the impossibility of making perfect attachments to the ends of the test piece, in order that every wire shall carry its share of the load; to the fact, also, that the inside wires of the strands are shorter than the outside wires, which induces a tendency for them to break. The frequent bending of ropes, which is unavoidable in that portion of the hoisting rope running over the sheave and winding on the drum, in time causes it to unstrand slightly and the wires to twist. An exaggerated example of this condition may be observed when a single wire is taken in the hands and repeatedly bent back and forth, or an end is held in a stationary position by one hand while the other hand, firmly holding the wire, is caused to move in a circle. The wire soon shows a disintegrated, fibrous appearance and its strength is greatly reduced. If the bending is continued the wire will break. This actually happens in hoisting ropes if used too long a time—wires at first "nick" and then break. A careful examination of an old hoisting cable, which has been used too long, will usually discover numerous broken wires. The great friction of the twisting and grouping of the strands holds the broken wires in place, but there is a limit to this, beyond which it is not safe to go. Theoretically, the strength of plow steel is from 190,000 to 350,000 pounds per square inch, but there are sometimes weak spots in the individual wires. These are few, and are really not a great menace.

## Anomaly in Ore Enrichment.

Within the past few years the subject of secondary enrichment of ore bodies has been given much attention, particularly in reference to the occurrence of copper ores. The theories advanced are, in brief, that the oxidation of large masses of low-grade sulphides of iron and copper has resulted in the leaching out of the copper contents and its redeposition at some lower level where conditions are favorable. The generally accepted idea is that the gossan, or "iron hat," represents the remains of the iron sulphide, which, originally turned to iron carbonate, subsequently became limonite, which in some cases, by dehydration, becomes hematite. The gossan may or may not contain copper. The superficial ores of copper—those at or nearest the surface—are the carbonates and oxides. These, either by gradual transition or by a sharp line of demarcation, are succeeded below by the richer copper sulphides, chalcocite, bornite, etc., and these in turn by the normal low-grade sulphide ores of copper and iron (chalcopyrite and pyrite). The copper content of these ores has made a wide range from pure chalcopyrite to those containing a greater or less amount of pyrite and gangue minerals, until the percentage runs down as low as a fraction of 1% copper. The occurrence of enriched sulphide ores of copper (chalcocite and bornite) in the Campo Seco mines, Calaveras county, Cal., at a level far below the zone of normal sulphides, is a matter inviting the attention of the students of secondary enrichment of copper ore bodies. These mines passed through the several zones of oxidation and enrichment many years ago and entered the normal zone of relatively low-grade sulphide ores. Now beneath this is found a lower and unsuspected zone of enrichment, which affords much food for study and thought as to its genesis and possible repetition. It probably represents a condition purely local, where the structure of the rocks was such that a zone or "spot" of enrichment became possible.

## Production Costs.

The most important factor in the operation of a mine is the dividends the proposition can produce. The next most important matter is the production cost, whether the proposition be profitable or not. Often the reports of mine managers show surprisingly low costs, and there are instances where these statements of costs are misleading, for the reason that one or more important items have been omitted. In some cases "general expenses" are not given. It not infrequently occurs that general expenses are a most prominent feature of the operating expense, and are as unavoidable as the cost of stoping or milling, and their omission from a report, either monthly or annual, is misleading. Every mine's manager likes to make a record for producing bullion at a low cost per ton of ore mined and treated, but if he neglects to include general expenses, deterioration, insurance, or interest on invested capital, etc., he can make a good, but false, showing. The report which fails to charge up the cost of power is as incomplete as that which neglects to state the cost of stoping ore. And the report in which dead work is not entered as a legitimate and necessary expense is equally valueless, as a means of comparison, which is the only value a report has to those not directly interested in the property. There are instances where a new manager has the benefit of thousands of dollars worth of deadwork accomplished by his predecessor, and which was absolutely necessary, but which he neglected to mention in his report, and his production costs are apparently far below those of the former manager, who acknowledged the expense and charged it to the work at the time. As a matter of course it is proper to charge this dead work but once, but the fact remains that the new manager is placed in a position to enjoy that for which he is not entitled to credit. This obtains more frequently in mining operations than in mill, concentrator or smelter. There are cases where a new manager can reduce working costs by introducing better methods and better machinery and making innovations wherever he could see they were needed. This is due to superior knowledge and experience, and not to some fortuitous circumstance which aids in making an apparently low cost possible.



## CONCENTRATES.

A FIRE, however intense, if still confined to one room or a small space, can be instantly smothered by throwing ammonia on it.

AURIFEROUS MISPICKEL (arsenical pyrites) has been treated by bromo-cyanide process at the Deloro mine, Hastings county, Ontario, Can.

COAL CLAIMS must conform to the lines of survey. A single individual can take but 160 acres of coal land, nor a corporation or association of persons more than 320 acres.

THE highest electrical voltage now transmitted is 60,000 volts, and the longest transmission is 250 miles. The limit of voltage or distance is now largely a question of expense.

AT an altitude of 15,000 feet oil ceases to possess lubricant powers, though graphite does not. Pure glycerine will furnish the desired lubricating effect above that height.

MUCH of the desert land in California and Arizona has not been surveyed and is open to location as mineral land if mineral deposits can be found thereon. The surveyed areas are also subject to location if not already occupied.

ONE PER CENT of copper carbonate tends to render the cyanide process ineffective; one-tenth of one per cent of antimony or sulphate of zinc in the ore also materially interferes with the extraction of any gold in the ore by the use of cyanide of potassium.

THE rock in which the rich ores of Goldfields, Nev., occurs is described as a brecciated and silicified rhyolite. Where the silica has solidly cemented the rock the gold values are generally low, but where it is crushed and porous the values may run up into fabulous amounts. The gold is said to be found chiefly in the filling and not to a great extent in the massive pieces of the rhyolite breccia.

THE boiling point of water—212° F.—descends about 2° for every 1000 feet of ascent above sea level. The difficulty found in boiling beans and other food at great altitudes can be obviated by the use of specially constructed apparatus. A cooking pot with an air-tight lid and furnished with a safety valve blowing off at a pressure of 15 pounds to the square inch will overcome most of the difficulty mentioned at an altitude exceeding 14,000 feet.

HIGH VOLTAGE in the transmission of electricity is not synonymous with large power. Voltage in electricity may be likened to "head" in hydraulics, and amperage to volume or quantity. An ampere is the unit of quantity, and by the universal agreement of representative bodies of scientists and electricians of the world this unit has been fixed as that current of electricity which deposits 0.0011815 gram, or 0.017253 grain of silver per second on one of the plates of a silver voltameter containing a 20% solution of silver nitrate.

FOR catching fine gold in sluice boxes, cocoa matting and burlap have given satisfaction. Where this is done it is a good idea to run the stream in a box over a grizzly, which will eliminate a large amount of the coarse material and leave only the finer sand and gravel to be handled by the lower box which catches the undersize of the grizzly. Often good results are secured by arranging the burlap or matting on a broad inclined table, the material passing through the grizzly being evenly distributed to the head of the table or "undercurrent," as it is often called.

THOFERN'S process for the treatment of slimes from a copper refinery embraces their lying exposed to the air for a considerable time and then being melted down to be freed from base metallic oxides. This latter is accomplished in a small refinery furnace, lined with magnesite brick, which does not corrode by contact with the slag. The fusion produces a copper matte, containing the silver and gold. The matte is run into plates, and then electrolyzed in special tanks. The residue is again treated for the silver contained therein by the concentrated sulphuric acid process.

WHEN one locates a mining claim he lays it out in the direction of the supposed strike. If, subsequently, it is found that owing to some flexure or other cause the vein passes out of the side line, the locator is entitled to his extralateral right for all that portion of the vein lying between the end line and the point where the vein passes out of the side line, but can take no more, presuming in this case that the end lines of the claim were parallel. If, however, the end lines of the claim are not parallel, he has no extralateral right even though the vein runs entirely through the claim.

ORTHOCLASE FELDSPAR, as an essential constituent of rocks high in silica—that is, trachyte in the strict sense—is characteristic of certain groups of rocks and particular localities. It occurs in the groups found in the great basin and along the Pacific coast, and again

appears as the belt east of the Rocky mountains is reached. The development of phenocrysts of orthoclase in the less siliceous forms of rocks is a special phase of crystallization found in regions where trachytes occur, and is particularly characteristic of the belt along the eastern flank of the Rocky mountains.

TIN SCRAP, where obtainable, is used in preference to iron scrap to precipitate copper from its solutions, for the reasons that the tin scrap consists largely of sheet iron covered with a thin film of tin, and presents a much larger surface than heavier scrap iron of an equal weight and consequently will act more rapidly. It is also usually less expensive than iron scrap of other kinds. Occasionally galvanized iron is used. The sulphuric acid present in the natural copper solution dissolves the zinc which flows away as sulphate of zinc, leaving only a trace of zinc in the cement copper formed.

BY 1 H. P. is meant the amount of energy required to lift 33,000 pounds 1 foot in 1 minute. A force which will raise 33,000 pounds 1 foot in 1 minute is equal to 2 H. P. The size of cylinders of an engine are not a true index of the power of the engine. In addition to this must be considered the pressure of steam in the cylinder, the number of revolutions per minute and the point at which the steam is cut off. The indicated horse power and the actual horse power of an engine are somewhat different. The latter depends upon the frictional and other resistance in the engine and is variable with the different types of engine.

WHEN planning a stamp mill particular care should be given the distribution of ore in the bins. The better plan is to crush the ore in breakers at a point outside the mill, and preferably at the shaft or tunnel mouth, and from bins beneath the breaker load and tram cars either singly or in trains to the mill, having the cars enter through the end of the mill, and the ore distributed uniformly. This prevents the accumulation of most of the fines beneath the grizzly and the coarse rock at the ends of the bins. The rock going to the stamps is more uniform in size and value, and the labors of the mill men are correspondingly diminished.

IN Mexico "petanque" is rock rich in gray copper, and generally carries shipping values in silver. "Orochi" is rock in which the values are all in gold and silver, with the gold predominating. Neither the words "petanque" nor "orochi" are compiled in the vocabulary of the ordinary dictionary of the Spanish language, but are a combination of the Castellana and Indian idioms. The word "petanque" is used principally in the northern States of the Republic, and particularly in the great copper zone of Sonora. The term has also been applied to other dark, semi-metallic, heavy ores, rich in silver.

TALC, for paper manufacture and other purposes, is mined at a number of localities in the United States, notably in Georgia, Vermont, New York, North Carolina, Massachusetts, Pennsylvania, Maryland, Virginia and other Eastern States. Large bodies of talc, some of them of commercial value, are known in California, in Shasta and Riverside counties. These latter deposits are not worked extensively owing to high cost of transportation. In 1903 there were mined in the United States over \$6,901 tons of talc and soapstone in their varied forms, valued at \$840,000. New York State is the largest producer, the output of 1903 being over 60,000 tons, valued at \$421,600.

METALLIC MANGANESE is very little used in either arts or manufactures, is difficult of its reduction from its ores and is only produced in very small quantity for test work in laboratories, etc. It is worth about \$20 per pound. Manganese ores of high grade bring prices depending largely upon supply and demand, there being no fixed prices. In California the crude ore as it comes from the mine is worth in San Francisco about \$10 per ton. It is ground and disposed of by dealers at about \$20 per ton. The ore sample is pyrolusite (manganese dioxide) and is apparently high grade and free from impurity to a great extent. It is useful as a flux in some smelting operations, also in the manufacture of steel.

EUCALYPTUS TIMBERS are used extensively in the mines of some portions of Australia, but, as far as known, they are used to a very limited extent, if at all, in America, although large amounts of eucalypts (mostly blue gum) are grown in California. Eucalyptus is said to make durable battery stamp guides. Redwood is employed to a limited extent as mine timbers, chiefly at New Almaden quicksilver mines in Santa Clara county, Cal. Oak is occasionally found in mines, but its greater cost and the difficulty of framing it discourage its extensive use, although undoubtedly superior to other kinds of timber of the same size. In the West one drawback to the employment of oak underground is the difficulty experienced in securing sound logs of large size.

CONCRETE is superior to brick or stone for compressor foundations, unless the stones are of very large size. A compressor is subjected to more vibration than steam engines, and must be securely anchored. A few hoisting engines have been made having the anchor-bolt holes elongated instead of round, the object being, it was stated, to relieve the jar upon the engine. In practical use it was not demonstrated that this device was desira-

ble. Engines, like compressors, should be solidly and immovably bolted to the foundations which must be massive enough to sustain any shock to which it may be subjected. If there be any lost motion this will soon be increased by the movement and vibration of the engine, and in time will result in serious damage to the engine.

THE number of feet that may be drilled in a shift of eight hours by hand must depend upon the hardness and toughness of the rock and upon the expertness, as well as the energy, of the miner. In hard granite 7 to 8 feet per shift is considered good hand work. In solid quartz rock it may be more or less, according to the character of the quartz. Some quartz cuts much easier than others; a flaky glassy quartz will cut more rapidly than a dense quartz rock like flint or quartzite. Among the hardest rocks are metamorphic rocks (originally shales), which are found silicified and impregnated with finely disseminated iron sulphide. Rocks of this character are sometimes so hard as to discourage all attempts at hand drilling. Some diorite and diabase dikes are not only very hard, but also extremely tough.

SOME constructing engineers who advise against flat ore bins, suggest a compromise between flat floors and those that are inclined by employing both in the same bin. This is accomplished by building that portion of the bin next the ore chutes flat, providing the rear portion with an incline of about 40°. This admits a larger tonnage than those bins having wholly inclined bottoms, and to a great extent overcomes the necessity for shoveling when cleaning up the bin, and, moreover, a mass of ore will rest on the flat floor and on the lower part of the inclined floor protecting it from the excessive wear incident to inclined floors, which slope up to the front of the bin. Iron plates should be secured above the chute doors, as the constant downward movement of the ore toward the door when the bin is well filled will wear away the planks of which the bin is constructed.

TINNED SCREENS are preferred by some mill men to any others, but the only actual advantage apparent in them is that the coating of tin prevents the screen becoming rusty before use, whereas, steel or iron screens not tinned, but made of equally good material, may rust if not properly cared for before being tacked on to the screen frame. Some mill men burn the screens to remove the tin, others do not. The burning, it is claimed, anneals the screen, but the metal of which tinned screens are made does not really require annealing. A test on adjoining batteries with burned and unburned screens would give reliable information as to the advisability of burning the screens before use. When tests of this kind are made it is necessary that the height of discharge during the trial be essentially the same during the test, and that the rock fed to the respective mortars be of essentially similar character and size.

WHERE the amount of water making in a mine can be handled with skips it is the best practice to equip one compartment of the shaft for this purpose, using a skip of as large dimensions as can be operated in the shaft. It is also a good idea to provide a separate engine for the bailing skip, that the handling of ore, men and materials shall not interfere with the bailing. Bailing skips have been successfully run tandem, as many as three being used at one time, each being provided with an automatic device for discharging and operating independently, but at the same moment. The largest skips hold from 1500 to 2000 gallons, or from six to eight tons of water, exclusive of the weight of skip and rope. A skip of this capacity will weigh about 2500 pounds, more or less, according to the character of the bottom (whether heavy cast iron or sheet steel), the number of bolts and stays, and whether the skip is equipped with hood for protection of men.

THE stamps in use in the mills of the Witwatersrand weigh 1000 to 1250 pounds; the stems are 16 feet long, 3½ inches diameter, with 20x9-inch bosshead and 12x9-inch shoes. The speed of drop is about 95 per minute, a height of 8 inches; screens range from 600 to 1000 holes per square inch, 700 (about 26.5 mesh) being about the average. The height of discharge is kept near 6 inches, and five tons of water are used to each ton of ore crushed. With the 700-mesh light screen and 1050-pound stamp, the average amount crushed of deep level ore is 4.8 tons, varying somewhat with the different mines. Some California mills crush upward of five tons per stamp per day through a 900-screen (30 mesh). Such ore is soft, slaty or schistose rock, with sufficient quartz to cause the soft material to pass rapidly through the screens. When the tonnage crushed exceeds five tons per stamp daily a coarser screen is generally used, though seldom coarser than 400 (20 mesh). The instance mentioned in the query to which this paragraph is a reply, where it is stated that ten tons are being crushed per stamp in a California mill, is probably exaggerated, as the rock is not actually weighed, but estimated by the number of cars sent to the mill. This rock consists of soft decomposed amphibolite schist, loam, grass roots and other debris incidental to rock mined in surface workings. It is loose and relatively light, and as a 30-screen (900 mesh) is used the tonnage may be safely discounted by a liberal percentage. In milling gold ore the idea should be to make the largest saving of values economically possible, and not to endeavor to secure large tonnage capacity at the expense of unnecessarily high tailings.



## Mining in Sierra County, Cal.

[FROM A STAFF CORRESPONDENT.]

While one of the most inaccessible of the mining counties of California, yet Sierra county is one of the oldest of the gold producing counties in the State. Mining there has been marked by a transition from the conditions of the '50s to those of to-day, yet in this length of time it is surprising how little actual change has been made.

The early workers in the region were placer miners. As the river beds were gradually worked out, more attention was given to hydraulicking the large gravel deposits of the region. This method was becoming of great economical importance when it was checked by legislation in the '80s. Since that time hydraulicking, under restriction, has been continued in a desultory way. Its place has largely been taken by drift mining, the miner following the richer recent gravel channels as well as the greater lava capped ancient gravel channels. A number of quartz ledges were discovered and have been worked off and on, some of them for nearly fifty years. In drifting in the bedrock under the lava good quartz veins are often found, their apexes being covered with lava and their discovery dependent on chance. These often prove more profitable than the gravel channels, and are now being worked through tunnels originally run to reach the channels.

In brief, the above is the evolution of mining in Sierra county. At present this county is the home of the prospector and small miner. Every canyon and gulch are staked with claims, many of which are being worked by three and four men. In the aggregate these small mines involve as much labor and capital as do the few large mines in the more southern mining counties of the State. Occasionally these claims have developed into large properties, employing many men and producing handsomely. But it may be safely stated that, as a rule, Sierra is essentially the county of the prospector.

In a trip extending through the width of the county west of the summit of the Sierras many of these mines were visited, and a description of the conditions throughout the county will undoubtedly prove of interest, not only as a mere description of the county, but also as a statement of the commercial needs of the miners, for each mine is continually installing machinery. The county will be described by towns from south to north.

At Pike City the Alaska mine has been bought for \$10,000, and on August 8 men were unwatering the shaft preparatory to further development. This mine has been worked intermittently by different companies since 1856, an 8-stamp mill having been put up in 1858. During this time over \$1,000,000 has been taken out, mostly from the surface. The present intention is to test the value with increase in depth. The present shaft has been sunk 462 feet vertical and will be continued. A 20-stamp mill is on the property, the 40-stamp mill having been burned. The company is hauling in electrical machinery and an air compressor from above Oroville. George St. Johns has charge of the property. The development of this mine will materially aid Pike City.

Thirty men are at work at the Plumbago mine, below Alleghany. This quartz property has been steadily producing for a number of years. The tunnel is in nearly 1300 feet. The mine is equipped with a 20-stamp mill, also a power plant generating electricity for the Plumbago and the Oriental.

At Alleghany the tunnel of the Oriental mine has been driven in 3650 feet, and a branch of the main quartz ledge has been struck. The vein occurs in diorite and has been partially developed by a 1000-foot shaft. H. L. Johnson is superintendent in charge. M. W. Mather is manager.

H. L. Johnson, the bonder of the Tightner mine, reports a mill return of \$3100 from a mill run on 1000 pounds of specimen ore taken from the large shoot recently opened up. The shoot has been followed 75 feet and averages 15 feet in width. The rich rock is found as a ribboned quartz within 2 feet of the serpentine hanging wall. The foot wall is schist. It is planned to start a 1000-foot drift to intersect this and other known shoots at a lower level. A 10-stamp mill will probably be put in near the mouth of the tunnel.

Drift mining in the southern part of the county has been an important industry since the early fifties. The so-called blue lead extends through the county parallel to the main range of the Sierras and at right angles to the present streams. The channel was discovered in 1852 near Minnesota. This body of gravel is capped with several hundred feet of volcanic debris. The paying portion is about 300 feet wide and from 1 to 3 feet deep, lying on or near the bedrock.

At Alleghany the Deep Blue Gravel M. Co. has drifted 1250 feet and hopes to find this second channel within 50 feet. Five men are at work at present. H. N. Dickerman has charge.

J. W. Morrell is running a 1000-foot drift to tap the channel at Balsam Flat. He also has the Steamboat claim under bond, working twenty men.

At Forest, J. M. Harper has six men at work at the American Hill. The tunnel has been driven 1300 feet through slate to intersect the Henness

pass ridge channel. At the Diadem J. M. Harper has four men at work prospecting at the 125-foot level of the 275-foot shaft. Four men are at work at the Mabel Murch gravel mine, 6 miles above Forest. The Young America mine will start up September 1st, and the tunnel will be run to tap the channel. Timber and other contracts are being let. W. W. Tiner will have charge. At the Ruby mine W. Wolf has four men at work in the gravel mine. A bedrock tunnel has been run 3000 feet and has recently tapped the main blue lead channel. As more water is available later in the season, the quartz mine on this property will also be opened up. It is the intention to install a dynamo and electric hoist to be run by a 12 H. P. gasoline engine.

Manager Pinkston has forty-five men at work at the Sierra Buttes mine, Sierra City. This old property has been revived and now gives every indication of becoming again a steady producer for years to come. A 20-stamp mill is in place near the mine and a new 40-stamp mill is to be installed near the river early in 1905. A 150-ton cyanide plant is being installed near the river to handle the tailings from both mills, the tailings being delivered from the 20-stamp mill through a flume. The plant consists of six 150-ton percolation vats, five days' treatment being contemplated. During the winter the plant will handle the tailings that have accumulated.

The new 10-stamp mill at the Keystone mine will probably be finished by the middle of October. At present the company is running a tunnel under the old workings. Stopping will be commenced when the mill is completed. R. Nye is in charge.

At the King Consolidated mine, near the Keystone, two men are driving the lower tunnel now in 425 feet and connected with the 135-foot upper tunnel by a 300-foot raise. The quartz vein in slate formation is about 5 feet in width, and a mill test returned \$8 per ton, of which \$6 is free milling. The company plans to erect a 5-stamp mill this fall.

The Mountain mine, above Sierra City, has fifteen men at work underground and is rehabilitating the 40 stamp mill. New foundations for the mortar blocks are being laid on concrete. Twenty stamps will be repaired and started immediately, the other twenty to be also promptly repaired. New amalgamating tables are being constructed. Algernon Del Mar is millman; L. H. Carver, superintendent in charge.

R. Phelan has men working at the Butte Saddle mine, a quartz proposition equipped with a 10-stamp mill and 6000 feet of aerial tramway.

In addition to these quartz claims a large number of placer and hydraulic mines are being worked in a small way. Good values are being received from the cleanups of the Klondike and Roman, owned by R. Phelan.

At the Pride mine, hydraulicking under the restrictions imposed by the United States Debris Commission has been in progress since May 2. The water being about exhausted, cleanup has been just finished. Work on the debris dam will be continued, getting ready for next spring. Arthur Pride is in charge. The same conditions obtain at the Westall mine.

In the vicinity of Downieville there is considerable prospecting and mining on a small scale being done, although somewhat curtailed at this time of the year by a scarcity of water. Of the larger properties the White Bear mine, 7 miles north of Downieville, is steadily producing. This drift mine has a narrower channel than the majority of the California drift mines, but it is of higher grade. The value lies chiefly on or near bedrock, but in mining the whole height of the channel (4 feet) is removed and washed. In starting the mine, tunnel No. 1 was driven 550 feet, but the gravel not being found a raise of 112 feet was made to No. 3, when the main channel was found. A tunnel was driven at No. 2 for ventilation and drainage. A large amount of gravel has been blocked out by the 1700 feet of drift in No. 3. The gravel is hauled from the working face to the collar of the raise by horses. Here it is dumped to No. 1, whence it is run out to the washing plant at the mouth of the tunnel. Here the gravel is hydraulicked and run through sluices. This mine is the largest producer in the vicinity of Downieville. W. J. Belcher is superintendent.

Adjoining the White Bear on the north is the Telegraph mine, under the superintendence of J. W. Finney. The tunnel on this property was originally run to tap the gravel channel, but intersected a number of quartz veins in its course. These have since proved more profitable than the gravel. The croppings of these veins are capped with lava and their discovery depends upon chance. Undoubtedly there are many quartz veins, the probable sources of gold in the gravel channels, covered by these immense lava flows and only to be discovered by chance or systematic search. A 5-stamp mill has been installed and a mortar block is in place for another five. Water power is available most of the year, but a complete auxiliary steam plant has been installed. The sulphurets are high grade and are saved on two concentrators.

There is considerable activity in both placer and quartz mining around Poker Flat—postoffice at Howland Flat. J. Freeborough has three men at work at the Alhambra quartz mine and hopes to get his Huntington mill running by fall. He intends to install concentrators. At the Strassner, J. B. Lassiat

of the Poker Flat G. M. Co. employs four men. Due to a failure in water supply the mill is not running at present. Poor & Johnson are working the Soldier Boy placer at Deadwood, and C. Keller is working the Bunker Hill drift mine. J. and A. Keefer are sinking a bedrock shaft at the Gibraltar. J. M. Pride has four men driving a tunnel to tap the channel at the Carlton Con.

Port Wine and La Porte were famous camps in the days of unrestrained hydraulic mining, but at present little is being done beyond placer and drift mining during the wet season. Running north from La Porte through Gibsonville, is a great gravel channel that promises well for the future. A tunnel is being run to tap it at the Claybank. The Bellvue and the Tabor mines at Gibsonville have already reached it. This channel was originally worked by the Thistle shaft, but work had to be discontinued because of the water. Bore holes were then made with an oil-well drill to determine the direction of the channel, and following the results obtained the Bellvue tunnel was driven 5400 feet, only to find that it struck the top instead of the bottom of the channel. The company is now engaged in changing the grade of the last 1200 feet of the tunnel so as to avoid the disadvantages of an incline. The surface works were burned out on July 17, but have now been almost completely rebuilt. Two Pelton water wheels furnish power to run the compressor, blower and machine tools. When the channel has been opened it is expected to put in an electric haulage plant. Thirty men are at work at present and a larger force will soon be put on. C. B. Wingate is superintendent.

At the Tabor mine a 4000-foot drift and 320-foot incline have been run. A 40 H. P. boiler and engine belted to a dynamo furnish power to run a 10 H. P. hoist at the top of the incline, the air fan and the two 3-inch Jackson centrifugal pumps which are set tandem, the upper pump taking the water raised by the lower machine, thus doubling the lift of the pumps. Each is operated by a separate 5 H. P. direct-connected motor. It is the intention to install a complete electric haulage plant. "T" rails are laid in the mine. When water power is abundant this is utilized by employing Pelton wheels under 140 feet head.

This district labors under many disadvantages, as to short season, isolation from outside world, high altitude and expensive freight rates—5 cents per pound during part of the year—yet the mines are enabled to endure in the face of these drawbacks. Many mines face their wooden tracks with strap iron in preference to paying the high freight rates on "T" rails.

Downieville, Aug. 25.

## How Some Mines Are Promoted.

TO THE EDITOR:—I read with much interest a recently published article in the MINING AND SCIENTIFIC PRESS, under the heading of "How Some Mines Are Promoted," and it would be gratifying to many to see this important question more fully expounded and "pressed home," not only for the benefit of the speculator, or investor, but for the standing credit of the introducer, or promoter.

I have been connected with mining and industrial promoting companies for some fourteen years, and your article (in many, if not the majority of cases) is a good and fair explanation of the cause of so many failures and downfalls, and, instead of encouragement, brings only disappointment and disgust to the shareholder.

Of course, the blame does not rest with the vendor. He will get all he can for his property. We then have to come to the promoter, or middleman, who gets hold of that property and introduces it to the purchaser. He presents it in all its colors and possibilities, and the purchaser takes for granted many of his statements, or else omits to inquire into them. He issues his prospectus to the public, as your article says, with an overcapitalization. The public sees it, and, because it has a big capitalization, thinks it's a "big thing," not realizing that that "big thing" has to make a mighty big profit to satisfy their desires. And what is the result? They ultimately find their remedy in a good round pill wrapped up in a call notice of \$1 a share; and, rather than lose their \$5, they will try and "prop up" their first investment by paying this call or supporting the reconstruction advised by the directors.

The remedy is administered, the effect doesn't take place, a coffin is built, laid down and buried, but the memorial cards are placed in an album and never forgotten, and the man who has one says, "Never again."

I would like to see your article taken up and extended, not only by yourselves, but by other contemporaries, both in the States and England, and I am sending a copy of your issue to London to a friend of mine for that purpose, and hope it will eventually meet the eyes of others, who will also take the matter up, and, moreover, keep it before the public, whose support and protection is of the first importance in the mining business.

A SUBSCRIBER.  
Ocampo, Mexico, Aug. 28.



The Desert Dry Lakes of California.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS BY  
G. E. BAILEY, E. M.

DRY LAKES VALUABLE WHETHER SALINES ARE VISIBLE OR NOT.—Attention has been called to the fact that all of the dry lakes are recognized as saline by scientists; but some one may say, "I know of a dry lake that looks like a sheet of yellow clay, with nothing but a little alkali showing in patches here and there." It is admitted that at certain times some of the dry lakes may present this appearance, yet it remains a fact that all the dry lakes contain valuable salines, whether these salines are visible to the eye at all times or not. It should be remembered: First, that these lakes are the lowest depressions of ancient saline lakes of vast area; second, that these depressions have been filling gradually through long geological ages; third, that this process of filling is not yet ended, but is going on at the present day; fourth, that the appearance of these lakes depends much upon the local conditions of the atmosphere at the time they are visited. For a short time, or for a few days, after one of the rare rainstorms that occasionally visit the desert, they may be veritable lakes of water. After a cloudburst they may be covered with a heavy layer of clay and gravel. When the hot sun has dried up the shallow waters, they may be white and glistening with an efflorescence of saline crystals; but violent sandstorms a few days later

were not dissolved again, being protected by the clay layers and marls that absorbed the efflorescent salines when the lake was greatly concentrated by evaporation. Thus, alternating evaporation and filling have been large factors in forming the stratified layers of clays and saline matters now found in the deserts.

Naturally but few borings or shafts have been put down on these dry lakes, but the few that have been made show that the bowls of the lakes contain exactly the formations as pointed out by the scientists, and that some of these layers contain rare and valuable salines.

In the tenth annual report of the State Mineralogist of California, 1890, the following data are given of the borings made in the Searles or Borax lake, in the northern part of San Bernardino county, Cal., the borings being made in the southern, or dryest, and most sandy portion of the lake:

The borings mentioned, commenced in 1887, disclosed the following underlying formations, the successive strata passed through having been observed and noted by Superintendent Searles:

Two feet of salt and thenardite.  
Four feet of clay and volcanic sand, containing a few crystals and bunches of hanksite.

Eight feet of volcanic sand, and black, tenacious clay, with bunches of trona, of black shiny luster, from inclosed mud.

Eight-foot stratum, consisting of volcanic sand containing glauberite, thenardite, and a few varied hexagonal crystals of hanksite.

Twenty-eight feet of trona of uniform thickness, other borings showing that this valuable mineral extends over a large area.

Twenty-foot stratum of black, slushy, soft mud, smelling strongly of hydrosulphuric acid, in which there are layers of glauberite, soda, and hanksite. The water has a density of 30° B.

ardite and trona; most of these occurring, however, in small quantities only. Artesian water was obtained at a depth of 55 feet that rose 3 feet above the surface. The dry, hard playa crust, about 1 foot thick, was analyzed by C. N. Hake as follows:

	Per Cent.
Sand.....	50.0
Soda sulphate.....	16.0
Salt.....	12.0
Soda carbonate.....	10.0
Borax.....	12.0
Total.....	100.0

The method of working was simple, consisting of scraping the dust into windrows and then gathering by carts and taking it to the works 2 miles distant. It was noticed here in digging the crystals out of the mud that the crystals grew. The holes left soon filled with water containing boric acid in solution; this, coming into contact with soda, formed crystals of baborate of soda (borax), which were deposited in the mud. Large vats were dug in the mud and brush thrown in for the crystals to form on. On ground that had been worked over a new crust formed also that was thick enough to remove in three or four years. Such growths give the following analysis:

	Six Months.	Two Years.	Three Years.	Four Years.
Sand, per cent.....	58.0	55.4	52.4	53.3
Soda carbonate, per cent.....	5.2	5.0	8.1	8.0
Soda sulphate, per cent.....	11.7	16.7	16.6	16.0
Soda chloride, per cent.....	10.9	10.0	11.1	11.8
Borax, per cent.....	14.2	12.9	11.8	10.9

It will be noted that the borax is richest at first and that the sodas increase faster than the borax. The effect of the Æolian sands is especially noticeable. These analyses throw considerable light upon the genesis of the deposits.

At Lake Danby, in the southeastern portion of San Bernardino county, the following facts are noted in Bulletin No. 24:

The Surprise salt mines are located about 25 miles



Bristol City, San Bernardino County, Cal., Situated on a Dry Lake Covering Over 200 Square Miles. In This Lake are Beds of Rock Salt, Borax and Gypsum.

may cover them with a layer of fine sand, concealing the salines.

The effect of these sands moved by the winds of the desert is described in Bulletin No. 24, under the title of "Æolian Sands," as follows:

The traveler is apt to make his first acquaintance with these when they are in motion, filling the air with dust, sand, and gravel, which are blinding, choking and irritating beyond all description—on account of the alkaline material with which they are saturated. Sand sprouts or "sand augers," as the desert men call them, may often be seen as slender, writhing, twisting columns of sand, a mile high, that sag and sway and twist here and there with sinuous grace, only to disappear, ghost-like, as mysteriously as they appeared. When at a distance, he can admire the slender, hollow dust columns, that move to and fro like pillars of smoke, according to the caprice of Æolus. Dust storms that last three days are not uncommon, and in the distance look like clouds of smoke. The presence of sand in large quantities in the salt, soda, borax, and niter beds, is soon understood, if one studies the Æolian sands awhile. At the Searles borax lake it was found that, after a crust had been removed from one part of the marsh, it filled with water that soon deposited crystals of borax, and in six months the waters were blown so full of fine sand that the new crust contained 50% of sand. These sands account for the presence of sand in all of the playa lake deposits of the desert.

I. C. Russell says of this filling and refilling and covering over and concealing of the salines (page 64, Lake Lahontan):

In some instances easily soluble salts form a large percentage of the deposit, which then becomes a salt bed, a bed of gypsum, or is largely composed of other similar salts. At times these deposits become covered with mechanical sediments, and perhaps buried so deeply that they are not again dissolved when the basin is reoccupied by a lake. Examples of salt playas are numerous, especially in southern Nevada, where they are of economic importance, and (besides common salt) frequently contain large quantities of sodium sulphate and carbonate, borax, etc. In some instances the lower portions of earthy playas are saturated with brine, which, when raised to the surface and evaporated, is capable of supplying an almost unlimited quantity of salt.

In speaking of the geological history of Lakes Aubury and Le Conte, Bulletin No. 24 says:

At the times when the two great lakes approached complete desiccation, their pools formed independent areas or lakes, which completely evaporated. The saline matter precipitated at such times was so completely buried beneath playa deposits that when the lakes were filled with water again, during another oscillation, the salts

This dry lake then conceals beneath its surface of sand: First, 2 feet of salt, and thenardite—that is, 2 feet of common salt mixed with sulphate of soda (Glauber salts); second, 12 feet of clay and sand, containing more or less salines; third, an 8-foot laver of sand containing glauberite (sulphate of soda and lime) and thenardite (sulphate of soda)—while below this comes a remarkable stratum of 28 feet of trona, of uniform thickness, as shown by other borings. The value of this deposit will be appreciated when it is explained that the trona of the mineralogist is the sesquicarbonate of soda of the chemist, or the baking soda of our kitchens. This remarkable dry lake then contains layers of table salt, 2 feet thick, and a 28-foot layer of baking soda, besides plenty of Glauber salts that can be reached by a shaft 22 feet deep, and developed by a shaft 50 feet deep. Besides these there are 16 feet of clays and sand impregnated with sodas that would yield a soda brine if the boring were filled with water. At the borax works farther north on Searles lake, artesian waters were found that did give borax brines. The following account, showing the value of these borings, is taken from the description of Searles lake and the operations there, Bulletin No. 24:

The beds are of special interest, as the operations there in 1874 and for several years later were the training school at which many leaders in later years studied the borates. The beds were discovered Feb. 14, 1863, by Dennis Searles and E. M. Skillings, but work did not begin until 1874. The San Bernardino Borax Mining Co. was incorporated in 1878 to work these beds. The borax beds are near the center of a playa lake that is 10 miles long by 5 miles wide, situated 1700 feet above sea level. The portion productive of borax is an oblong area of about 1700 acres, slightly depressed below the general level of the playa. Water stands in this area to the depth of a foot in wet seasons. The old shore lines of this arm of Lake Aubury are distinctly to be seen on the slopes of the Slate and Argus ranges, some 600 feet above the playa lake, showing the different levels of the ancient lake. The water on the beds is of a dark-brown color of 28° density, Baume. The mud below the water was full of large crystals, occurring in nests as in Lake county, at irregular intervals to a depth of 3 or 4 feet. The natural crystals were of a green color, transparent, and often contained fluids in their large cavities. Curiously enough no ulexite or colemanite was ever found in this playa. Thirteen tons of the crude material produced one ton of borax, equal to 7.69%. The beds were not regular, but quite spotted in borax. The associated minerals were anhydrite, calcite, celestite, cerargyrite, documonte, embolite, gay-lussite, glauberite, gold, gypsum, halite, hanksite, natron, soda, niter, sulphur, then-

southeast of Danby, a station on the Santa Fe Railroad. They are located in the bottom of a dry valley, about 6 miles from the south end of Old Woman's mountains. The rock salt lies in two strata, each from 2 inches to 8 feet in thickness, separated from each other by a thick seam of clay and covered by a layer of sand and dust that is from a few inches to 2 feet in thickness. The salt bed has been developed over a tract of some forty acres and the claims of the locators cover over 800 acres. For some time this deposit was worked by the Crystal Salt Co., who hauled the salt to Danby in traction wagons. The larger portion of the product was sold to the silver mills for use in chloridizing. Some of this salt has been shipped to San Francisco and proved to be of superior quality. In 1882, J. B. Cook is said to have dug a shaft 35 feet in solid rock salt before water was reached. A 65-foot shaft, now caved in, is said to have shown 22 feet of solid crystal salt. An analysis of the clear rock salt gave: Sodium chloride, 98%; water, 1.3%, and traces of silica, iron, aluminum, potassium and calcium.

The New Liverpool Salt Co. attempted to find the bottom of the great Salton basin with the following results:

Borings made at Salton give the following strata:  
(1) Below the salt crust was 6 inches of mud resting on (2) 7 inches of a crust composed of chlorides of sodium and magnesium; (3) 22 feet of black ooze containing 50% of water and carrying both the chlorides and carbonates of sodium and magnesium.

This boring shows the existence of 22 feet of ooze saturated with a brine rich in salt, carbonate of soda and magnesia. The day will come when such brines will be used by the chemical factories. It has been the usual experience of prospectors and others that it was useless to dig down in the bed of a dry lake for water that could be used for drinking or cooking, as the usual result would be a strong brine of salt, soda or borax. The presumption is, therefore, that wherever a dry lake occurs in the great basin valuable layers of borax, sodas, niter or salt or brines saturated with these salines will be found below the surface.

(TO BE CONTINUED.)

WHEN locating a mining claim secure a suitable mill site, if the claim does not afford such. The question of water is also important. A mine without water is in an undesirable position for operations in the future. Where no water is obtainable, as in the desert, the mine owner must await developments, but mines in the desert are generally very good or no good at all.



## The Ore Deposits of Bisbee, Arizona.\*

NUMBER VIII.—CONCLUDED.

Written by F. L. RANSOME.

In the presence of solutions containing carbon dioxide or bicarbonates of the alkaline earths, or by direct reaction with the calcium carbonate of the gangue, the sulphates of iron and copper may be converted into carbonates, those of copper being fairly stable, while the ferrous carbonate readily undergoes a further oxidation and hydration into limonite. In this way the close association of limonite with the carbonates of copper in certain portions of the oxidized zone is in part explained. The ferric sulphate may also pass into basic sulphate and then into limonite, while the cupric sulphate may be transformed to the basic sulphate brochantite. Becquerel succeeded in producing small crystals of this mineral by keeping a fragment of porous limestone for several months in contact with a saturated solution of cupric sulphate. By the addition of sodium bicarbonate to the solution the brochantite was transformed to malachite. Brochantite is probably of common occurrence as a transitional step in the formation of malachite from the sulphate, although it does not occur in great quantity in the Bisbee mines.

The sulphuric acid which forms under certain conditions of oxidation may play a varied part in the further alteration of the ores. It may in zones of such deep and irregular oxidation as those at Bisbee come in contact with cuprite and form cupric sulphate and native copper. Or it may form various metallic sulphates, or gypsum.

With reference to the abundance of kaolin or clay in connection with the oxidized limonite ores Mr. Douglas concludes that the alumina, sometimes forming as much as 17% of the ledge matter, has been derived from the neighboring porphyry. While kaolin has undoubtedly been produced in the porphyry through the action of sulphuric acid formed from the oxidation of pyrite, upon feldspar and sericite, yet it does not appear that all, or even most of the kaolin in the oxidized ores and ledge matter, can be traced to this source. Like limonite, it is one of the common products of the oxidation of the mineralized limestones, and it is clearly a local concentration of material, which, before the oxidation of the pyrite, was more widely distributed through the rocks. If the limestones in connection with which the ores occur were noticeably shaly and argillaceous the abundance of kaolin might easily be accounted for by the action of sulphuric acid upon such beds, the acid coming, of course, from the oxidizing pyrite. The alumina would go into solution as a sulphate, and might then be transported and redeposited as kaolinite in the presence of solutions containing silica. The occurrence of the clays is such as to strongly suggest that the alumina contained in the limestones was originally a constituent of the limestones. Its concentration in the porous limonitic ledge matter has probably been effected by mechanical as well as by chemical agencies.

The conclusion that large quantities of gypsum must have been produced by the reaction of the metallic sulphate solutions with the partly calcareous gangue of the original pyritic ore seems inevitable. But no gypsum has been seen in any of the Bisbee mines. Owing to its solubility and to its chemical stability which prevents it from entering into less soluble combinations, it has probably been removed by percolating waters as fast as formed. A large amount of sulphur has been eliminated from the ore bodies by their partial oxidation, and this removal seems to be most reasonably accounted for by the supposition that it has been carried away in the form of gypsum. Mr. Douglas calls attention to the fact that in regions yet more arid than Bisbee gypsum accompanies the oxidized ores in limestone and cites the Boleo mines in Lower California. Under certain conditions, however, gypsum, resulting from the attack of sulphate solutions from oxidizing pyrite upon limestone, may not be entirely removed even in comparatively humid climates. This is shown by the occurrence of gypsum having this origin in the Logan mine at Rico, Colo.

The most marked physical effect of the oxidation of the ore bodies has been a great increase in the porosity of the masses acted upon. This, by enabling solutions to percolate easily through the partly oxidized zone, has greatly facilitated the migration and concentration of the desulphurized ores and their segregation in workable masses from the bulk of the limonitic and clayey ledge matter.

The oxidized material is not only more porous, but much softer and more plastic than the original mineralized limestone, and hence greatly weakens by its presence the rocky structure in which it occurs. The overlying limestones, no longer adequately supported, fissure and settle down upon the soft plastic ore and gangue. The access of solutions is thus still more facilitated, and the processes of oxidation and solution proceed so much the faster. That part of the surface which is underlain by oxidizing ore bodies is thus rendered less resistant to erosion, other

things being equal, than the surrounding country. This accounts for the frequent concurrence, pointed out by Mr. Douglas, of ore bodies with relatively low ground. It by no means follows, however, that because most of the known large ore bodies near Bisbee have occurred beneath topographic depressions, all low ground in the vicinity is underlain by ore, or that no ore occurs except under such hollows.

**VALUE OF THE ORES.**—The percentage of copper in the ore as mined is to a very large extent subject to direct control by those who direct mining operations. With ample facilities for extensive and economical operation, the grade of ore that can not be handled sinks lower and lower. Thus while a large mine may contain ore as rich as it did when first opened, the average tenor of the ore now worked is usually very much lower.

This almost self-evident fact is well illustrated by the Copper Queen mine. The ore first worked, early in the eighties, averaged 23% of copper. As the mine developed, as methods of treatment improved, and as transportation became less costly, the tenor of the ore was greatly reduced until the average at present is about 7%, with a range of from 4% to 20%. The minimum grade, however, is only mined when occurring with better ore, or when particularly desirable for fluxing purposes.

The average tenor of the ore from the Calumet & Arizona mine in 1902 was about 10% of copper, according to I. L. Merrill. But the stopes were then recently opened and contained some remarkably good, oxidized ore. As development progresses it will probably be found economical to reduce the average grade of the ore.

The gold ore of the Easter Sunday mine is reported to run about \$30 per ton when sorted. But as the small quantity of ore thus far produced has been accepted by the Copper Queen smelter upon the condition that the silica shall not fall below 84%, the actual tenor that the ore would show if mined and treated directly as a gold ore is unknown.

**FUTURE OF THE DISTRICT.**—Although more or less mineralization occurs at many points in the Mule mountains, there is little to indicate that any deposits of copper ore will ever be found in the Bisbee quadrangle approaching in importance those already known and those probably awaiting discovery in the faulted limestone syncline about Sacramento hill. For over twenty years the Copper Queen mine has produced an average of more than 16,000,000 pounds of copper annually. Recently the Calumet & Arizona Co. has begun energetic operations in ground almost surrounded by the property of the Copper Queen. Not only is there sufficient ore known in these mines to keep them in operation for many years to come, but there is no clear evidence that the bottom of the ore-bearing ground has been reached in any of these extensive workings. Moreover, the statement may be ventured that the specter of the lower lime has hitherto had an undue influence in restricting prospecting to nearly horizontal planes. There is certainly a reasonable hope of finding ore bodies in the Martin and Abrigo limestones beneath the masses that have been so profitably worked in the overlying Carboniferous beds. The occurrence of small bunches of ore in the Abrigo limestone at the Whitetail and Wade Hampton claims shows that ore deposition may take place in these lower beds. It may be that, owing to their greater depth, such ore bodies, if discovered, will be found to consist of low-grade cupriferous pyrite, unenriched by the generally descending solutions that have contributed so largely to the value of the known masses. This, however, is a point that prospecting alone can determine. It would seem that near the Dividend fault the conditions are favorable for the continuance of enriching processes to depths greater than those now reached in this part of the underground workings.

But more than this, it may be pointed out that less than half of the semi-circular mineralized zone about the porphyry mass of Sacramento hill has been explored at all. Ore was first discovered at the surface on Queen hill at the northwest end of the zone. From this discovery developments have been pushed by underground exploration to the south, often with little or no surface indication of ore. There still remains, however, an extensive area of unknown but promising ground, lying just south of Sacramento hill and extending eastward toward the southeastern continuation of the Dividend fault—an area which is here concealed by the Glance conglomerate. This is the eastern half of the semi-circular mineralized girdle about the intrusive mass of porphyry. While structurally the beds south of Sacramento hill form a less favorable nook for the deposition and concentration of ores than that inclosed between the Czar and Dividend faults and the northern contact of the porphyry, yet their attitude with reference to the intrusive stock, and to the continuation of the Dividend fault down Mule gulch, is distinctly favorable to mineralization. The developments in the Spray and Calumet & Arizona mines have shown that profitable ore bodies are by no means confined to the structural pocket in the vicinity of the Czar and Holbrook shafts. There is no known reason why they should not yet be found skirting the southern and southwestern contact of the porphyry, which, as recent explorations with diamond drills show, extends from the ice factory in a southeast direction for a distance

of at least 2000 feet under the Glance conglomerate.

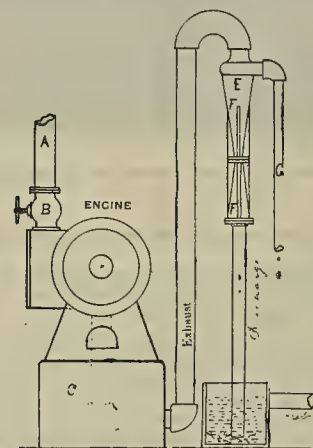
It is true that the easterly dip of the beds southwest of the porphyry stock carries the Escabrosa limestone to a much greater depth near Mule gulch than it reaches in any of the present workings. It is probable that this depth, a short distance east of the Gardner shaft, may be so great as to preclude the occurrence within the Escabrosa limestone of any but original, unenriched pyritic ore, which may or may not be workable. But judging from surface indications there has been considerable mineralization of the Naco limestone south of Sacramento hill, and there is nothing improbable in the occurrence of high-grade ores in this limestone at stratigraphically higher horizons than those in which ore bodies have hitherto been found. The exploration of this ground calls for no greater outlay or boldness than is already displayed in other parts of the district with less reasonable hope of reward.

The outlook for finding profitable ore bodies within the main porphyry stock of Sacramento hill is not regarded as particularly promising. As the dump of the Copper King shaft shows, this rock may be very heavily impregnated with pyrite. But the mineralization seems to tend more to abundant dissemination than to the formation of solid sulphide masses. Even if the latter occur, it is doubtful whether they would be found sufficiently cupriferous to constitute ore. Moreover, the chemical and physical character of the porphyry renders it very much less favorable than the limestones to the deep oxidation and secondary concentration that has played so important a part in the genesis of the known ore bodies. Very little exploration of the porphyry has been made, however, and work in this direction cannot be condemned as altogether vain.

In conclusion, it may be said that Bisbee is less likely to suffer from a lack of ore than from too rapid exhaustion of those high-grade oxidized ores which are necessary for the economical smelting, by present processes, of the low-grade sulphides.

## An Injector Condenser.

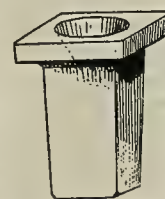
One of the simplest forms of a condensing engine is



that fitted with the injector condenser. The accompanying cut shows a condenser of this type. A is the steam pipe; B, the stop valve; C, the exhaust pipe; E, the annular head into which the condensing water is thrown through the pipe, G, and by the arrangement of which the water is formed into a sheet; F F shows the two inverted nozzles through which the condensing water escapes into the hot well H. The method of operation of the injector condenser when the engine starts is as follows: The exhaust steam expels the air from the exhaust pipe and condenser; then a jet of cold water from a pump or tank creates a vacuum, which may be maintained by a head of water of 10 feet fall.

## Jumping Up Iron for Welding.

The illustration shows an anvil tool which will be found useful in upsetting iron for welding. Slightly



point the end which is to be jumped up and drive it into the tool. In this way the iron is jumped up a little way back from the point, where it is actually wanted, and saves time and labor hammering down the burr which forms when it is done in the usual way on the face of the anvil; besides, it is much easier to scarf. Another idea sometimes adopted when welding axles or similar work is to get a strong ring which will just fit over the end to be jumped up. Place the ring, cold, on the anvil, and drive the heated end into it and jump up with the ring on. The ring will prevent the iron spreading at the bottom.

TOWERS for aerial tramways may be built as high as the economics of construction will admit. The expense is always to be considered.

\*Abstract Professional Paper No. 21, U. S. G. S.



## Cyaniding in the Black Hills.

Written by J. T. MILLIKEN.

The cyanide process has done much toward the development of the gold mining industry in the Black Hills of South Dakota. Fifteen years ago the ores now successfully treated by the cyanide and chlorination processes had resisted every attempt, up to that time, made to recover a payable percentage of their values, by every method tried except smelting, which was generally too expensive for the low-grade ores, though thousands of tons of rich ore had been shipped to Denver, Colo., Omaha, Neb., and elsewhere for treatment. Following is an abstract from the Black Hills Mining Review of a paper recently read before the Black Hills Mining Men's Association, showing how the cyanide process has made a simple matter out of a most perplexing problem of the metallurgy in the Black Hills. Both wet and dry crushing are employed in the operation of the cyanide process in the Hills. The two large concerns which employ the dry method are the Golden Reward and the Imperial companies. The description of process following is that practiced at the Imperial, of which J. T. Milliken is superintendent:

The ore being treated at the Imperial is from the potsgam, is extremely hard, close grained and highly siliceous, and the gold is minutely disseminated. Eighty-five per cent as it comes from the mine is fairly oxidized, the remainder being a blue unoxidized ore. The latter is very refractory, close grained, and contains from 4% to 5% iron pyrites, traces of arsenic as arsenopyrite and antimony. The blue ore makes it difficult to recover 75% from the low-grade ores of the Black Hills, but as the two ores are mixed together it is impossible to effectually separate them.

The Imperial mill occupies a flat site, each department having its own building independent of the mill proper, which form of construction affords perfect control of the dust and confines it to the building wherein it is produced. The engine room and the leaching and precipitating department are separate from the crushing department, which is the only department where dust is produced.

Ore is received from the mines over the Burlington and Northwestern railroads and dumped into railroad bins, from which it is drawn into a large crusher, the discharge of which feeds into a bucket elevator, by which the ore is conveyed to a rotary screen for sizing. The oversize returns to rolls, and the undersize is carried by a belt conveyor to storage bins whose capacity aggregates 1000 tons. The discharge from the rolls joins the feed from the crusher and is again elevated to the sizing screens, so that only the carefully sized material goes to the storage bins. Here the sampling is accomplished. The samples are cut from the sized ore as it leaves the screen by a fine automatic sampler. The cut is one-twenty-fifth of the whole, which is spouted to a steel-covered floor and is again reduced by a sampler, run through a pair of sampling rolls, undergoes further reduction, is thoroughly dried, finally ground in a sample grinder to about 80 mesh, is thoroughly mixed, cut with a riffle to about 10 ounces, bucked through a 120-mesh screen, and two samples are taken. The superintendent explains that the thoroughness with which sampling is practiced at this mill is of great value for giving reliable figures.

The ore is then fed by an automatic fine-ore feeder onto a belt conveyor, thence discharged into a bucket elevator and deposited into a dryer. The temperature maintained in this dryer is close to 300° F., the object being to dehydrate the ore, by which the percolation of solution in the cyanide vats is assisted.

From the dryer the ore is discharged into a roller-chain continuous bucket elevator, by which it is conveyed to a cylindrical screen. The over size passes to rolls and joins the feed from the dryer, and is again elevated and sized. The under size passes to the finishing rolls.

The finished pulp is fed onto a screw conveyor, and at this point is sprayed with a cyanide solution to minimize the dust in the leaching room. The screw conveyor discharges onto a belt conveyor, and the ore is thence elevated to another belt conveyor, passing over the leaching vats, by which means all the vats are filled.

There are four leaching vats, each 6 feet deep, 35 feet in diameter, and built of  $\frac{3}{8}$ -inch steel, and when filled hold about 275 tons of ore. In filling the vats the ore is charged in a standardized solution, five pounds of cyanide to a ton of water (0.25%), and when the vat is filled the mass is saturated. After the filling the surface is covered with standard solution and the charge allowed to stand until perfectly quiet and thoroughly saturated. Leaching then begins and continuous percolation continues until the charge is washed. The time required to fill a vat is fifty hours, and treatment averages eight days.

Practically six-tenths of a ton of solution is used to each ton of ore treated. Larger amounts of the solution have been used, as much as 2000 pounds, and weak and strong solutions have been returned to the vat without any apparent increase in extraction, and amounts as little as 600 pounds of solution to the

ton of ore have given the same tailings as when the normal 1200 pounds per ton of ore has been passed through the charge.

The vats are provided with the usual filter grating, covered with cocoa matting and eight-ounce duck, and 8-inch diameter sluicing gates, one in the center and one in each quadrant. Sluicing is accomplished with hydraulic pressure.

In the precipitation department there are two gold-storage tanks, 4 feet deep and 20 feet in diameter, built of  $\frac{3}{4}$ -inch steel. These are for the effluent and weak solutions. There are two sumps under the zinc boxes the same size as the gold storage, and two double-compartment zinc boxes with fourteen chambers, 2 feet square and 2 feet deep in each compartment, making twenty-eight in all. These hold when closely packed fifty-five pounds each of lathe-turned zinc.

The zinc area required for precipitating the values from 130 tons of ore per day is 104 cubic feet, containing from 700 to 1000 pounds of zinc shavings. Solutions are standardized by pumping from sumps into two tanks, each 16 feet deep and 14 feet in diameter.

In the Imperial mill the sands and slimes are treated without separation. The amount of gold solution passing through the zinc boxes is readily measured, constantly sampled and checked with the total solution returned from sumps, and with the drip samples taken on each tank continuously during leaching, including washing. This extraction, compared with the extraction figured on the difference between the control and tailings samples, is about 1.4% higher. The total bullion return checks with the solution extraction within 1.5%, the total bullion return being 1.5% higher. The total bullion returns since the mill was started was 78.76%.

The operating cost per ton of ore for the last running twelve months, based on a daily tonnage of 100 tons, is as follows: Labor, \$.58; fuel for power, \$.225; fuel for drying, \$.110; lubricants, \$.051; roll steel, \$.057; equipment supplies, \$.045; cyanide, \$.120; zinc, \$.050; melting supplies, \$.014; assaying supplies, \$.015; miscellaneous supplies, \$.040; insurance, \$.030; this means a total cost per ton of \$1.367 for milling. A daily tonnage of 130 tons for twenty-four hours is maintained. Certain improvements are contemplated at the plant which, when completed, will still further reduce the cost of operating.

The usual sulphuric acid method of cleaning up is used. Owing to the small amount of solution and its freedom from slimes, the precipitates are high grade and in excellent state for dissolution with the acid. The bullion for the last six months has averaged 935.7 fine. The average time of clean-up is eighteen hours. The slimes are dried during the night, melting starts in the morning, and two men carry out the work. The average cost per ounce of bullion recovered is 8.3 cents. During the month of July 2554.4 ounces of bullion were recovered, at an average cost of 7.1 cents per ounce. The bullion for the last four months has averaged 504.5 silver and 431.2 gold.

Mr. Milliken makes some interesting comparisons between the fine wet-crushing plants and the dry-crushing plants. The principal drawback to the dry-crushing plant is the dust; but this, the author thinks, has been greatly magnified by popular talk. With the present improvements for handling dust and a mill designed for confining it to the department where it is produced, a dry-crushing mill is not a bad place to work, and there will be no difficulty in keeping men.

Another point that has been argued against fine dry crushing is the loss of values in the escaping dust. Mr. Milliken says there is a loss in values by escaping dust, but there is also a loss in dissolving gold in the wet-crushing process which exceeds anything he has ever seen in dry-crushing plants.

In making his comparisons between the loss of gold in slimes and the loss of gold in dust, Mr. Milliken bases his returns upon results and information derived from Mr. Gross, the superintendent of the Penobscot mill, as that mill is one of the most modern wet-crushing plants in the Black Hills, and great care is being taken to reach accurate results.

Mr. Milliken also compares the various items of cost at the Penobscot mill with similar or corresponding items at the Imperial, and presents some interesting figures.

In conclusion, he says a wet-crushing mill is much simpler in construction, having fewer pulleys and belts, and generally only one elevator, and no screens except the battery screens. The cost of construction will be practically the same in mills designed to treat similar ores. The wet-crushing plants are more cleanly and more easily kept so.

On the other hand, in the scope or elasticity of the processes the wet crushing is limited in many ways. It is not an unusual difficulty for an ore running high in values to produce a large percentage in slimes, which carry values exceeding the original, or heads, by 150% to 200%. A very unusual characteristic of gold ores, and one that makes the low-grade ores of the Black Hills particularly applicable to wet crushing, is the fact that the slimes carry less values than the sands or the ore from which they are separated.

On 95% of the low-grade mines the blue or unoxidized ore is developing very rapidly, and at no distant time the mills will have to resort to roasting and cyaniding, and all the ores that have been exper-

imented upon will have to be crushed to at least twelve mesh, though sixteen or twenty mesh have given the better results.

## Permanent Irrigation Structures.

In the course of a report as consulting hydraulic engineer of the Turlock, Cal., Irrigation District, Prof. S. Fortier makes a contrast between the cost and desirability of pipe lines and of flumes and trestles which will be interesting to all who are carrying water over low places:

**FLUMES ON HIGH TRESTLES.**—There are two flumes on high trestles on the upper portion of the main canal. The upper one is 300 feet between approaches, and the bottom of the flume is 60 feet above the surface of the water in the creek. The second is 514 feet long and 61 feet high.

Both of these flumes are in a dangerous condition and liable to collapse at any time under a full head. If it is intended to increase the capacity of the canal to 600 cubic feet per second, next year, both crossings should be renewed this fall. In reaching conclusions as to the best means of providing a suitable crossing in each case, several types of structure have been considered.

**INVERTED PIPE SIPHONS.**—The idea of siphoning the flow of the canal under these deep ravines has not received the consideration which its merits deserve, and the attention of the members of the board is called to the following facts: In the use of pipes for the crossings, three sizes have been considered—6 feet, 7 feet and 8 feet internal diameter, respectively. The largest size would be the cheapest, but the 6-foot pipe would prove the most satisfactory. I have accordingly adopted the smaller size throughout. The surveys show that there is ample fall in both cases to provide a mean velocity of over 10 feet per second. That is probably as high as it is safe to go. In the estimates submitted it will be observed that in the case of both wooden and steel pipes figures are given for three lines of 6-foot pipe and also for five lines. The capacity of the former in round numbers would be 900 cubic feet per second and of the latter 1500 cubic feet per second.

**REDWOOD STAVE PIPE.**—The estimates are based on the use of dark, heavy redwood, bound by steel bands and well protected from corrosion. Both approaches are to consist of cement concrete flumes, and the ends of the pipes are to be embedded in asphalt concrete. The necessary blow-offs and angles are included.

**STEEL PIPES.**—The shell of these 6-foot pipes is to be  $\frac{5}{16}$  of an inch in thickness and made from a fine quality of open-hearth steel. The approaches are of concrete and each pipe is to be thoroughly coated before being laid and afterwards embedded in a 3-inch layer of asphalt concrete. By keeping the insides painted from time to time, corrosion will be impossible.

**WOODEN FLUMES ON WOODEN TRESTLES.**—The trestles rest on concrete piers, and the approaches, which are usually the first to decay, are to consist of concrete flumes.

**WOODEN FLUMES ON STEEL TRESTLES.**—This type comprises steel trestles on concrete foundations, a wooden box of good redwood and concrete approaches.

**ALL-STEEL FLUMES.**—In this both trestles and flumes are of steel and rest on concrete masonry foundations.

It may be well to add, in connection with flumes, that in all the various types mentioned the width is designed to be 20 feet and the depth of water 8 feet. On the given grade this size of flume would carry about 1500 cubic feet per second.

**MORGAN RAVINE CROSSING.**—Estimated cost of each of five different types of structures to replace the present Morgan flume:

Redwood pipes, 6 ft. diameter, three lines.....	\$11,000
Redwood pipes, 6 ft. diameter, five lines.....	17,500
Steel pipes, 6 ft. diameter, three lines.....	21,000
Steel pipes, 6 ft. diameter, five lines.....	31,750
Wooden flume and trestles.....	18,500
Wooden flume and steel trestles.....	31,500
All-steel flume and trestles.....	40,500

**PEASLEE RIVER CROSSING.**—Estimated cost of each of five different kinds of structures to replace the present Peaslee flume:

Redwood pipes, 6 ft. diameter, three lines.....	\$14,000
Redwood pipes, 6 ft. diameter, five lines.....	21,250
Steel pipes, 6 ft. diameter, three lines.....	24,400
Steel pipes, 6 ft. diameter, five lines.....	39,000
Wooden flume and trestles.....	22,500
Wooden flume and steel trestles.....	40,000
All-steel flumes and trestles.....	47,250

**COMPARISON OF COSTS.**—In reviewing the foregoing figures on the cost of the different structures, I would recommend the use of steel pipes laid in the manner indicated. In my judgment, these steel pipes would outlast an all-steel flume and trestle structure and cost less for maintenance and repairs. It will also be observed that, on the basis of a full head for both kinds of structures, there is a saving of \$17,000 in first cost in favor of steel pipes. This maximum capacity, however, will not be required for many years to come—possibly not until 1920—and in the meantime fewer lines of 6-foot piping would suffice. A new line might



be added at any time when the demand for water required an additional supply. Comparing the cost of three lines of pipe, which would give a discharge sufficient for several years to come, with an all-steel flume, there is a saving of \$41,850.

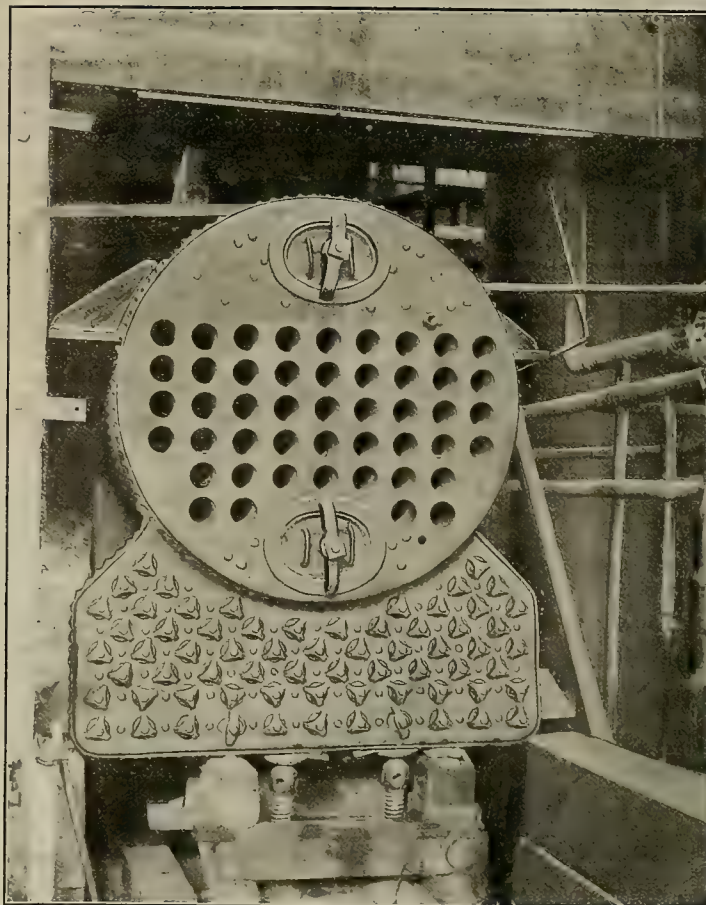
For similar reasons I would prefer the use of redwood stave pipes to wooden flumes on high pine trestles. From an eighteen years' experience in the construction and use of redwood stave pipes, I have no hesitancy in stating that the wooden pipes would last much longer than the wooden flumes on pine trestles.

Of the various types of structures named, there remains but the redwood flume on steel trestles. Since the cost of this combination is about equal to steam pipes, I would again express a preference for the latter. There is no question, I think, but that the redwood box would require to be renewed several times during the life of the steel pipes, providing, of course, that the exterior and interior surfaces of the latter are thoroughly protected from corrosion. By embedding the exterior surface in asphalt concrete and applying frequent coatings of paint to the interior, it is believed that the metal can be kept entirely free from rust.

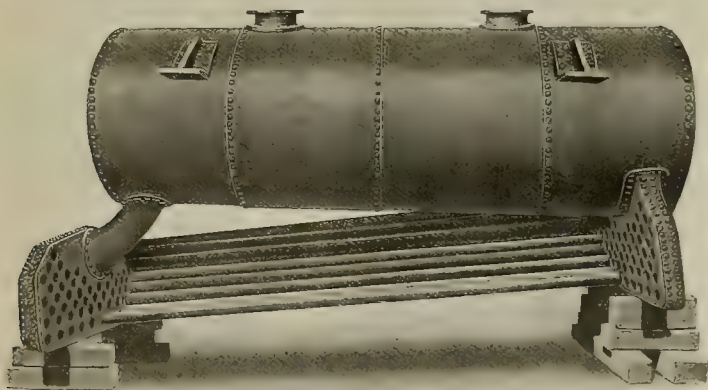
### Combined Water and Fire Tube Boilers.

The Simmons boiler illustrated herewith consists of an upper fire tube section similar in construction to the ordinary horizontal fire tube boiler and a lower inclined water tube section, the front header of which is directly attached to the fire tube section, while the rear header is connected to it by a suitable elbow. This construction permits of a continuous waterway or circulation from the fire tube section through the elbow to the rear header of the water tube section, thence through the inclined water tubes to the front header and through this to the fire tube section.

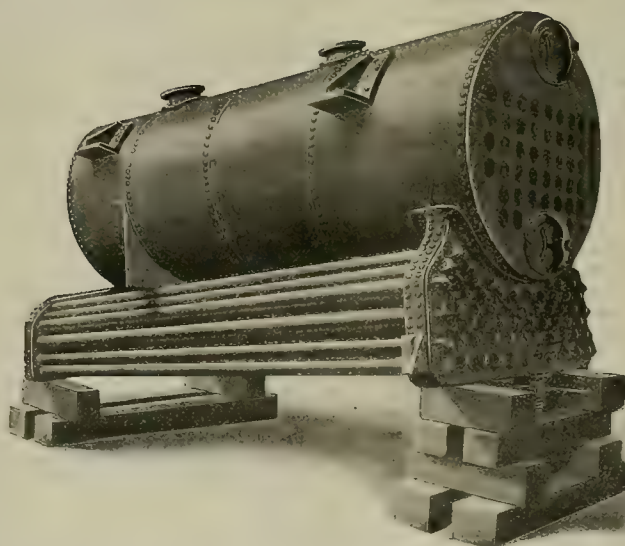
The furnace is located at the front, under the water tube section, and the flames and heated gases, traveling in an opposite direction to the flow of the water, pass to the rear over and around the water tubes and thence through the fire tubes to the front, where they discharge into the stack or smoke flue. Owing to the distance through which they pass in their course through the boiler and the large area of heat-absorbing surface to which they are exposed, the gases are discharged into the stack at a low temperature and resulting fuel economy follows. No tiling over the tubes or cross-deflecting tiles are used



Front End of Boiler Showing Hand Hole Plates and Crow Feet Covering Water Tubes.



Side View of Boiler Showing Water Section Partly Tubed



Complete Boiler With Water and Fire Tube Sections.

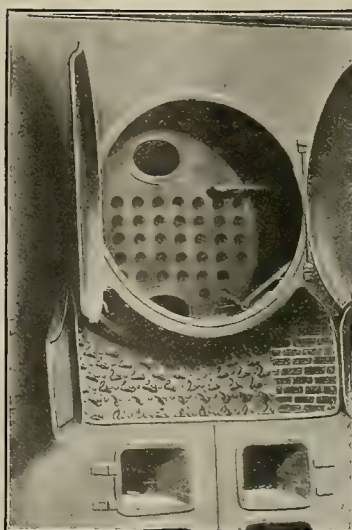
for the purpose of deflecting the flames, collection of soot and unequal action of the heat on the tubes common to boilers in which these tiles are used being avoided. The makers say:

"A peculiar feature of this invention is its adaptability to plants of fire tube boilers already installed which lack the required steaming capacity, for the water tube sections can be attached to these fire tube sections and the heating surface, and consequently the capacity increased to meet the requirements without increasing the floor space occupied by the boiler plant.

"Such an installation was made early in 1903 at the Buffalo Brewing Co.'s plant at Sacramento, Cal., where three 66-inch by 16-foot horizontal fire tube boilers, which had been in operation for about ten years, were found to be inadequate to the requirements and it was determined to attach the water tube sections to them and thereby practically double their capacity.

"Owing to the fact that it was necessary to keep the plant in operation, but one unit could be changed at a time. The first was, therefore, disconnected from the steam header and moved forward a slight distance to enable the workmen to attach the Simmons water tube section containing 1000 square feet of heating surface, after which change it was moved back to place, bricked in, connected and put in service. The other two boilers were changed in the same manner and when the work was completed the capacity of the plant had been increased from 300 to 600 H. P.

"The original plant occupied a floor space 22 feet



Front With Breaching and Fire Doors Open.

long, 27 feet wide and 11 feet high, while the remodeled plant of double the capacity occupied exactly the same floor space, but was 1 foot higher. The

illustrations show this interesting work in progress.

"In March, 1903, a series of tests was conducted at this plant, which showed an evaporation per square foot of heating surface from and at 212° F. per hour of 3.63 pounds, an evaporation per pound of oil per hour from and at 212° F. of 14.3 pounds, and an efficiency of 72.72%.

"The efficiency was based on the heat absorbed by the boiler as represented by the water evaporated into dry steam from and at 212° F. per pound of oil compared with the heat value of the oil per pound, proper correction for the moisture in the oil being made.

"When it is considered that the boilers tested had been in service for a number of years, and that there was no special preparation for the test, the results obtained were very satisfactory and the tests demonstrated that these results would have been materially improved if the length of the furnace and the distance between the lower row of tubes of the water tube section and the top of the grates were increased, as this would have resulted in a better combustion and consequent increased evaporation.

From observations made during the test, the water level was shown to be maintained very uniform, the range being from 4½ inches maximum to 2 inches minimum, while the drop in the water level when the fires were put out was found not to exceed 1½ inch. The quality of the steam showed a very small percentage of moisture, the maximum being 1.5% and the minimum .44%.

"In a modified form the Simmons combined fire and water tube boiler is well adapted to marine ser-

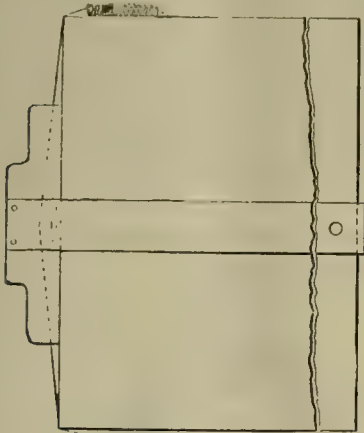


vice, combining, as it does, the good features of the water tube type of boiler with the large steam separating space of the Scotch marine type. It has the additional advantage of being light and compact, having from 2 to 2½ feet of heating surface for each cubic foot of space which it occupies, while its weight is about one-half of that of the Scotch boiler of equal capacity."

The sale of this boiler is controlled by Harron, Rickard & McCone, 21-23 Fremont street, San Francisco, Cal., from whom further information in reference to it can be obtained by any one interested.

Simple Drawing Board Attachment.

A simple attachment for a drawing board may not be an original idea, but is very serviceable. The attachment, herewith illustrated, is easily constructed.



Attach a spring A to the top of the drawing board, then attach a piece of strong twine to the opposite end of spring; next pass it around both corners of the board having it perfectly tight, and fasten at the lower edge by means of a screw eye. Put a round-head screw B in the under side of the T-square head and insert twine in rear of the screw; the tension of the spring will then hold the head of the square against the edge of the board C, and many mistakes will be prevented, as the T-square is always true.

Dangers of Shaft Sinking.

TO THE EDITOR:—It is possible that your readers may be misled by your editorial of September 3rd, on the Argonaut accident. From reports and actual tests, the management knew the fuse to be of the first quality before sending it into the mine. It is not thought, by those familiar with the conditions surrounding the accident, that the quality of the fuse caused in any way the premature explosion. The fuse is of foreign manufacture and is being rapidly introduced here for reasons which concern all local users of explosives.

Generally speaking, the California mines have been using California fuse. A few months ago the California fuse manufacturers combined, with the result that the price of fuse went up, and the quality went down. Since that time four or five mines in this vicinity have begun using imported fuse, and no doubt many others will follow. The "trust" did not notify us when they increased the burning speed of their fuse, and had it not been that we made a practice of testing new lots, there might have resulted a serious accident. This is the point on which your editorial touches, and we heartily agree with you that it is the proper thing to do under existing conditions; but these conditions should be changed so as to have all fuse tested in the factory.

ARTHUR GOODALL,  
Manager Fremont Con. M. Co.

Drytown, Cal., Sept. 4.

The above comment on the recent accident in a California mine is timely, and seems an occasion for the reiteration of what was previously said herein in relation to the above-mentioned distressing accident. There is probably no branch of practical mining in which lurks so many dangers as shaft sinking. There are dangers from above, owing to the possibility of a skip bucket or cage getting beyond control of the engineer and suddenly dashing down the shaft upon the men working in the bottom. There is danger of falling pieces of rock and ore, and the tools and other objects carelessly dropped into the shaft from above; there is danger after spitting the fuse of a premature explosion, as exemplified in the Argonaut case, and danger still lingers, after the shots are "gone," of drilling or picking the next shift, into a cut-off hole. If the accident at the Argonaut mine was not really due to a length of defective fuse, the cause of the disaster will never be learned. The suggestion of the correspondent above, that the fuse be tested in the factory, is eminently correct, but it does not relieve

the mine superintendent of the necessity of testing fuse for his own knowledge and satisfaction. It should be the inflexible rule of every mine that any irregularity in the burning time of fuse be promptly reported to the superintendent. It is unsafe to relax vigilance in this direction.

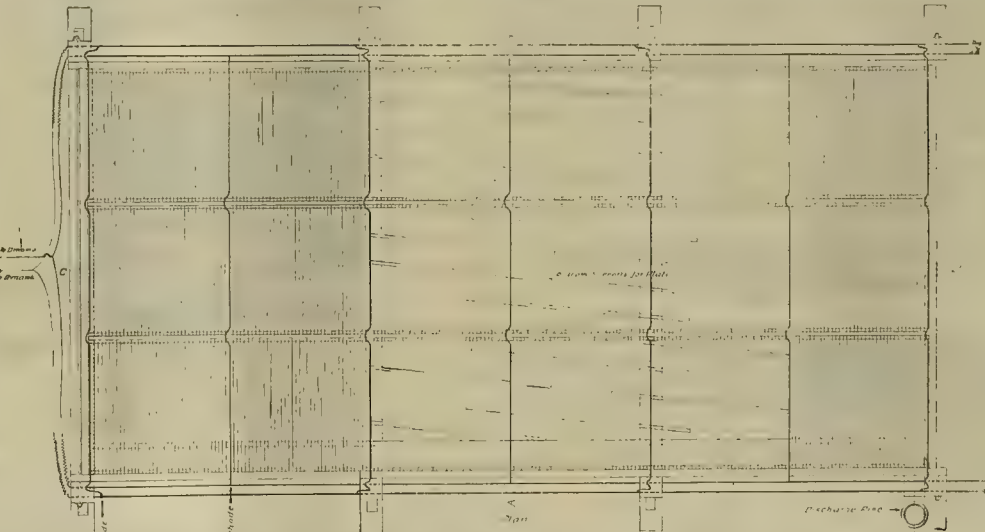
Electrical Precipitation in Montana.

NUMBER III—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by  
MATT. W. ALDERSON.

Each plate is painted on the positive side with graphite in linseed oil. The oil would interfere with the passage of the current, so plates are baked to temperature of 260° C to drive off the oil. Before the graphite was used iron plates without coating were employed, but they were attacked by the solution to such an extent that in a few months they looked like a lace curtain. With the coating of graphite on the positive side there is no appreciable corrosion or breaking up, and the plates after months of service are practically the same as new.

As a general rule in electrical precipitation, the lower the current the more metallic the precipitation, and the higher the current the more mossy or granular. With the solutions at the Butters plant the metals fall to the bottom of the precipitation boxes as a fine powder, but with the solutions at Empire, using as high as two amperes to the square foot, one cannot throw down the bullion as a precipitate; it forms as an adhesive coating on the plates. The amount of this coating depends, of course, on the amount of solution that has been handled. Generally about 4000 tons are treated in each box before a clean-up. Then the coating will come off in flakes, many of which will be as much as a foot across. The plates each strip off from seven to seven and a half pounds of bullion at a clean-up, the bullion averaging about \$1.50 a pound before melting. This bullion has been shipped by express to refineries East, but plans have been made for a furnace in which the bullion will be melted, thus reducing the quantity one-half, and,



The Malm Electrolytic Cyanide Plant, Marysville, Mont.

as the product will be in bars of about 500 pounds each, they may be shipped by freight, thus reducing transportation charges to one-sixth present cost.

The excellence of the work done is best shown by an analysis of the product. This, made as a smelter would make it—for base metals only—shows the following average of several clean-ups:

Copper.....	51.2
Lime.....	13.4
Iron and aluminum oxides.....	7.3
Arsenic and antimony.....	6.7
Lead.....	3.3
Gold and silver.....	3.2
Total.....	85.1

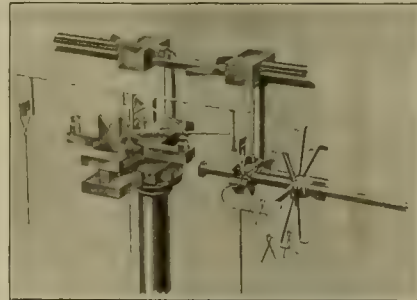
This, it is to be understood, is not a complete analysis, but one for the straight metals only. No other common base metals are found, so it is taken for granted the remaining 15% are various oxides. In the light of the above one may form something of an idea of what an enormous load of base products the solutions would soon carry if they were not removed. The recovery of copper is about 800 pounds a day, or 1.6 pounds to each ton of tailings. A surprising feature is that the bullion sometimes shows as high as 6% lead, a substance very sparingly soluble in cyanide solutions. This lead is in the ore as carbonate, and a small quantity of it is taken into solution and saved in the precipitate.

The cost sheet for the present year shows cost of loading: Labor and supplies \$.021, power \$.025 = \$.046. Previous cost for this was: Labor and supplies \$.072, power \$.045 = \$.117. Other costs are as follows: Cyanide \$.104, lime \$.016, precipitation and clean-up \$.03, pumping \$.03, sluicing out \$.006, re-

pairs \$.011, miscellaneous \$.036; total, \$.029 per ton of tailings treated. These figures do not include interest on investment or anything for redemption fund, but are working costs only. As such they give a clear idea of the economy of the operations.

Weighing Without Weights.

A device for weighing without weights on button balances has been invented and patented by F. W. Thompson, 1717 Arapahoe St., Denver, Colo., to be accomplished by the use of riders, as shown in the engraving herewith.



Weighing Without Weights.

"These riders, when not in use, are suspended from a multiple rider carrier, mounted to move parallel with the horizontal part of the hanger, and to rotate in either direction so as to bring any desired rider in position to be placed on the hanger (not on the beam) as occasion may require, the same as weights are placed in the pan by hand. All the riders may be placed on the hanger for a single weighing, if necessary. Each rider has a peculiar bend for the purpose of designating its weight, and each arm of the carrier is numbered to correspond to the weight of the rider it is to carry. The object of this invention is to do away with the handling of small weights by hand or with the tweezers."

The manufacturer claims that by using these riders

it saves the assayer time over the old method of using weights. The riders are all in plain sight along the wire and the result is obtained at a glance. There is no opening and closing of the balance door for the purpose of changing weights, which sets up air currents and requires a few seconds' wait for it to subside.

THE PROSPECTOR.

The rock specimen from Temescaltepec, Mexico, is diorite, with infiltrated veinlets of quartz.

The rock from Amalie, Kern county, Cal., is metamorphic, probably altered, diorite, and is now practically a granular quartz rock with disseminated iron sulphide.

The rock samples from San Jose, Cal., are: No. 1, a metamorphic sandstone, showing a few small grains of cinnabar; No. 2 is serpentine; No. 3 is the metamorphic slate-like rock called alta by the miners. It probably forms the wall of a vein or fissure.

The several mineral specimens from Trinity county, Cal., have been identified as follows: No. 1, pyroxene, with quartz veinlets; No. 2, diorite porphyrite (not typical). No. 3, an intrusive rock, altered and containing much calcium carbonate and finely disseminated pyrite; No. 4 is diabase; No. 5, diorite; No. 6, diabase, and No. 7, diorite.

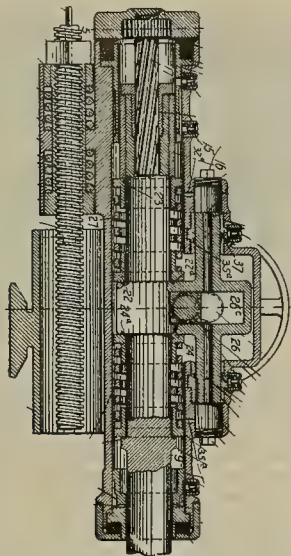


# Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 30, 1904.

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 768,894; Henry Deitz, Denver, Colo.



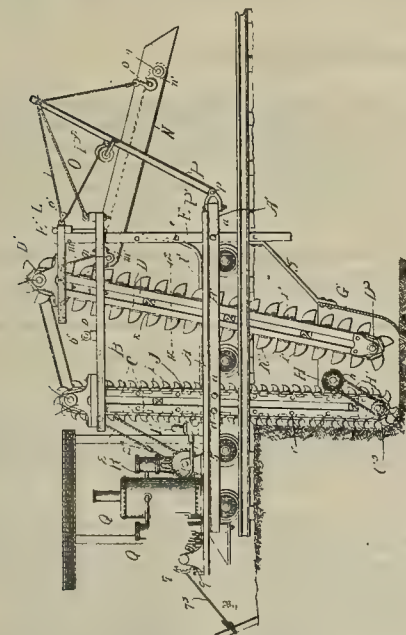
In drill, combination of casing having central guide-way and longitudinal guideway located laterally of central guideway, drill holder mounted to reciprocate in central guideway, tool-actuating part located laterally with relation to drill holder and bifurcated to straddle latter, projection extending from tool-actuating yoke and fitting in lateral longitudinal guideway to be limited thereby to movement in path parallel to that of drill holder, suitable bearings mounted on drill holder on opposite sides of bifurcated yoke portion, and suitable means for reciprocating yoke.

TOOL FOR MAKING DEEP WELLS.—No. 769,080; C. M. Heeter, Butler, Pa.



Drilling tool for deep wells having sides recessed to afford shoulders for engagement with fishing tool; recess having converging guiding sides, and longitudinal groove for reception of hook of fishing tool.

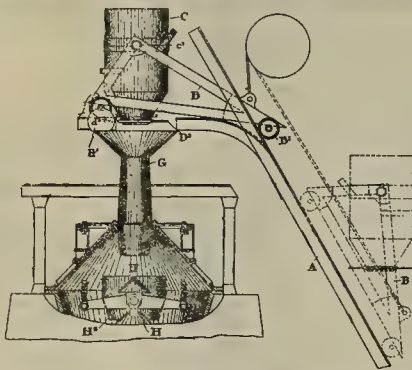
EXCAVATING MACHINE.—No. 769,105; A. McCarthy, New Orleans, La.



In excavating machine, combination with suitable movable support, of endless flexible means rotatably carried by movable support, transverse plates carried by flexible means, plurality of picks affixed to transverse plates, plurality of movable scoops located in rear of picks and carried by movable support.

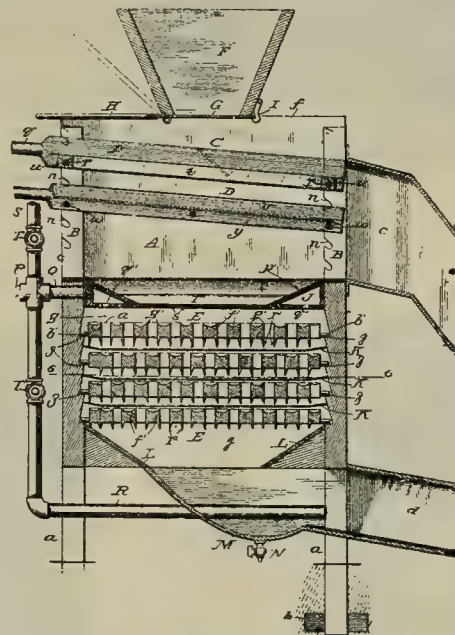
port, and means for conjointly operating flexible means and scoops and feeding movable support forward during operation.

SKIP CAR OR HOIST FOR BLAST FURNACES.—No. 768,208; S. W. Vaughn and J. B. McClure, Lorain, and A. J. Boynton, Elyria, O.



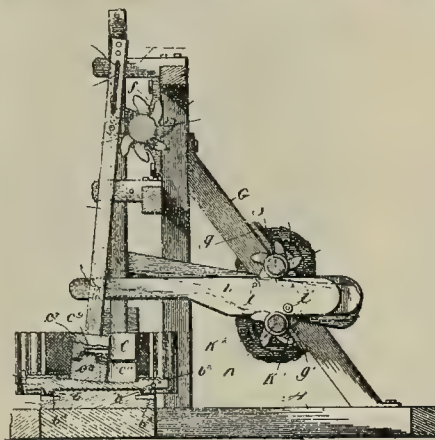
In skip car, combination with bucket having centrally opening valve consisting of pivoted sections, and circularly movable annulus to which sections are connected, of sliding bar on furnace top arranged to engage annulus, and means for operating bar.

APPARATUS FOR RECOVERING VALUES FROM SAND OR DIRT.—No. 768,624; C. M. Poppenberg, Brainerd, Minn.



In apparatus for recovering values from sand and dirt, combination of casing, plurality of quicksilver holders arranged one above the other, and having depressions provided with sharp edges, and spaces between the depressions for downward passage of sand or dirt, means for supporting the holders in casing in such manner that spaces are formed between the sides of the holders and casing for downward passage of sand or dirt, and deflectors arranged below upper holders so as to receive sand or dirt from spaces and conduct same to next lower holder.

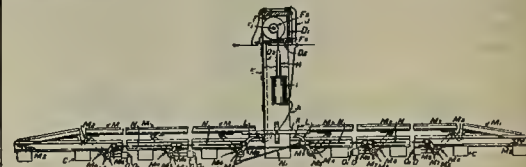
STAMP MILL. No. 768,844; J. Cable, Chicago, Ill.



Stamp mill comprising mortar bed, gravity-acting stamp, means for lifting stamp from one side of bed only and releasing stamp, whereby it drops by gravity upon material on mortar bed, and means for

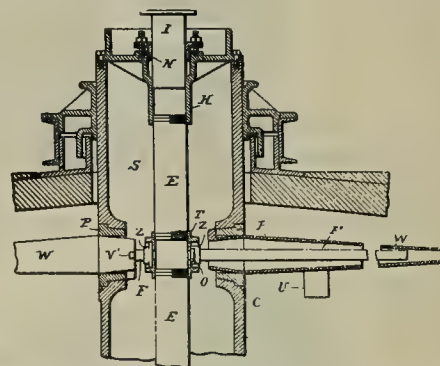
shifting stamp while bearing on such material from side of bed at which it drops to opposite side of bed and for returning it, whereby stamp is shifted in complete to-and-fro traverse in contact with such material between each drop and lift thereof.

MINE GATE.—No. 768,653; J. P. Cowing, Cleveland, Ohio.



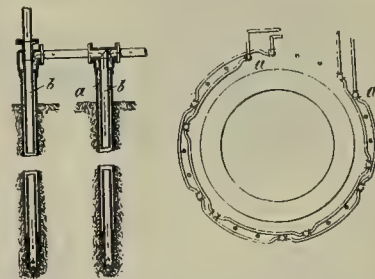
Combination with trolley wire and car rails, of depressible rails carried by car rails, gate frame mounted adjacent rails and supporting trolley wire, rotatably mounted curtain carried in frame, contact member mounted near base of frame, means actuated by depressible rails being electrically connected with car rails adapted to contact with member upon depressing depressible rails, and electrically operated means in circuit with trolley wire adapted to raise curtain upon depression of last named rails.

ROASTING FURNACE.—No. 768,748; O. Hofmann, Argentine, Kans.



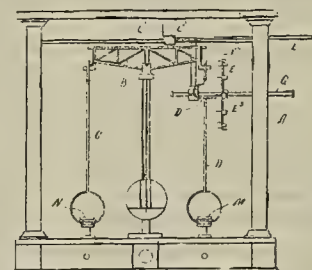
In roasting furnace combination of hollow shaft provided with openings at roasting shelves, sleeves fitting openings and provided with flanges, and bolts for connecting flanges to shaft, bolts being provided with nuts at one end and with wings at opposite end adapted to interlock with shaft.

CONSTRUCTION OF FROZEN WALLS FOR SHAFTS IN MINES.—No. 768,774; K. Schmidt, Erkelenz, Germany.



Improved means for forming frozen walls for shafts embracing plurality of overlapping groups, each composed of connected freezing-tubes, and freezing medium conveyed through groups.

ASSAY BALANCE.—No. 768,829; F. W. Thompson, Denver, Colo.



In balance of class described, combination with balance beam, of hanger connected therewith and provided with horizontal part adapted to hold riders used as weights, and rider carrier mounted in suitable proximity to horizontal part, carrier being provided with rider-holding pins and being revoluble and longitudinally movable.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

## ALASKA.

Manager R. W. Simmons of the Alaska C. Co., operating near Coppermount, on Prince of Wales Island, reports work progressing on the smelter. A 200-ton furnace is being built.

Two more ditch systems are being constructed at Nome this summer. The larger is that of the Champion M. & T. Co., of which T. A. Champion is manager. It will comprise nearly 40 miles of ditches, being designed to bring water to every foot of gold-bearing ground on Nome and Snake rivers and their tributaries.

## ARIZONA.

### Gila County.

The Old Dominion C. M. & S. Co. at Globe reports tearing down the old smelter under way. The new smelter is nearing completion, although there is still considerable work to be done before the furnaces can be blown in. It is expected to start by September 20th. The washouts on the G. V., G. & N. railroad caused a delay in getting machinery and material needed to finish the work. There is considerable track to be laid about the smelter. Grading is under way south of the smelter building for the main track running parallel with the present track, which is to be used as a switch to the old coke and ore bins. The new ore bins are finished and also the trestle connecting them with the feed floor of the smelter building. The recent heavy rains interfered only slightly with surface work, the most serious result being the caving from the surface of the mine workings near the open cut east of the old shaft. The bottom of the gulch fell out and considerable water from the surface found its way into the mine. To prevent flooding in the future the break in the gulch has been flumed. Work has been progressing on the steel ore bins at the new shaft. Up to July 1 the Old Dominion company had spent \$708,305 on its plant at Globe, and expects to complete its new work within a total of \$900,000. The management is charging all new underground work, including the sinking of the new shaft, against the cost of its copper—a matter of between \$6000 and \$10,000 per month. The converter plant will not be completed until late in the fall.

H. Terrill, in charge of the Cowboy, Gladys and other gold claims at Dripping Springs, near Troy, for Oklahoma men, says development has reached depth where he will equip the mine with machinery, including a hoist.

### Graham County.

The Home C. Co. has sold to J. Molder ten of its gold claims, being the Buzzard's Shadow group in the Copper mountain district, 3 miles from Morenci. Molder intends to drive the Lillian tunnel through the mountain. The tunnel is in 300 feet and in a body of low-grade free milling ore which runs \$4 per ton. He also will continue sinking the shaft on the Buzzard Roost claim. The Home C. Co. is sinking its shaft on the Hobson claim with W. Jenkins as superintendent. The wagon road has been finished to the mine.

Manager Potter of the Sierra de Oro mine, near Clifton, reports a strike made in running a crosscut tunnel. The tunnel is in 800 feet, and has cut the fourth lead, which is 4 feet wide and carries values of \$70 in gold and 6% lead. This lead was cut at a depth of 462 feet from the surface. The tunnel is being driven to cut two large veins which outcrop on the surface, and which will be reached in 300 and 600 feet from present face of tunnel. In addition to finding ore the tunnel is also making enough water to run a plant, which will be placed at the mouth of the tunnel, and cost of transportation of ore reduced, says the Clifton-Morenci Mining Bureau.

### Maricopa County.

F. Webb, at Bismuthville, 16 miles from Phoenix, on the McDowell road, says the reduction works of his bismuth mine is turning out two tons per week, and the ore carries 10% bismuth. The reduction plant uses a leaching process. The ores are first ground fine, then run through a series of tanks holding 500 pounds each, in which is placed the leaching solution. Webb estimates it costs 10 cents a pound to reduce the ores to a sub-chloride powder, ready for shipment to the refinery. He expects to enlarge the plant. The mine is 10 miles from the plant, which, to get water, is near Evergreen, on the canal.

### Mohave County.

(Special Correspondence).—The development of the 500 level in the Gold Roads property shows the vein to be larger and

as good a grade as that developed above. The metallurgical operations have not been wholly satisfactory and the company is considering the making of radical changes in treatment, among which is the substitution of wet for dry crushing. It is thought the result will be a higher saving of values at decreased expense.

Acme, Sept. 5.

W. J. Cleeland of Kingman, part owner of the mines of the Philadelphia & Arizona M. Co., at Chloride, reports development being increased, and more men will be put to work. Equipment will also be increased.

Men are at work on the Enterprise mine at Stockton Hill, and it is reported a steam hoisting plant will be put up on the main shaft. W. A. Mensch is manager.

E. Hilty, part owner of the Hilty-Anderson mines, in the Gold Roads section, near Acme, says development will be resumed.

### Pinal County.

The Troy-Manhattan C. M. Co., at Troy, reports work proceeding at the Davis shaft, where the discovery of wolfeite is being opened up. The concentrating machinery to treat the product is being set up. Work is going on in the Queen tunnel on a raise to meet the Alice shaft.

### Santa Cruz County.

In Mansfield gulch, Tyndall district, Santa Rita mountains, near Nogales, E. W. Rolfe and M. Stetson report finding ore values 2½ miles northeast from Joplin group of mines, and 1½ miles east from Presidential group. The discovery shaft is sinking on the Ruby. There is a 9-foot ledge showing sulphide of copper ores assaying 12% copper, 18 ounces silver and \$4 per ton gold. It will be developed.

Work is progressing in the Joplin mines, in the Tyndall mining district, Santa Rita mountains, near Nogales. The ore body is being opened up. The Joplin is bonded to E. C. Mallette, of the Springfield-Arizona Co., for \$20,000.

### Yavapai County.

E. F. Cullerton of Chicago, Ill., part owner of the Kinney group of mines near Prescott, says hoisting machinery will be put in.

The New Idea G. M. & M. Co. has been incorporated to work Childers' mines at Turkey, 38 miles southeast of Prescott, on the Prescott & Eastern Railroad. The incorporators are E. Cosgrove, A. S. Goodell, J. Agee, W. F. Lorenz, W. R. Orr and T. M. Childers of Silver City, N. M. The last named is manager.

The United Verde mine, at Jerome, is increasing its output. The company has re-equipped the main shaft, affording added hoisting facilities. The smelter is also being improved. Two of the 250-ton furnaces have been replaced by furnaces of 500 tons capacity each. A third furnace of the same size will also be built. A dust chamber is in course of construction. The ore taken from the United Verde mine is largely sulphides, requiring no concentration, and is heap-roasted before smelting. C. W. Clark is general manager.

### Yuma County.

C. H. Gray, of Prescott, owner of the Arica mines, 45 miles northwest of Ehrenberg, reports he will reopen the group. There is one shaft 130 feet deep and another 150 feet. Gray proposes to continue sinking the deeper shaft.

## CALIFORNIA.

### Calaveras County.

The Parnell mine at Smith's Flat, near Angels, has been bonded to M. Voinich et al. for \$10,000. Work will be started this month and the mine opened up.

G. C. Turner of Stockton, president of the Voinich M. Co., reports work progressing on the company's mines on Bear mountain, west of Angels. The outside work consists in the main of surveying and building a ditch course from Greenhorn gulch to convey the water to the Voinich mine. The company will get pressure of 260 feet head, which will run machinery at the mine. The company has a 10-stamp milling plant which will be set up. Sinking the shaft continues, the depth being 600 feet. They will cut a station and prepare for opening of stopes.

### El Dorado County.

The Franklin gravel mine, near Placerville, has been sold to D. H. Jackson and Eastern men. H. C. Plummer will have charge. A barrel-mill to work the cemented gravel will be completed in October.

D. H. Jackson of Placerville, with Eastern men, has bought the Landecker gravel mine for \$250,000 cash. Contracts will be let for building a mill and its equipment with machinery.

### Kern County.

C. A. Canfield of Bakersfield, manager, says the Chanslor-Midway pipe line will

not go through Sunset, but to the ocean at Port Harford direct. It would not handle Sunset oil, but will take Midway and some McKittrick product. Construction will start this month.

### Madera County.

(Special Correspondence).—The Yosemite C. M. & R. Co. is arranging to put in a steam hoisting plant. The property of the company consists of forty-eight acres, through which run four parallel veins about 300 feet apart, containing copper ore. On the outcrop of the veins shafts or other excavations have been made to 110 feet in depth. The property is in northern Madera county, contiguous to the branch of the Southern Pacific railroad from Berenda to Raymond, the right of way of the railroad forming its southern boundary. It is on the copper belt. Two and a half miles north is the Buchanan mine and still farther north, in Mariposa county, are the Green and Green Mountain copper mines. Three miles south of the Yosemite company's ground is the Ne Plus Ultra copper mine. The principal working shaft is within 200 feet of the railroad. At that point also is a stream of water fed by springs. The veins carry carbonate ores, with black and red oxides above the water level, where they change to sulphide—water being found at depth of 50 to 60 feet. The width at water level is 4 to 10 feet. The sulphide ore so far as tested is of shipping grade. On two of the veins shafts have been sunk, one to 60 feet and the other to 110 feet. At depth of 92 feet the deeper shafts opened up native copper, and the quartz at that depth carries also the red and black oxides. The office of the company is at Fresno.

Fresno, Sept. 6.

### Nevada County.

Manager J. Underwood, of the Omega mine, near Washington, has men retimbering the tunnel. Next week he expects to begin construction of a dam. When the Omega mine is again in full operation it will employ seventy-five men.

The Mohegan-Gold Flat M. Co. of Grass Valley, J. T. Morgan, president, will resume development of its property on Gold Flat, with J. Skewes as superintendent.

The Nevada County mine has been connected with the Siberian mine's water main, near North Columbia, for power, giving it a 600-foot head.—The Badger Hill mine is being opened up by W. H. Hicks, C. Hopkins and M. MacConnell of San Francisco. They will pump out the 120-foot shaft and sink it deeper. Then they will drift both ways.—Another mine at Badger Hill is being developed by O. Griffiths. He has put in an arrastra and is working the ore, which has free gold.

At Rough and Ready the steam pumps are unwatering the Ironclad mine. Cross-cutting will be resumed, as will also the driving of the drift in the 330-foot level. Foreman E. Russell has charge temporarily for Superintendent S. J. McConnell.—Sinking the new shaft on the New Constitution ground on Randolph Flat is well under way, under G. C. Hay. The shaft is a double compartment and is going down on the vein, 200 yards from the old one. Machinery is being placed for a steam hoist.

### Orange County.

The Santa Ana Tin Co., operating in the Santa Ana mountains, near the head of Trabuco canyon, are treating their ores by a wet process which is reported to operate satisfactorily. It is claimed these mines produce a number of rare metals, as well as tin.

### Placer County.

The Star Town mine at Last Chance, near Michigan Bluff, is running a bedrock tunnel to tap the main channel. W. Davis is superintendent.—The Evening Star mine has been bonded by an Eastern company, which is working two shifts. They are running a bedrock tunnel to tap the main channel.—At the Deep Canyon G. M. Co.'s mine stoping is under way. The men are following a lead across the canyon.—The company owning the Channel Bend river claim, E. C. Kavanaugh manager, has started work on the dam which will be used to work the mine. The dam is being built 1 mile below the mine on the American river.

The Placer M. Co., of which D. Ray is superintendent, at Last Chance, near Michigan Bluff, has struck the channel and gravel is being taken out. When the raise which they are driving is completed thirty men will be added to the payroll.

### Shasta County.

(Special Correspondence).—In Old Diggins mining district, near Redding, D. E. Hunt and J. Sallee have obtained a bond on the Reid mines, consisting of six claims. To west of this group they have also a bond on the Hendy group, owned by Joshua Hendy Estate of San Francisco, for

driving a tunnel a distance of 1200 feet to strike the ledge of the Sampson mine of the Reid group at a depth of 320 feet and 220 feet below the level of the old workings. The entrance to this tunnel is 4000 feet from railroad spur on opposite side of Sacramento river, where will be built bunkers for ore to be shipped across by aerial tramway moved by electrical power. At a point 900 feet in, a crosscut is being run to open the ledge of the Spanish mine. The old workings on the Sampson consist of a 150-foot crosscut cutting the 14-foot ledge at 150 feet below the surface, and drifts run each way. The quartz was shipped to Keswick and averaged \$6 a ton in gold. No stoping was done. Electricity will be used in working aerial tramway and also the drills in development operations.

The property of the Broda M. & S. Co. is located in Old Diggins mining district, and consists of eight full claims, patented ground. There are five distinct gold-bearing quartz veins, with values ranging from \$3 to \$20 gold per ton. There is also a copper vein, the values from shipments being 4% to 12% copper, and from \$1.50 to \$7 in gold. Development is progressing with the tunnel in 120 feet and at 400 feet farther in it is expected the copper ore body will be cut at a depth of 400 feet below surface. An 80-foot shaft cut through 50 feet of gossan and the ore found assayed 7% copper and \$2 gold. Several gold-bearing quartz ledges will be cut by the tunnel before the copper ledge is reached. The company is of Redding, with F. F. Dustin, secretary; W. W. Old, manager.

The Shasta National Con. M. Co. has been organized in New York City and bonded the eight mining claims in Old Diggins mining district, owned by the National Con. M. Co. of San Francisco. The main crosscut tunnel is in 900 feet cutting the ledge and from that point drifts were run 500 feet, a winze was sunk 100 feet and drifts run 400 feet. At 200 feet farther on in the main drift another winze was sunk 300 feet and drifts run several hundred feet from two levels. All ore above these drifts was stoped and milled. The mine has been idle for several years. J. Dailey is in charge, and he has run a crosscut from a point 500 feet in, in the old tunnel, 150 feet, cutting a second ledge 6 feet in width. On each wall is a 6-inch pay streak of white quartz, base in character, with values of \$20 per ton in gold. Work will continue for 50 feet farther when a drift will be sunk and crosscuts made. On the property is a 20-stamp mill with four Frue vanners and a cyanide plant of 25 tons per day capacity, an assay laboratory, office and other buildings. H. P. Walker is president; C. V. N. Radcliff, treasurer; P. M. Maher, secretary. The main office is in San Francisco.

Redding, Sept. 6.

(Special Correspondence).—Near Shasta, Berg and Dobrousky Bros. of Redding are developing the Early Discovery, a gold group. The area consists of 160 acres of patented ground with several contact veins. A crosscut tunnel at 190 feet in cut a 3-foot ledge of ore 100 feet below the surface. Drifts were run both ways. The ore is a soft, granulated quartz, and averages \$10 per ton in gold. A three-compartment raise is being driven to reach the surface to aid in getting air. Afterward a shaft will be sunk to open the ledges at greater depth.

South of Shasta, the Middle Creek G. M. Co. is preparing to work the porphyry dykes cutting through its claims. The ground is near the Bunker Hill mine. H. O. Cummins is in charge for the Gold Creek M. Co., it being composed of North Dakota men. A sinking pump has been put in, in addition to the hoisting plant already in operation.

G. A. Schroeter has men mining ore from his group, 4 miles south of Shasta. The ore is shipped to Selby's.

The Sunlight mine, owned by W. A. Pryor et al., is being negotiated for by Eastern men. The advent of electrical power around Shasta will enable this property to be unwatered, and the ore, known to exist in drifts already made, to be mined and shipped. The intention is to sink the main shaft to 200 feet, establish levels and run drifts.

Midway between the Mt. Shasta mine and Whiskeytown is the Kankapee group of six claims, owned by Pryor, Henry et al. Development will begin under bond September 15.

Seven miles from Oro, L. F. Barlow, as manager, has men working the property of the Marina Mariscano G. M. & M. Co. of San Francisco. The group comprises eight claims, and is on the divide between Jerusalem creek and North Fork of the Cottonwood. There are two parallel ledges, the ore is oxidized and also carries sulphides. The 1200-foot tunnel tapped the ledge at 350 feet below the surface, and drifting from that point was extended each way 500 feet. The ledges



are irregular in width, and are in a general formation of lime and porphyry. The value of 1000 tons of the ore shipped to the smelter showed \$223 per ton.

Shasta, Sept. 6.

(Special Correspondence).—Near Whitehouse Camp, in Old Diggings district, considerable activity in mining is under way. Low-grade ore is being shipped across the river by an elevated wire tramway and loaded onto cars at Central station at \$2 per ton. The tramway works by gravity, the boxes of ore requiring derrick power to load onto the cars. The work is under supervision of A. A. Anthony.

The Original Quartz Hill G. M. Co. is developing three patented claims in Old Diggings mining district. The formation is a diorite and the ore white and rose-tinted quartz, carrying tellurides of gold, with a small percentage of sulphurets, and classed into "low grade" with values of \$5 per ton and "select" with \$40 per ton. There are three well-defined ledges extending through the claims, with a northwest-southeast course. The main or west ledge is 40 feet wide, the middle ledge 37 feet, and the east ledge 12 feet in width. Development is by open cuts. The tunnel on the middle ledge, 330 feet in, with a crosscut 100 feet, is at the breast 140 feet below the surface. Connections are made to the surface by raises. In the lower tunnel the ore body between walls is 49 feet. Superintendent W. J. O'Donnell estimates 200,000 tons of ore ready for stoping above this tunnel to the surface. The Keswick smelter, 3 miles away, pays \$2 per ton for quartz flux. The company is composed of Chicago, Ill., men. It is proposed to build a reduction plant. M. Maryganski is manager.

The Central mine, near Whitehouse, is owned by Whitehouse & Bliss of New York. It was first worked in 1879. The ledges are from 1 to 14 feet in width and principally between walls of slate. The ore is quartz and is being used as flux at the Keswick smelter. The upper tunnel at 235 feet cut the ledge and 400 feet of drifting has followed. Another tunnel cut the ledge at 900 feet in, and drifts have been run 600 feet. Men are doing development under the management of A. A. Anthony.

The Evening Star group of three claims, owned by F. Panter and F. Litsch of San Francisco, has been developed. The ledge matter is quartz between walls of porphyry and slate. The ore carries sulphurets, with tellurides, the average value being \$10 per ton in gold. The 1500-foot tunnel struck the ledge at 1200 feet in. At one point in the drift from the tunnel the ore shoot is 120 feet in length. C. Lanyon is superintendent.

Walker Bros. of Salt Lake City, Utah, compose the Utah & California G. M. Co., owning a group of claims near Whitehouse, and have G. Seamans in charge. Recently a leasing contract was made with Lawyer & Thompson, and they are making regular shipments to the Keswick smelter.—V. Veuquod and A. Duval are developing a promising claim on the banks of the Sacramento river, opposite Central station, near Keswick. The ledge is 2 feet wide of low-grade ore, which is sold to the Keswick smelter.—R. C. Wilson of De Lamar and C. O'B. Redding of San Francisco are developing a copper proposition on Little Bully hill, near Winthrop. The double-compartment shaft is down 90 feet and at 100 feet farther depth they expect to strike the vein of the Bully Hill.

Redding, Sept. 7.

(Special Correspondence).—The Redding G. & C. Co. is operating on Clear creek, 12 miles from Redding. The holdings are 128 acres of patented placer ground, extending 1½ mile above the Igo bridge and ½ mile below. Lumber has been delivered for building a flume to divert the water from the river bed during building of the dam. At same time the gravel of the river bottom will be washed for gold it may contain. About 1000 feet below the dam an electric power plant will be erected for transmitting power to mines, mills and commercial interests. A smelter may be built, as over 200 tons of ore have been guaranteed to be delivered daily from the gold properties in that section. L. F. Mitchell is manager.

Redding, Sept. 7.

#### Siskiyou County.

(Special Correspondence).—The King Solomon mines, near Cecilville, are owned by the Canyon Mountain Co. of New York. The former owners placed on the property an 8-stamp and a 5-foot Huntington mill, with which they treated the ore taken out to a depth of 250 feet on a 60-foot ledge. The shoot has been proven 600 feet in length. The company, under the management of W. H. Young, has run a crosscut tunnel 600 feet and tapped the ledge 200 feet below the old workings. The ledge was 60 feet wide at that point. The strike of the ledge is 40° east of

north, next to a schist formation on one side. A mill run of 600 tons taken from the ore shoot gave a return of \$6 per ton in gold. A winze has been sunk 50 feet and in the same character of ore. Manager Young says the old milling plant has been abandoned and the company will increase developments during the coming winter, and in the spring build a 20-stamp mill and a cyaniding plant. Electricity will be the motive power in use.

Cecilville, Sept. 6.

(Special Correspondence).—On Nigger creek, 12 miles from Gazelle, the Shook M. Co. owns 320 acres of patented railroad land. The mineral ledges are in a slate formation and some are 30 feet in width. Development is by a 75-foot shaft on the ledge and three tunnels in 150 feet each. The ore is a sulphide. Concentrators are not yet used in the stamp mill. A portion of the 320 acres is gold-bearing gravel, there being a channel 70 feet wide, 1500 feet long, and the banks 15 feet in depth. Several nuggets have been found. J. W. Shook, at the mine, J. L. Berry and H. A. Behnke of Gazelle are owners.

Gazelle, Sept. 6.

(Special Correspondence).—The Siskiyou Electric Power Co., with headquarters at Yreka, E. H. Steele manager, has its plant installed on Fall creek, 22 miles northeast of Yreka, where from a spring and two creeks at least 2000 inches of water are at all seasons available. The plant starts with 500 K.W. output, but has a capacity for 4000 K.W., and the pipe is laid for that power. The lines extend to Yreka, a branch going to Montague, and the main line from Yreka to Fort Jones, Etna, Callahans and the principal mines of the various gulches and throughout Scott valley. Light is furnished to the towns and light and power to the mines, mills and sawmills.

The Crater Creek M. & D. Co. of Santa Rosa has bought and is developing nine claims adjoining and across the ridge from the Dewey mine. The foot wall is slate and the hanging wall granite, with the ore quartz, with values of \$15 per ton in gold. Development work is being increased to admit of placing hoisting and other machinery next spring. W. T. Barnes, H. Butts and P. F. Green of Santa Rosa are president, secretary and treasurer, respectively.

On Salmon mountain, between Friend and Six Mile creeks, M. J. Ward of San Francisco and J. B. Foot as manager are developing a group with a 6-foot ledge outcropping between slate and porphyry. The main tunnel—a crosscut—is in 1000 feet. It has maintained that width in 400 feet of drifting to the east and west. The ore as put through a 2-stamp mill yields \$20 per ton in gold. As it carries sulphurets, a cyanide plant will be added next spring.

Yreka, Sept. 7.

(Special Correspondence).—On Scott mountain, 7 miles from Callahans, the Forest King M. Co. of Portland, Or., is developing a group of claims. The ledges are on a contact between porphyry and serpentine, with bunches of siliceous ores, high grade, with sulphides and free gold. Development is by sinking on the side of the ledge matter in the serpentine wall, because it is soft. Manager J. Empey will develop the ground from the 100-foot level, using a horse whim for hoisting purposes. He estimates 500 tons of high-grade ore on the dump.

Callahans, Sept. 6.

#### Trinity County.

(Special Correspondence).—Mining operations in Hayfork section are not active at present. The Tom Layman group of four claims, within 5 miles of Hayfork, shows a quartz ledge 20 feet in width with gold values. The property is partially developed by three tunnels—40 feet, 110 feet and 200 feet. There is another crosscut tunnel of 240 feet. In a 4-foot ledge assays show values of \$50 in gold. Across the gulch is the extension, owned by L. Layman. Three tunnels—50 feet, 100 feet and 170 feet—show a ledge of quartz 4 feet in width carrying much gold. The best values in all these claims are found in small stringers of sugary quartz. The owners are developing. The ore, a sugary quartz, with sulphurets, assays \$60.

The Golden Summit Hydraulic Co. owns on Weaverville road, 10 miles from Hayfork, 500 acres of gravel ground which it is estimated will yield 15 cents in gold per cubic yard. Work is under way on ditch to bring water from Summit creek and will be finished by October and mining operations begun. Forty acres are blocked out, one open cut being 700 feet in length showing good gravel below. The banks are 25 to 35 feet in thickness and the bedrock is slate. R. Mack and B. F. Myers are principal owners of the company. Platinum values are also found in the gravels.

Van Gordon, Coler, Smith & Hammond have formed the Drinkwater M. Co. and bought the Drinkwater gravel mine of

160 acres, and 120 acres additional for dumping ground. Water is brought from Kingsbury creek. A No. 2 hydraulic giant is in use.

J. B. Dobbins of Hayfork owns a group of four claims which are an extension of those of the Layman group. The 200-foot tunnel opens up a well-defined ledge in slate walls. Several open cuts on the surface show stringers of quartz with gold values. The lower tunnel is in 180 feet and by farther driving it is expected the 4-foot ledge will be cut at 400 feet below surface outcrop. They will work the property during coming fall and winter.

M. G. Wormack and F. Bowerman have found, about 14 miles east of Weaverville in a serpentine formation, a ledge of asbestos, the fibers being from 4 to 10 inches in length.—C. D. Morton et al. own at Hynopm, 25 miles south of Hayfork, 1200 acres of lignite coal holdings.—J. W. Diller owns on Salt creek three claims which he is developing by sinking a shaft on a 3-foot ledge of quartz. It is a low-grade proposition. Near his property is a natural bridge, the arch of which is 40 feet high and 100 feet across.

On Kingsbury creek A. L. Kellogg owns a group of five claims, the ledges being in blanket form and between porphyry and slate. The ore is free milling and values from pockets worked by arrastra yielded \$60 to the ton. Development is by three tunnels 40 to 200 feet in length.—Fifteen miles west of Hayfork W. H. Friend is developing a group of seven claims in a slate and granite formation. The ledge, 16 feet in width, is quartz with iron sulphurets, carrying silver and gold values. A tunnel 150 feet in cut ledge at 75 feet below the surface and values were \$12 per ton.—Berry & Keller of Selma have bonded the McCampbell group of claims up Hayfork canyon and are increasing developments. On the surface a 6-inch stringer has been exposed for 1000 feet.

On Barker creek, 6 miles northeast of Hayfork, C. H. Farmer et al. are developing a group of three claims. The workings are on a 3-foot ledge in granite, slate and quartzite. One tunnel is in 800 feet, another 180 feet. Ore is a white quartz with \$25 assays.

Hayfork, Sept. 6.

#### Taolunne County.

It is reported machine drills will be placed in the Mohican mine, near Groveland. The incline shaft is down 300 feet from the tunnel level, and the ore is reported yielding satisfactory results in the 10-stamp mill.—A gasoline engine and hoist are being put in at the Hall Ranch mine, near Groveland, where operations will begin next week, says A. Trittenbach of the Dutch mine, at Quartz, who is manager.

El Rico M. Co., operating the Belle mine, near Tuttletown, has been granted extension of one year on its bond. Among the improvements proposed by the company is enlargement of the shaft from one to three compartments. After that is done the shaft will be sunk 200 feet deeper, making it 800 feet total. The hoisting machinery will be replaced by a double reel hoist. W. J. Rule is superintendent.

#### Yuba County.

Men have been put to work in the Boa mine, at Timbuctoo, near Marysville. M. C. Meeker is superintendent.

### COLORADO.

(Special Correspondence).—Arrangements have been completed for blowing in of the smelter at Golden this month. The plant will be run as an "independent" operator and is expected to be a stimulus to mining in the section tributary to Golden. The plant was erected some years ago and operated as a pyritic smelter, but for various reasons it was closed down. The new management claims to have a market for its matte and will be in a position to handle all classes of ores excepting those in excess of 5% lead. They claim to have made a low treatment charge and with the low freight rates now existing, the output in Clear Creek, Gilpin, Boulder and other counties should be materially increased. The plant will have an ore capacity of 300 tons per day.

The new United States mint at Denver was opened the past week. It is said that before the end of another year the coinage of gold will begin, and a local market will be established for all the gold produced in the Rocky mountains. Coinage machinery will be installed as rapidly as possible. For the present the new mint will be used for the purchase of bullion and as an assay office. Director Roberts was present at the opening.

Large amounts of printed matter and advertising literature are being distributed by the State at the World's Fair, that Colorado may be well advertised.

Denver, Sept. 4.

(Special Correspondence).—The political situation in Colorado at present is not

political. Are we going to have a Governor that has backbone, or are we going to have a man who will sit by and let the Western Federation of Miners run the business? It seems we are more interested in the Governor than in the President, although he has taken a pretty good stand himself on unionism. I find this said everywhere in my travels, in talking with business men and mine managers: "Are we going to be allowed to run our business, or will Mr. Moyer and Mr. Haywood be in a position to dictate to us? If they are, we might as well close up shop and get out." Few people in Colorado outside of the Federation of Miners object to the deportations of the Governor, or, in fact, the white cappers, who are now taking charge of things in the Cripple Creek district.

In San Juan county (Silverton district) they have no strike. When the miners and operators made an agreement a couple of years ago, the operators made the statement: "We have property. If we break this agreement or contract, you can come on to us for damages. What have you, as collateral or security, that you will put up, that you, as a body, or as a union, will not violate your agreement?" They put up their Union hall at Silverton as security. When the strike came on, Mr. Moyer called them out. They told him: "We have a contract, and our building is up as security." His reply was: "To hell with the contract! I want you to strike." Had they gone on strike they would have lost their building. San Juan county is prosperous to-day, because they have no strike.

Denver, Sept. 5.

#### Chaffee County.

The Salida Copper-Gold Co.'s leaching plant, 4 miles west of Salida, is in operation. The plant has a capacity of 300 tons per day.

#### Clear Creek County.

The Queen City G. M. & M. Co., operating on Democrat mountain, near Georgetown, is increasing development. Work on the main tunnel is in 450 feet. The tunnel will cut under apex of mountain at depth of 1000 feet, and will open the Astor vein. It will be necessary to drive a total of 1500 feet. A. B. Montgomery, of Denver, is manager. The group consists of twenty-five claims.

The output from the Sunburst mine, near Georgetown, operated by the Red Oak M. Co., will be largely increased. Concentration tests are being made. Jones & Co., operating a lease in the lower level, have awaiting shipment 100 tons of ore, which gives returns of \$80 per ton. The block has been opened for 300 feet. A. Roberts is developing the upper Sunburst level and has exposed 12 inches of smelting ore. He is sending regular shipments. Other lessees are working.

#### Dolores County.

The concentrating mill at the mouth of the Group tunnel, near Rico, is being operated under lease by the Durango L. Co. The mill equipment consists of a crusher, two trommel screens, two Hartz jigs, two Huntington mills and ten Wilfley tables. Manager Hooper says he has increased the capacity of the mill one-third by installation of the jigs, and has prevented the pulp from sliming by extracting the lead, carrying glance and brittle silver, before the ore enters the Huntingtons.

The Intrinsic G. M. & M. Co. at Rico has put on more men and will increase development of the ore bodies of Sambo hill.—The three-compartment raise on the Enterprise vein of the Pro Patria workings is being placed in condition. Three eight-hour shifts are on the work. The Argentine mine is sending average of thirty-five tons of ore per day to the mill. But one shift is in the mine. The mill is working twelve hours per day and turning out lead concentrates.

#### Fremont County.

Florence reports say at the Dorcas mill the leaching is finished, and the company will be enabled to gain a greater percentage of values. Fifty-dollar ore and upward is said to be handled successfully.

#### Gunnison County.

G. Williams, manager of the Congress M. Co. at White Pine, says he is putting in machinery at the mine for development work.

The Pitkin Reduction Co.'s plant, formerly the Quartz Creek M. & S. Works, has reopened under the management of A. B. Clark, who intends to treat custom ores of the mines near Pitkin. The mill is being overhauled. In connection with the plant is a laboratory and assay office for sampling and testing of ores for cyanide process.

The Gothic M., M. & C. Co. of Canton, Ill., men, is operating its 100-ton mill on ores of Gothic section. Its smelting plant of fifty tons capacity will not be operated this season. The company is operating



the Hard Cash mine on Galena mountain at Elko. It has a jack train of forty animals packing ore to the mill. High grade ore has been opened in the 300-foot tunnel on the Hard Cash. The vein shows a foot of solid galena, with gold and silver values. The output will be increased. The tunnel will be driven 500 feet farther to cut the New York vein. A jack train of seventy-five animals and two four-horse teams are hauling ore to the mill from the Sylvanite mine, operated by the Gothic M., M. & C. Co. The ore is a high-grade silver material.

#### Hinsdale County.

The Handie's Peak G. M. & M. Co., M. Corwin, superintendent, has started operation of the Leonard group, between Boulder and American basins, near Lake City. From Boulder basin a crosscut tunnel of 400 feet will be driven to develop the mineral bodies of the group and in the Basin mine buildings will be erected.

G. W. Dryden, manager of the Pelican M. & M. Co., says he will start development of the Pelican group of mines, up Henson creek, near Lake City. A tunnel will be driven, also continue the drift on the Pelican vein for 100 feet from the present breast. The new tunnel will start on the Atlanta lode of the Pelican group and will be 600 feet long, giving 240 feet additional depth on the Pelican vein.

#### Lake County.

L. F. Jones, of Chicago, Ill., superintending installation of the electrical plant at the Yak tunnel at Leadville, says a direct connected dynamo and engine is being placed in position and the wiring of the tunnel is being completed. The trolley wires and feeders have been put in the tunnel to the Cord winze and the tracks to that point have been connected for electrical trains. By next week he expects to have 3 miles of the tunnel and its connections ready for the electric trains. Electrical pumps and electrical hoists are to be put in the Yak and some of the properties tapped by the tunnel. The Cord winze is a double compartment shaft. An electrical hoist with two drums will be set up in the Cord to take the place of the steam plant in use. The pumps which have been operated with compressed air will be furnished with power from the dynamos.

Five shafts are being worked by the Small Hopes M. Co. and its lessees on Yankee hill, Leadville. The ore being taken out is mostly low grade. The Emmet shaft is center of operations and is being developed both by company and by a set of lessees. The second level of the mine, 600 feet from the surface, is being worked by the company. The bottom, or 800-foot level, is being operated by lessees who are taking out ore and also doing exploratory work. On the Cary and Result shafts lessees are working. From those shafts a total of thirty tons a day is being shipped, chiefly iron ore. The Small Hopes Co. is shipping 1000 tons a month from the R. A. M. dump. The dump was made a storage for ore taken out of the R. A. M. several years ago.

#### Ouray County.

The report of Manager Cox of the Camp Bird, Ltd., operating at Camp Bird, for the fiscal year ended April 30, 1904, shows 73,718 tons of ore mined and treated, producing:

Gold.....	\$1,857,271
Silver.....	50,151
Lead.....	14,370
Copper.....	469
Total.....	\$1,922,261

Amalgamation recovered, 78.3% of the values; concentration, 14.6%; cyaniding, 7.1%. The sixty stamps were dropped 355 days and the cyaniding plant ran 352½ days, treating 65,736 tons, dry weight, of mill tailings. The maintenance and operating costs for the stamp mill were \$77,629, and for the cyaniding plant \$50,958.—In regard to the electric installation, the superintendent's report says: "The advantages derived through the electric storage battery pertain to both safety and economy, since it will be possible to operate hoists for a time after the potential current is interrupted, avoid overloads to the potential lines and charge the storage when loads are light in other directions. The distance from portal of mine to collar of main shaft on third level is nearly 1 mile. It is decided to operate all pumping plants with induction motors of 400 volts." The 10,000-volt system will be extended underground to a point near the shaft collar and the current there stepped down. At the mills electric power was substituted for steam in December last. During the summer the mill is operated by water power. On the third level in the mine 5000 feet of track were realigned, the number of ties doubled and other replacements made to make the track safe and firm for electric haulage. The heating plant in the mill was

changed from water to steam system.—The summary of development work during the year shows: Drifts, 3184 feet; crosscuts, 221 feet; raises, 1178 feet; shaft, 234 feet; diamond drilling, 4620 feet. On construction work \$153,584 was expended. Ten stamps will be added to the mill.

#### Pueblo County.

Pueblo reports say repairs on the three blast furnaces at the Minnequa works of the Colorado F. & I. Co. are progressing. It is expected the three furnaces will be blown in next week. The wire mill will be running at full capacity, as the securing of rates by the company to Eastern and Southern points will provide a market for its full output.

#### San Juan County.

Shipments of concentrates and ore from the Highland Mary mine, near Howardsville, have resumed. Additional canvas tables are working. About one car of ore a week is being shipped to the smelter, says Manager Graham.

#### San Miguel County.

The Telluride Power Co. maintains an electric generating plant at Ames, 14 miles from Telluride, capable of generating 14,000 H. P. At Vance Junction, 7 miles below Ames station, it owns another electric plant with capacity of 2000 H. P. The latter place is 7 miles below Telluride. Coal in Telluride costs \$7.50 per ton; in addition to this, is the cost of packing the same to the mining and milling plants. Electric power is furnished at a nominal figure, and among the mines using it are the Smuggler-Union, Tomboy, Camp Bird, Liberty Bell, Japan, Nellie and Ella, Gold King, Ophir Con., Alta, Butterfly and the Mayflower. By the route over which the power is transmitted to the Camp Bird mills of Ouray Co., the distance is 20 miles, says L. L. Nunn, manager.—On the Nellie and Ella mine, 2 miles up Bear Creek basin from Telluride, forty men are employed. The products of the mines, consisting of fifty tons daily, is transported over a wire-rope tramway between the Ella and the Bear creek mill, 1½ mile in length. The output keeps twenty of the stamps constantly dropping.

In Mt. Wilson district M. A. Wood of Telluride and P. P. Steinwandle of Canyon City, owners of the G. A. R. group, in Navajo basin, are increasing development work. They are driving a crosscut tunnel to open the principal lead at a depth of 1000 feet below the surface.—Near the G. A. R. group J. A. Ross and J. G. Eversman of Denver own the Wheel of Fortune group. A tunnel 2000 feet in length has been driven in from the Navajo basin side. Three cross lodes have been cut and one of them is 10 feet in width. The ore is of lead and silver, carrying values in gold.

#### Summit County.

The Reliance Gold Dredging Co., near Breckenridge, E. L. Smith superintendent, has started work of building a dredger on the company's French gulch placer holdings. A series of drill holes are being sunk to determine location of the dredger.—The compressor and air drills put in at the Jessie mine are in operation. The mill started up this week.

#### Teller County.

For a year experiments have been in progress on the dumps of the Stratton's Independence, Ltd., at Victor, to determine method of treatment. It is estimated there are 750,000 tons of ore in the dumps, which will yield a profit of about \$3.50 per ton. It is stated that the metallurgist proposes to submit his plans to the directors in London, Eng., to build a mill with capacity for treating 1000 tons per day. There are now eighteen sets of lessees, employing 200 men, in the Stratton's Independence, Ltd. It is stated that half of those leasing have ore which pays to ship.

The Rocky Mountain M. Co. has leased its Beacon hill property, at Cripple Creek, to L. H. Shepherd. The mine adjoins the El Paso company's ground. Shepherd will start a new working shaft with expectation of cutting extension of the main El Paso ore shoot.—Lessee Morton & Co., on lower portion of the Coriolanus mine, on Battle mountain, is putting in machinery.

V. C. Chellow & Co., who have a lease on the Gold Sovereign, Bull hill, at Victor, are unwatering the Jackson shaft. It is intended to start lateral work. At the Rawson shaft on the same group, Bradley & Dugan have come into ore and are putting in an 8-drill compressor. It is intended to crosscut east and west from the shaft, at a depth of 550 feet.

The Dexter G. M. & M. Co., owning the Dexter property on Bull hill, at Victor, began work on company account this week. The lease held by the Colorado L. & M. Co. has been cancelled. The shaft on the Dexter has been sunk to 650 feet. In the bottom of the shaft an 8-inch vein

has been opened, which is giving values of \$80 in gold to the ton. There is ore to be mined in both the 200 and 300-foot levels. The vein is there 3 feet wide, assaying \$30 in gold, says Manager W. E. C. Little. He will put in a 5-drill compressor, a 125 H. P. boiler and a 10x12 hoist.

#### IDAHO.

##### Boise County.

At the Thorne camp, in Gambrinus district, near Idaho City, work is progressing in the shaft, which is down about 145 feet. Machine drills have been put in. The shaft is of two compartments. A cage has been put in, replacing the bucket. The nearest ledge to the shaft is the John Henry, which will be tapped at a depth of 300 feet. V. Thorne is manager.

The South Africa M. Co., near Idaho City, will put in a Chili mill with capacity of 100 tons daily.

##### Idaho County.

The Dewey mine of the Buffalo Hump district has been sold to the Central Hump Buffalo Co. G. Bremer of Seattle, Wash., is interested, and says they brought it mainly for the water power on it that is necessary to development of other mines held by the company. The company is planning to build a smelter.

The Ranier G. M. Co. owns a group of five claims, 3½ miles south of Warren. Work consists of sinking a shaft and running a crosscut. A hoist will be put in at the shaft, also other equipment. The company is arranging to have its ores milled at the Keystone mill, which property joins that of the Ranier on the west, says J. B. Brown, manager of the Ranier.—Three miles east of the Ranier company's mines is the Mayflower group owned by the Thunder Mountain Gold Reef M. Co., of which J. E. Jewell is superintendent and manager. The company is completing a concentrating and cyanide plant.—The Silver King Co. is increasing operations with twenty men. Work is confined to the lower or crosscut tunnel which is in 1150 feet. The Keystone mine is also operated by the Silver King Co. The mill will be ready for operations next week.—H. Shieler & Co. will work the Little Giant mine and are preparing for operations at the mill.

##### Kootenai County.

Manager F. W. Haverland, of the Tyson M. & M. Co., at Tyson, near Saint Maries, has started building an 18-mile ditch, which is estimated will cost \$50,000.

##### Latah County.

The mining department at the University of Idaho, at Moscow, is increasing its geological and mineralogical equipment. The mining department has about \$6000 worth of apparatus, and occupies nine rooms in the new school of mines building. It is proposed to add a metallurgical laboratory equipped with machinery, to work ore by all known processes. There will also be diagrams of all known processes that are considered worthy of attention. Sectional views of the leading processes will give a fair idea of their workings at a glance. A. S. Miller is in charge of the mining department.

##### Shoshone County.

J. A. Morrow says in the Pierce City mining district, near Greer, he has development work under way on the Wild Rose group. He has drifted on the main lead. The ore has been tapped at depth of 100 feet. The mill will be started next month and will be operated all winter. J. Gaffney is working the Ozark mine. T. Wilkinson is operating a cyanide plant on the Wild Rose tailings. The tailings assayed \$8 and Wilkinson reports saving \$8 per ton. The plant has a capacity of sixty tons per month, and during the summer 300 tons have been handled.

The Bunker Hill & Sullivan M. & C. Co. at Wardner has put in a 50,000-pound weighing railroad track scale. An addition 40x60 feet has been built on the mill for placing eight Wilfley slime tables. An addition of 75 H. P. to the compressor plant has also been made. J. L. Safford, R. L. Brainard and J. Brantly are working their Big creek mines.—Work has started in the Silver King mine. The mill is being operated. The work is under J. Kendall.

##### Washington County.

Landore reports say work on the smelter is progressing, and Manager Adams expects to start operations next month.—Ford's Black Lake property is working sixty men. The ore bins are finished and the mill is nearly completed. The tram is being overhauled and Manager Ford states the plant will be started before October 1st. The mine is at Black Lake, near Council.

#### KENTUCKY.

##### Livingston County.

Near Salem a concentrating plant is being built on the Cullen mine. Equipment

includes two 200 H. P. boilers, a 150 H. P. engine, a revolving mechanical dryer, two crushers, four sets of rolls and nine jigs. An air compressor is also being set up. The shaft is down 160 feet, and the vein is 23 feet wide.

#### MONTANA.

##### Broadwater County.

Operations have been resumed in the East Pacific mine, near Winston, by R. A. Bell of Helena.

##### Deer Lodge County.

Superintendent C. Coughlin of Camp Caroline, near Anaconda, says it is the intention of the company to sink a 500-foot shaft on the Sunset claim. There has been considerable surface prospecting and ore taken out. The Blackwell mill has been remodeled and Coughlin is testing ore taken from the Sunset. They have a streak of pay rock at 85 feet and will determine if the concentrating process will be profitable. The ore is run over the plates and then goes to tables. They have 3 miles to haul the concentrates.

##### Flathead County.

The Cherry Creek Placer Co. has been organized and Manager P. D. Pratt has men surveying a ditch line near Libby. It is expected this will give them 200 feet fall at the point where the first piping will be done. The ditch will be dug, the pipe line put in, sluice boxes built and sluicing of gravel started this winter. The company will put in a sawmill to cut timber for buildings, etc. The company owns eight placer claims on Cherry creek. There are 1120 acres in the group. The ditch will be 1½ mile long and will be built to carry 5000 inches of water.

Superintendent T. Fleetwood of the Illinois & Montana M. Co. has started development work on the company's placer claims to get the necessary work done for a patent. The company will increase development of its quartz claims, also in West Fisher district, near Libby. Machinery will be put in and buildings put up. The ores will be milled. J. H. Geiger is manager.

##### Lewis and Clarke County.

The Red Bird M. Co. is operating a copper group west of Helena and in the Reliance mine is taking out ore from a 5-foot vein running \$80 a ton in gold, silver and copper.

##### Missoula County.

The mines and equipment of the Duquesne M. Co., near St. Regis, have been sold to A. Lutz of Alleghany, Pa., who will operate the group.

#### NEVADA.

##### Esmeralda County.

Bell, Sharpe and Stewart expect to have their mill in operation next week. The mill is 3 miles from their mine, the Golden Fleece, at Aurora, near Hawthorne.

##### Humboldt County.

The American Nickel Co., owning mines at Nickel, in Cottonwood canyon, near Lovelocks, reports it will sink a shaft 1000 feet to open up its nickel and cobalt ores. C. Bell is superintendent.

At the Sheba mine, south of Mill City, the shaft has been unwatered and they are again developing the lower workings. A raise is started by which ore from the old workings will be taken out by way of the new tunnel and conveyed by tramway to the mill in the canyon below. J. Kessel is in charge.

##### Nye County.

At the Tonopah-Extension mine, at Tonopah, the 125 H. P. boiler has been set up and steam connections made with the twelve drill compressor plant. Sinking is to be resumed. The drifts on the 400 and 500-foot levels continue to show ore.—The shaft on the Free Gold M. Co. mine at Gold Reef, near Tonopah, is down 90 feet, and assays give values of \$25 in gold. Superintendent C. Madison is building the galloways frame for the hoisting plant, which is set up.

##### White Pine County.

The Giroux Con. M. Co., which has holdings at Pilot Knob, near Ely, is credited with intention to build a smelter at its Dewey and Taylor shafts. J. L. Giroux of Los Angeles, Cal., is manager.

#### NEW MEXICO.

##### Dona Ana County.

The concentrator of the Stephen Bennett mine at Organ is resuming.—A concentrator will be built at Gold Camp in the Organ mountains, near Organ. F. H. Bascom Co. of Las Cruces is interested.

##### Grant County.

Silver City reports say work on the smelter of the Commanche M. & M. Co. is going on steadily. The capacity will be 200 tons daily and it will contain three furnaces. The foundations are completed



and the frame work is going up. The stacks have men at work upon them.

#### Lincoln County.

Vice-President Franklin of Chicago, Ill., and Director Falkenstein of the Jicarilla M. & M. Co., operating at Jicarilla, report they will put up a mill to treat the ores of the camp and surrounding country. Construction will begin November 1.

#### Rio Arriba County.

The Keystone-Bromide M. Co. at Bromide is increasing work in its Dillon Development tunnel. Work will be resumed on the Strawberry mine at Bromide.—J. D. Maupin has cut a body of copper ore on the Sunny Side mine at Bromide.

The Tusas Peaks M. Co., at Tusas, is opening up ore leading to the main vein in sinking the shaft on the Tampa mine.—The Jaw Bone Dev. Co., at Bromide, has put in a diamond drill, and reports progress in development work.—Satisfactory results are reported from the new concentrator at Buck Horn mine, at Hopewell.

#### Sierra County.

On the Treasure mine, near Hillsboro, ore carrying \$80 per ton in gold has been struck.—Work is temporarily suspended on construction of the Good Hope-Bonanza mill, near Hillsboro, due to inability to get timber from the sawmill, the road to which has been washed out by the rains.—At the Monument mine, near Fairview, air drills are being put in.

The shaft on the Snake mine at Hillsboro has been repaired to the 180-foot level. A hoisting engine is being put in.—M. Hennessey has increased his holdings of placer ground at Shandon to 600 acres, on which he will do extensive development work.

#### Socorro County.

The mining camps of Magdalena and Kelly report damage done to mining property by recent floods, the Graphic and Kelly mines being the principal losers. From the Graphic dump 200 tons of zinc ore were washed away. About two-thirds of the mines in the district were flooded.

### OREGON.

#### Baker County.

At the Blue Bird mine, near Sumpter, the milling plant is being finished. The 100-ton concentrating plant for the bodies of low-grade ores is being supplemented with a stamp mill for the free-milling ores. Drifting continues on the new ore body in vein No. 2, and it holds an average width of \$5 feet, with \$10 values, says Manager Wright.

J. Thomsen, manager of the May Queen mine, near Sumpter, says he has started ten stamps dropping. They are stopping ore from the ore shoot, which has proven 250 feet in length, and the raises are 100 feet high. Sinking will be resumed.

J. T. Mahoney of Sumpter is resuming development on the Porto Rico mine, in the McCully Fork section. The group comprises three claims, principal work being a shaft sunk on the vein, showing a width of 8 feet, with assays from \$2.60 to \$40 per ton.

Operation of the sinking plant put in at the I. X. L. mine, near Sumpter, has begun and the shaft of 200 feet will be extended 100 feet, and drifts run. The incline shaft will be discontinued. At the mill two 5-stamp batteries are crushing ore, and the cyanide plant is also in operation. The drifts on the main I. X. L. vein are 500 feet in length and 200 feet of drifting has been done on the Hidden Treasure, or cross vein. The sinking plant has a capacity for 800 feet, says Manager Kelly.

The Vault group of three claims in the Cracker Creek district, near Sumpter, have been bonded to J. W. Kontz and development has been started, the principal work being a drift. The vein is 8 feet in width, assaying \$5.

At the Viola mine, near Sumpter, owned by J. Hughes, a hoisting plant will be put in. The vein is 14 feet wide of milling ore.

#### Grant County.

At the Badger mine, near Susanville, the management is putting in an additional ten stamps, giving a combined capacity with the rolls of eighty-five tons daily. Ore is being stoped on the 600-foot level and on the 700-foot level. The ore body is 6 feet wide with 3 feet of high-grade shipping rock. Near junction of Elk creek and Middle Fork of John Day river an air compressor is being set up which will operate hoist and drills. The mill is being operated by direct water power. At the Bull of the Woods mine, across the creek, which is also owned by the Badger Co., the shaft is down 250 feet and an aerial tramway is being built to carry its ores to the Badger mill. High-grade ore is also being sacked from the mine, which, with the Badger's ore and concentrates, keeps eight six-horse teams

hauling from the mine to Tipton for shipment to the smelter.

#### Josephine County.

The Platts quartz group on Boland creek is reported developing a ledge 12 feet in width, carrying free gold values of \$10 to the ton. Platts & Sons, owners, expect to put on machinery. The Platts mine is near the mouth of Boland creek, near Althouse.

At California Bar on Sucker creek, near Althouse, the Sucker Creek M. Co., under Superintendent H. Warner, has put on a pumping and hoisting plant. Two drifts are being run to show the extent of the gravel deposit. Two pumps are used, one to keep out the water from the excavation and the other to pump water from the creek to operate the sluices. A 7-mile ditch has been surveyed.

S. Bowden is arranging for development and equipment of the Sunset mine, of which he is owner, near Kerby.—R. G. Virtue of Leland says he will start development of the Ajax mine, in which he is part owner, in Mount Reuben district.

### SOUTH DAKOTA.

#### Custer County.

The Extreme M. & M. Co., near Custer, will complete the tramway from the mine to the mill and will continue the main shaft to 300 feet. The 10-stamp mill will be operated.

#### Pennington County.

J. E. Young, treasurer of the Grand G. M. Co., says he is superintending erection of buildings and machinery at the company's mines near Hill City.—Work on the Sunbeam M. Co. group on Friday gulch, near Hill City, is being resumed. N. Hart of Lead is manager.

### UTAH.

#### Beaver County.

The Lulu M. Co. has been organized under the laws of Wyoming, with P. Ryan of Millford president and manager, M. Cullen of Salt Lake City, J. B. McCormick, and P. Conley of St. Paul, Minn., et al. The property adjoins the Horn Silver mine at Frisco, on the east. The Lulu has one shaft down 400 feet.

#### Grand County.

Moab reports say the Inter-State M. Co., G. H. Clark, manager, is building its 100-ton cyanide mill in Gold basin, 35 miles from Moab, and expects to have it completed before winter begins. The Ren Hatch gold-copper-cobalt property at Sinbad has been sold to Eastern parties.

The Grouse Mountain M. & S. Co., near Basin, has cut a vein which assays \$83, and will build a cyanide mill. The property consists of nine claims, 180 acres in all, and one water right on Placer creek, in the Miner's basin, La Sal district. It has been developed by two tunnels.

#### Juab County.

The Wasa M. Co. has been incorporated by J. and A. Soderlund, F. Sundell and A. Strom, the last named being manager. The company owns a group of nine claims in north Tintic, near Eureka, on which there is a vein of iron-bearing quartz carrying values in silver and gold.

#### Salt Lake County.

Manager W. Hatfield, of the Albion M. Co. at Alta, says the shaft has been unwatered, and the tunnel is in 2000 feet. With 700 feet more driving the main shaft will be tapped.

C. Wagener et al. report striking payable ore in Emigration canyon, 9 miles east of Salt Lake City. A fissure in sandstone was found 8 inches wide, assaying 100 ounces silver and 10% copper.

#### Summit County.

In the California mine, at Park City, ore is reported struck, showing 20 feet between walls, and is of milling grade. The ore bodies will be further developed before putting the mill in operation.

#### Tooele County.

(Special Correspondence).—The annual report of the Con. Mercur G. M. Co., operating at Mercur, has been issued, showing the following tonnage, by months, mined and milled during the fiscal year ended July 1, 1904:

	Tons.
July.....	24,478
August.....	23,786
September.....	21,992
October.....	22,821
November.....	24,306
December.....	21,787
1904—	
January.....	14,068
February.....	13,825
March.....	14,648
April.....	14,084
May.....	13,598
June.....	17,308
Total.....	226,701

The output for 1902-1903 was 346,359 tons. Just before beginning the fiscal year 1903-1904 reduction was made in the daily ton-

nage because eight of the mill's twenty-six leaching vats were taken for the slimes plant equipment. On January 1, 1904, owing to unsatisfactory grade of the base ore being produced, four of the nine roasters were shut down. By June conditions had improved, and so the tonnage was increased.—The financial statement shows \$648,516.48 in gold bullion produced, an extraction average of \$2.86 per ton. The tailings ran from \$0.80 to \$1.43, an average for the year of \$1.03. The tailings values are being lowered. The ore treated was the lowest average grade the company has yet treated. The ore as mined and milled did not come up to the values and tonnage as estimated for the ore reserves at the beginning of the fiscal year. In addition, there were premature cave-ins in certain of the stopes, making it impossible to get at much of the better grade ore.

The mining costs for the year were \$317,650.97, or \$1.40 per ton, and the milling costs \$362,069.42, or \$1.60 per ton. The slimes plant was closed down on May 26. The Manning mill, which is being maintained for working over tailings from the old Mercur mill, was not operated last year. It has been leased on a royalty basis, and is being again put in operation.—In the mine development work has been extended and systematic resampling done to show conclusively what blocks of ground could be counted on for ore. The known boundaries of existing ore bodies have been extended. G. H. Dern of Salt Lake City is manager. Mercur, Sept. 5.

### WASHINGTON.

#### Snohomish County.

Manager U. K. Loose of Snohomish says the mines of the Index M. Co. at Index will be equipped and operations resumed.

The Copper Independent Con. M. Co. of Boston, Mass., owning mines at Silverton, will reopen its property and remodel the mill.

### WYOMING.

#### Fremont County.

B. N. Tibbals of Chicago, Ill., manager of the Federal G. M. Co., operating at South Pass, reports he is increasing output of ore and development work.—It is reported the Carissa gold mine will be reopened.

#### Laramie County.

The shaft of the Fairview mine, near Hecla, in Silver Crown district, will be sunk to 1000 feet.—The mill of the Hecla C. & G. M. & M. Co. is running on ores from the Louise mine and concentrates are being shipped.

### FOREIGN.

#### AFRICA.

##### Algeria.

Official statistics state that the quick-silver mines at Taghit exported in 1903 twenty metric tons of mercury. Exports in 1904 will be much greater, says Manager Lagache.

##### Rhodesia.

The Rhodesian Chamber of mines, at Bulawayo, reports the gold output for month of July was 17,213 ounces from Matabeleland and 7126 ounces from Mashonaland, a total of 24,339 ounces—an increase of 3937 ounces compared with June.

##### Transvaal.

The Knights Deep mine, of the Consolidated G. F., Ltd., group, at Johannesburg, will put in a pumping plant to deliver 2,000,000 gallons of water per day against a static head of 1200 feet. The pump is to be coupled direct to a three-phase induction motor.

### AUSTRALIA.

#### New South Wales.

The Broken Hill Proprietary Co., operating at Broken Hill, reports half-yearly statements have been issued showing a profit for the six months ending May 31 of £107,698. Smelting operations at Port Pirie are satisfactory; bullion output for half-year shows 35,000 tons produced, an increase of 3742 tons pig lead, also 62,800 ounces fine silver over previous half-year. In view of the satisfactory results of experiments in sulphuric acid plant at Broken Hill, it has been decided to duplicate same, and then will be able to supply outside companies' requirements. The board will erect the plant at Port Pirie for manufacture of sulphuric acid. When arrangements are completed the probable output will be 12,000 tons chamber acid per annum. It is estimated the cost of putting in the machinery will be £15,000. In addition it has been decided to utilize the acid produced in manufacture of superphosphates. Exploratory work in the lower levels has proven satisfactory; quality of the ore equals the average.

The tonnage of ore raised shows increase over previous half-year. Salt Cake plant has been practically completed, and has a capacity for treating 2000 tons weekly. The company has taken a lease of limestone property to supply requirements of flux—1500 tons weekly. Average prices obtained during the half-year: Lead, 6s 3d per ton; silver, one-sixteenth of a penny per ounce fine, better than during previous half-year.

#### Victoria.

(Special Correspondence).—Bewick, Moreing & Co. of London, Eng., have secured control of about 30 miles of deep alluvial, or ancient river channel, in Victoria, and numerous bore holes have defined their limits with fair accuracy. The serious drawback to the operation of these channels, and the reason they were not long since worked out is the large amount of water on bedrock. It is believed, after investigation, however, that the channels can be drained by pumping, and it is thought that when the water has been once removed, as the climate is extremely dry, and the rainfall light, that no further trouble need be anticipated on that score. The bedrock of these channels is several hundred feet below the surface, and like many of the ancient rivers of California, they are covered with a heavy cap of lava, but unlike most of the California channels, the Australian channels cannot be drained by tunnels owing to the low topographical relief of the country. Some of the largest placer nuggets in the world have been found in the beds of these ancient streams where they were not flooded with water.

Ballarat, Aus., July 28.

#### Western Australia.

(Special Correspondence).—The Sons of Gwalia, Ltd., mine is at Leonora, 150 miles north from Kalgoorlie by rail. Water is pumped from the mine, and carries a high percentage of salt. Recently the company secured a well 2 miles from the mine, which furnishes a good supply of boiler water. Formerly the boiler water had to be condensed. Condensers are in operation at the mine to supply water for domestic use. A family is allowed 10 gallons daily, free, and a single man 5 gallons. A scrub tree called mulga grows in patches and furnishes the wood for the mines of this section. It is a very hard wood and excellent for firing purposes. The cost is equivalent to about \$6 per cord, but all firewood is sold by the ton and is weighed in.

The mill on the Sons of Gwalia is of 50 stamps, with Wilfley concentrating tables. The tailings are elevated by a sand wheel and then led to the cyanide vats. A double leaching treatment is used. At present the concentrates are being reground in pans, treated by cyanide agitation, and the whole filter-pressed, recovery being 90% of the assay values. An Edwards' roasting furnace is being built, to first roast the concentrates, after which they will be reground and cyanided by agitation. This is the process practiced at the Oroya-Brown Hill mine at Kalgoorlie (also controlled by Bewick, Moreing & Co.), where a recovery of 95% is obtained. The ore of the Sons of Gwalia mine averages 1 ounce gold per ton and the concentrates \$80 per ton.

All work is none in 8-hour shifts, and no work is done on Sundays or holidays. Leonora, Aug. 1.

Perth reports say the total amount of gold exported or received at the mint during July amounted to 192,306 ounces, valued, after refinement, at £682,688, as against 212,501 ounces, valued at £765,005, in July, 1903.

The Lake View Consols mine at Kalgoorlie reports for month of July 8900 tons (of 2000 pounds) of ore treated, yielding 4131 ounces fine gold. Costs—Ore extraction, 11s 8d per ton; ore reduction, 13s 8d per ton; refining of bullion, 3d per ton; total working expenses, £1 5s 7d per ton; expenditure on machinery and plant, £19; expenditure on mine development, £1873.

### BRITISH COLUMBIA.

#### Cassiar District.

W. J. Robinson, manager of the British America Dredging Co., operating on Pine creek, near Atlin, says work will be increased on Dixie creek. His company will build a dredger on Dixie creek. Water will be used for power development. The company also proposes operating two additional dredgers on the Atlin leases. The British Columbia Dredging Co. is building a dredger on Spruce creek.

#### East Kootenay District.

C. Fernau says he will build zinc enrichment works at Rosebery and a zinc smelter at Fernie. Site at Rosebery has been bought. The enrichment works are intended to further concentrate zinc concentrates. The higher percentage of zinc thus obtained is said to render the product more desirable from the smelter's



standpoint and reduces the bulk on which railroad tolls must be paid. The process of enrichment is based on standard concentrating practice, varied to meet the special ore in treatment. In construction of a zinc smelter the outlay on machinery is not large, less mechanical plant being required than in an ordinary lead smelter, owing to elimination of blowing apparatus. Exceptionally large and heavy furnaces of firebrick, however, are required. Firebricks are \$70 to \$80 per thousand at Fernie. At Fernie the fuel used in the furnaces will be gas. The latter fact is the reason for the erection of the works at Fernie near the coke ovens. The Fernie smelter will be built to finally handle 30,000 tons of zinc ores per annum. This tonnage is not available at present, hence the plant when ready for operation will be prepared to buy but 10,000 tons of zinc ores per year. The plant will produce spelter.

Roseland District.

At the White Bear mine, near Roseland, milling operations have started. Wilfley tables are being used and water has been brought to the mill through a 5-inch pipe from the Black Bear pond. The electrical power company put in two 75 H. P. motors in the mill. Some of the tanks to be employed in the Elmore process are in place, but the bulk of the oil machinery remains to be set up, completion of the water end of the works being first arranged.

Slocan District.

The Mayetta group, near Slocan City, has been sold, says the Slocan Drill, to R. J. McPhee et al. There are nine claims in the group, adjoining the Ottawa on the north. A tunnel has been driven on the Aricle to cut a surface cropping of quartz.

Vancouver Island.

The Marble Bay M. Co. reports developing and shipping bodies of ore carrying copper, gold and silver values in its mines at Marble Bay on Van Anda island. A depth of 500 feet has been reached. L. A. Grant is manager. The Copper Queen, near Marble Bay, is also producing ore. Equipment is being increased.

West Kootenay District.

A strike is reported made on the Hecklar mine, owned by C. Brace and J. Ellersick of Spokane, Wash. It is in the Rapid Creek district, 1½ mile from Poplar. They have opened 3 feet of ore carrying free gold. They will have twenty men at work and will put up buildings.

A strike has been made on the Morning mine, owned by McIntosh, Nesbitt & Co. This property has been taking out gold ore, but they have opened another ledge with 3 feet of galena, carrying silver and gold.

Cambourne reports say forest fires have destroyed the tramway of the Goldfinch mine near there, and also a portion of the Eva mine's aerial tramway. The Eva group is owned by the Calumet & British Columbia M. Co. of Nelson, J. F. Musselman manager. The Goldfinch mine is owned by the Goldfinch M. Co.

Yale District.

The Mount Baker & Yale M. Co.'s 10-stamp mill at Siwash creek is set up, says the Inland Sentinel, and is expected to be operating next week. The company's sawmill has been running two months cutting lumber for camp buildings and the mill. Men are stripping the vein which has been crosscut in four places. The Mount Baker & Yale M. Co. has built a road from the Fraser river to the mine and stretched a cable across the river.

Milling is under way at the concentrating works of the Iron Mask mine at Kamloops. There are 100 men working underground, with G. W. Fisher as foreman. The workings include development down to the 600-foot level and the equipment includes a compressor plant, mill and boarding house. The concentrator has a capacity of 300 tons of ore per twenty-four hours.

CANADA.

Alberta.

R. W. Hinton of Roseland, B. C., mechanical engineer for the Pacific Coal Co. at Banff, says he will put in an air compressor plant at the Bankhead collieries.

Nova Scotia.

Guilford & Kelley, who have bought the Colonial M. Co. property at Moose river in Caribou district, say they have completed their 40-stamp mill on the Archibald mine. The Touguoy G. M. Co. at Moose river is sinking a vertical shaft and will drift in under the old workings.

The Mic-Mac gold mine at Bridgewater reports for nine months ended March 1, 1904, producing a total of \$31,392 in gold. Water power has been brought from the Port Medway river and will be converted

into electricity. The equipment has been improved.

Ontario.

It is said the International Nickel Co., operating nickel and copper deposits at Sudbury, Copper Cliff and Constable Head, will build a copper refining plant to handle output of its mines and smelters instead of shipping to the United States as at present. The refinery will be built at Copper Cliff, to be run by water power from the Spanish river and transmitted 50 miles to Copper Cliff. At Copper Cliff, 3 miles from Sudbury, an additional smelting plant consisting of two 500-ton copper furnaces is about completed. The matte is treated in Bessemer converters.

INDIA.

Outputs for month of July are reported for principal mines at Kolar: Balaghat Gold—3010 tons of quartz produced 2351 ounces of gold; 2380 tons of tailings (cyanide process) produced 227 ounces of gold; total 2578 ounces. Champion Reef—15,510 tons of ore produced 15,379 ounces of gold; 20,176 tons of tailings (cyanide process) produced 2603 ounces of gold; total 17,982 ounces. Coromandel—1370 tons yielded 404 ounces of gold; 1020 tons of tailings yielded 47 ounces of gold; total 451 ounces. Mysore—16,000 tons ore produced 15,503 ounces; 11,882 tons of tailings (cyanide process) produced 1250 ounces; total 16,753 ounces. Nundydroog—6400 tons produced 5088 ounces; 5018 tons of tailings (cyanided) produced 497 ounces; total 5585 ounces. Ooregum—10,818 tons ore produced 5100 ounces; 10,228 tons of tailings (cyanided) produced 1011 ounces; total 6111 ounces.

MEXICO.

Chihuahua.

The Hidalgo M. Co. of Parral has put up a gas plant at its Moreno mine, and will add a similar plant of 150 H. P. at its Alferena mine.

L. A. Beachel et al. of El Paso, Tex., have organized a company to operate the Victoria group of mines, 25 miles from Minaca, on the Chihuahua & Pacific railway. A smelter will be built. A silver-lead ore is produced, carrying copper values.

A strike is reported at the Cocheno mines at Cocheno, in Jesus Maria district. The vein is 35 feet wide and carries gold and silver. The mine is owned by the Standard Oil Co. There is a 60-stamp mill at the mine and a cyanide plant of 300 tons capacity per day. The bullion is carried on muleback 70 miles to Minaca.

The Calera mine, 12 miles from Minaca, owned by the Calera M. Co., is being worked for zinc. G. W. Phillips is manager. A spur will be built from the Chihuahua & Pacific Railroad extension and the Calera Co. will build reduction works. The ore also carries silver values.

Durango.

It is reported the Catorce Marcos, San Cayetano and La Cumbre mines, in Parilla, near Vacas, have been sold for \$75,000 gold, and machinery is being put in. A. E. McCaughan is interested. At Topia the Madrugada mine of the Miller & Sibley Co. of Bradford, Pa., has shown up a body of silver-lead ore. The increase of new work in Guanacevi district has induced the Mexican International Railroad to build its road into that district.

The Santo Domingo and Hay tunnel, adjoining the Velardena mine, at Velardena, has been bought by O. Koehler, O. Wahrmond and S. D. Bridge of the Jimulco M. Co., and will be worked under D. C. Irish. The American-Mexican M. & Dev. Co., which has option on ground for a smelter in Torreon, is planning a pyritic smelter for Velardena. The Avino mines are temporarily closed while a gas plant and engines are being installed. W. B. Jeffries is manager, and F. Fletcher, consulting engineer.

Guerrero.

Superintendent J. Brennon is building a 50-ton mill at the Ajuchitlan M. Co. mines at Ajuchitlan.

Jalisco.

At Ahualco the Fortuna M. Co. and the Pozas M. Co. report their mills nearing completion. They expect to start running before Oct 1.

C. Carroll of Guadalajara will open up a grindstone quarry 70 kilometers northwest of Guadalajara. Owing to lack of transportation facilities, the construction of an electric railroad from Guadalajara to the quarry is proposed.

J. J. Mann of Philadelphia, Pa., has bought a half interest in the San Pablo group of mines near Etzatlan and will increase equipment for development work.

Lower California.

The water jacket smelter, machinery and other equipment of the San Diego S. & R. Co., at San Diego, Cal., have been taken apart and shipped to Santo Domingo, to be used in connection with mines owned by G. P. Brown and the Es-

peranza M. Co., on the main land. The Esperanza company has been mining on Cedros island, but has also bought copper mines on the main land. At the smelter site the company has ample supply of water.

Nuevo Leon.

The Garza group of mines on Las Miras mountain, near Monterey, has been sold to the Minas Nuevas de Nuevo Leon, of which E. Doerr is president.

Puebla.

An electric line has been built from Tezuitlan to the works of the Tezuitlan C. Co. at La Aurora. The power is taken from the Atexaco river. E. R. Dalbey is manager and A. F. Schneider will superintend. The company has 800 men at work. The ore carries copper, silver and gold values and is developed principally by tunnels. The smelter has capacity of 250 tons daily.

Sonora.

The Santa Margarita M. Co. of Cananea, H. C. Rolfe manager, operating at Santa Margarita, near La Colorada, has four ledges from 8 to 12 feet wide. The tops of the ledges show extensive antigua workings. The ores assay in copper, silver and gold. A tunnel has been run 300 feet to cut the ledge below bottom of shaft. When connection is made the shaft will be continued, hoisting to the tunnel level and discharging through that. From the smelter site in the canyon a tunnel 1000 feet long will be driven to cut all the ledges at 1000 feet below croppings. A reduction plant will be built and the ore will go down by tramway. La Barranca, with its beds of anthracite, suitable for smelting, is 18 miles from Santa Margarita.

The Lucky Tiger G. M. Co., near Moctezuma, will build a combination quartz mill—stamps and rolls—with a daily capacity of 100 tons. B. F. Graham of Naco, Ariz., is manager.

At the Greene placers on the San Domingo river, owned by W. C. Greene of Cananea, the pay streak is reported from 2 to 8 inches thick. The waste covering the pay dirt will be removed and the gold collected by hydraulicicking. Installation of machinery has ceased temporarily, owing to high water. As soon as the rainy season ends work will be resumed.

NEW ZEALAND.

The New Zealand Mines Record reports the export of gold from New Zealand for the first six months of 1904 amounted to 267,305 ounces, as against 257,198 ounces for same period of 1903. In Otago and Southland districts there was an average of fifty-five gold dredgers in operation, producing about 1650 ounces gold weekly, or a total for the first six months of 1904 of 43,567 ounces. In West Coast district during same period an average of twenty-two dredgers produced about 580 ounces weekly, or a total of 15,142 ounces gold.

The Talisman Con. reports for month of July: Tons of ore treated, 3975; value of bullion, \$6886; cost of mining, milling, cyaniding and general expenses, \$4689. Other expenditure: Normal mine development, \$808; special development work, \$467.

PERU.

A. W. McCune, manager of the Cerro de Pasco M. Co. at Cerro de Pasco, says the railroad from Lima was completed in July and opened for through traffic about Aug. 1. Work on the smelter is progressing, but it is not expected to be ready for operation before next spring. The mines are 200 miles northeast of Lima. To reach the mines from Lima, the Andes range of mountains has to be crossed at an altitude of 15,665 feet. There are about 4000 men working in and about the mine, the erection of the smelter and the construction and operation of the railroad. About 1000 of them are working about the mines and smelter. The nearest coal mine is 8 miles, the main coal properties, however, being 22 miles away, due north from the smelter and mine. The coal is bituminous. There is no timber in that section and all the mining timber used by the company comes from Washington, says McCune. The latest developments show average of 20% in copper and sixteen ounces in silver. There are 400 or 500 claims in the group, which covers an area of about 1½ mile square, the extent of a single claim being 30x80 meters (32½x86½ yards). Many of the mines in the group have been worked for 274 years. The titles in nearly all instances are possessory in their nature, having been originally handed down from the old Spanish Government. The chain of title to 12 miles square of ground can be traced back for 300 years. Cerro de Pasco, where the mines are, is in the center of the tract. To save litigation which might arise out of questions of boundaries the company has bought up the entire tract. J. B. Haggin of New York is president.

Commercial Paragraphs.

THE Friedrichstadt shipyard (of J. & A. Jensen ag Dahl, Kristiania), one of the largest in Norway, has placed a two-year contract with the Ingersoll-Sergeant Drill Co. for the Haessler pneumatic hammers and drills.

THE Kimpen Crusher & Pulverizer Co., 100 Washington street, Chicago, have sold to the Esmeralda Copper Precipitating Co. one of their 74 "K" mills (pulverizer), which they intend to put in at their mill now building at Sodaville, Nev.

"PITFALLS OF MINING FINANCE," by H. J. Newton, Denver, Colo., in 156 pages discusses the devious ways of deception sometimes adopted by men who work the street, and not the mine, and who impose on the credulous and ignorant. It is sold by its publisher for 50 cents per copy.

THE Denver Engineering Works Co. announce that, in order to expedite the handling of its constantly increasing business, it has appointed Lyman P. Hammond as sales manager. Mr. Hammond has resigned his position as manager of the Denver branch of the Crocker-Wheeler Co., and will take charge of all work relating to the sale of the Denver Engineering Works Co.'s products after September 15. He will be located at the city office of the company, 604-605 McPhee Building, Denver. Mr. Hammond has had a broad experience in the manufacturing industry, and has made a good record in the sale of Crocker-Wheeler apparatus. He will be congratulated by all who are acquainted with the members of the Denver Engineering Works Co. and its products.

THE Ingersoll-Sergeant Drill Co. offers five prizes for advertisements best suited to their requirements. Any stockholder or employee of a company, firm or individual using Ingersoll-Sergeant machinery, or any one in the employ of the Ingersoll-Sergeant Co., will be at liberty to submit suggestions. Each advertisement should be prepared for a particular trade paper, designed to fill the same space as the company's regular advertisement in that paper. Any of the following papers may be selected: MINING AND SCIENTIFIC PRESS, American Machinist, Compressed Air, Engineering Magazine, Engineering News, Engineering and Mining Journal, Granite, Mines and Minerals, Railroad Gazette, Railway Age and Rock Products. The excellence of the advertisement will be determined by the subject matter, its arrangement and its appropriateness for the publication for which it is designed. The prizes will be as follows: First prize, \$25; second prize, \$10; third, fourth and fifth prizes, \$5 each. In addition, a prize of \$10 will be awarded for the best and most original suggestion for keeping the name of the Ingersoll-Sergeant Drill Co. before the public. Selections will be made from the advertisements received, and they will be published. The final choice will be made from among the advertisements which have appeared in print. The competition will close November 1, and the awards will be made as soon after that time as possible. They reserve the right to copyright and use any of the advertisements submitted. Send to the publication department of the Ingersoll-Sergeant Drill Co., 26 Cortlandt street, New York.

Trade Treatises.

Jeffrey grab buckets are finely illustrated in a brochure from the Jeffrey Manufacturing Co., Columbus, O.

"As the Photographer Saw Us," with price list, forms a good exposition of the work in the establishment of the Guarantee Electric Co., Adams and Clinton streets, Chicago.

A. S. Cooper, 219 Crocker Building, San Francisco, Cal., has issued an illustrated description of his patent gas lift to increase the flow of wells which yield artesian water and natural gas.

The different styles of mine cars and mining car fittings made by the Watt Mining Car Wheel Co., Barnesville, O., are fittingly portrayed in a finely engraved booklet from that company.

The September number of Graphite contains some interesting talks on the preservation of metal surfaces with Dixon's silica-graphite paint. There are several excellent illustrations in halftone of fine steel structures, and use thereon of silica-graphite paint is well exemplified. This publication will be sent free of charge upon request by the Joseph Dixon Crucible Co., Jersey City, N. J.



## Personal.

H. M. DAVEY is building the furnaces for the Marysville, B. C., smelter.

C. DURELL is manager of the Gold Reef M. Co., at Lewistown, Mont.

W. R. GLEASON is metallurgist at the Blue Bird mine, near Sumpter, Or.

W. JENKINS is superintendent of the Home C. Co., operating near Morenci, Ariz.

A. H. JONES is chemist at the Dorcas mill at Florence, Colo., vice D. Walser, resigned.

H. C. PLUMMER is superintendent of the Franklin gravel mine, near Placerville, Cal.

R. H. CHANNING, JR., is manager for the Utah Con. M. Co., operating at Bingham, Utah.

F. L. MINER is superintendent of the St. Paul M. Co., operating at Georgetown, Colo.

O. DENNHARDT is with the Cripple Creek-Homestake M. Co., at Cripple Creek, Colo.

EDW. M. CAPPS, a hydraulic engineer, has removed from Los Angeles, Cal., to Seattle, Wash.

A. LARSON is manager of the Velvet mines and mill on Sophie mountain, near Rossland, B. C.

B. F. THOMAS of Los Angeles, Cal., is at Magdalena, Sonora, Mex., examining mining interests.

E. H. BALLOU goes from Igo, Cal., to Pony, Montana, to take charge of mining operations there.

L. W. FELT, manager of the El Recreo copper mines at Mantanzas, Cuba, is visiting mines in Colo.

O. SANNE is assistant engineer for the Scherzer Rolling-Lift Bridge Co., with offices in Chicago, Ill.

J. SKEVES is superintendent of the mines of the Mohegan - Gold Flat M. Co., near Grass Valley, Cal.

A. MIDDLEBROOK, manager Denver branch Jeanesville Iron Works Co., was in San Francisco last week.

T. R. RUSSELL has resigned as superintendent of the Western Fuel Co. collieries at Nanaimo, Vancouver Island, B. C.

H. C. HOOVER, of the firm of Bewick, Moreing & Co. of London, England, is in S. Utah Africa on professional business.

T. WEARNE, recently with the Tamarrack C. Co., is head mining captain for the Superior C. Co. of Houghton, Mich.

W. W. ELLIOTT of Prescott, Ariz., is mill superintendent of El Tigre M. Co., operating in Moctezuma district, Sonora, Mex.

D. WALSER has resigned as chemist at the Dorcas mill at Florence, Colo., and has gone to Butte, Mont., to engage in similar work.

F. WEED, recently with the Annie Laurie mine, near Marysville, Utah, is superintendent of the Dumont-Boston mill at Dumont, Colo.

T. M. CHILDERS of Silver City, N. M., is manager of the mines of the New Idea G. M. & M. Co. operating at Turkey, Yavapai Co., Ariz.

JESSE J. MACDONALD has returned from Baja California and has taken the position of consulting engineer for the Gold M. Co., Dale, Cal.

E. A. SJOSTEDT is chief metallurgist for the Lake Superior Corporation and allied companies, with offices at Sault Ste. Marie, Ontario, Canada.

H. S. KERR is manager of the railroad of the Cerro de Pasco M. Co., operating between Lima and the company's mines at Cerro de Pasco, Peru.

H. A. GUESS has resigned as chemist for the Silver Lake mines, at Silverton, Colo., and has gone to Cananea, Sonora, Mex., as chief chemist for the Cananea Con. C. Co.

W. H. DAVIES, superintendent of the Statehood M. Co., operating in the Greenlee district, has returned to Morenci, Ariz., from Los Angeles, Cal., on company business.

P. GALVAN, formerly with engineering corps of the Illinois Central Railway, has been appointed chief assistant in the Engineers' Department of the Panama Canal Commission.

J. A. DIGGLES, recently metallurgist for the Melones M. Co. at Melones, Cal., is superintendent of the reduction works

of the Sons of Gwalia, Ltd., at Leonora, Western Australia.

R. W. HINTON, master mechanic in charge of the Velvet-Portland concentrator, at Rossland, B. C., has been engaged as mechanical engineer by the Pacific Coal Co. at Banff, Alberta, Canada.

P. M. MCCREE, formerly superintendent of the Commercial mine at Bingham, Utah, and recently in Tintic district, is superintendent of the mines of the Bingham & New Haven M. Co. at Bingham, Utah.

W. A. PRITCHARD, E. M., general manager for Bewick, Moreing & Co. of London, England, left San Francisco, Cal., Thursday, the 8th inst., for Kalgoolie via New Zealand and Sydney. Mr. Pritchard had just returned from Europe.

F. L. BOSQUI, has returned to San Francisco, Cal., from an inspection of the mines, at Gold Roads, Mohave county, Ariz., where he went in a consulting capacity to advise as to a change in the method of ore treatment. He has gone to Goldfield, Nev., to install a cyanide plant on the Combination mines.

E. H. BENJAMIN AND CHAS. G. YALE of San Francisco, Cal., who have been appointed members of the International Jury of Awards at the St. Louis Exposition, have left for St. Louis. Mr. Yale is also a delegate from California to the International Geographic Congress, meeting this fall at New York, Philadelphia, Niagara Falls, Washington, Pittsburgh and St. Louis.

## Books Received.

Under the head of Mineral Resources for 1903 the U. S. Geological Survey has issued "Production of Iron Ores;" "Production of Fluorspar and Cryolite;" "Production of Lithium;" "Production of Barytes, with a Note on Strontium;" "Production of Manganese Ores."

## Obituary.

J. MCGOWAN, a pioneer miner of Eureka, Nev., died in Eureka August 24. Deceased was a native of Vermont, aged 81 years. He went to Eureka thirty-three years ago and engaged in mining in Secret canyon.

## Dividends.

The Bunker Hill & Sullivan M. & C. Co., dividend No. 83, \$75,000, Sept. 3rd. Total paid since Jan. 1st, 1904, \$513,000, and total to date \$2,046,000.

## Latest Market Reports.

SAN FRANCISCO, September 9, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 56½c, refined (1000 fine); San Francisco, 56½c; Mexican dollars, 47½c San Francisco, 45½c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.75; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £57 1s spot per ton.

LEAD.—New York, \$4.30; Salt Lake City, \$3.50; St. Louis, \$4.12; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 13s 9d long ton.

SPELTER.—New York, \$5.12; St. Louis, \$5.00; London, £22 16s 3d per ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$27.60@27.70; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 29½c; bar tin, \$30@32½c. London, £126 2s 6d spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50. BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, \$1.50, 50c; dust, \$1.10; sulphate, \$1.10, .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.85 @13.20; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c per lb.

### CHICAGO CURRENT QUOTATIONS.

Bessemer	.....	\$14 75@15 00
Foundry Northern 1	.....	13 75@14 00
Northern 2	.....	13 25@13 50
Northern 3	.....	12 75@13 00
Southern 1	.....	13 40@13 65
Southern 2	.....	12 90@13 15
Southern 3	.....	12 40@12 65
Forge	.....	11 65@11 90
Charcoal	.....	14 50@15 00
Billets, Bessemer	.....	23 00@23 00
Bars, iron	.....	1 35@1 40
Bars, steel	.....	1 51@1 51
Rails, standard	.....	28 00@28 00
Rails, light	.....	23 00@25 00
Plates, boiler	.....	1 91@2 01
Tank	.....	1 76@1 81
Sheets, 27 store	.....	2 26@2 31
Angles	.....	1 76@
Beams	.....	1 76@
Tees	.....	1 81@
Zees	.....	1 81@
Channels	.....	1 76@
No. 1 railroad wrought	.....	11 50@12 00
No. 1 cast, net ton	.....	10 00@10 50
Iron rails	.....	16 00@16 50
Car wheels	.....	11 00@11 50
Cast borings	.....	4 00@4 50
Turnings	.....	7 00@7 50

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66½ B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, \$1.10, 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

MOLYBDENUM.—Best, \$2.00 per lb.

CHROMIUM.—90% and over, \$1.80, 80c.

PHOSPHORUS.—American, \$1.10, 70c.

SILVER.—Chloride, \$1.00, 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride, \$1.10, 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—\$1.10, 75c.

SODIUM.—Metal, \$1.10, 50c.

BISMUTH.—Subnitrate, \$1.10, \$2.10.

URANIUM.—Oxide, \$1.10, \$3.50.

FIRE BRICK.—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING AUGUST 30, 1904.

768,648.—TURBINE—D. F. Anbury, Seattle, Wash.  
768,649.—SPIKE EXTRACTOR—E. Hebler, Los Angeles, Cal.  
768,737.—CAN LAPPING MACHINE—F. A. Dixon, San Jose, Cal.  
768,789.—TROLLEY POLE CONTROLLER—M. O. Dolson, Los Angeles, Cal.  
769,064.—RAILWAY TIE—Dowell & Morrison, Roseburg, Or.  
769,065.—BED BOTTOM—J. W. Eflaw, Seattle, Wash.  
768,784.—BOTTLE-F. Franz, S. F.  
768,988.—HYDROCARBON LAMP—Grant & Stewart, Portland, Or.  
768,997.—CURVED CARRIER—C. H. Gund, Angels, Cal.  
769,082.—ROTARY ENGINE—C. Hendricks, Riverside, Cal.  
768,900.—SPLIT PULLEY—S. C. Hitchcock, Tacoma, Wash.  
768,663.—SAW PROTECTOR—J. A. Jackson, Oakland, Cal.  
769,095.—HILLING MACHINE—H. Kurth, Portland, Or.  
768,794.—ELECTROSTAT—G. I. Leonard, Pasadena, Cal.  
768,815.—POWER SET WORKS—H. McCleary, Tacoma, Wash.  
769,008.—SAW TEETH—J. & D. D. McMaster, Seattle, Wash.  
768,766.—HOSE SUPPORTER—Mensor & Greenblatt, Seattle, Wash.  
768,767.—GARMENT SUPPORTER—Mensor, Greenblatt & Potts, Seattle, Wash.  
768,768.—SOUND TRANSMITTER—T. R. Owen, Los Angeles, Cal.  
769,014.—CONVEYOR—W. E. Pedley, Riverside, Cal.  
768,820.—LUBRICATING DEVICE—E. A. Rix, S. F.  
769,022.—TYPE CARRIER—C. S. Rosin, Tacoma, Wash.  
768,712.—OIL BURNER—A. C. Rush, Los Angeles, Cal.  
768,776.—MOP WRINGER—C. E. Shaw, Spokane, Wash.  
768,701.—WAVE POWER—J. H. Smith, Los Angeles, Cal.  
768,836.—CASTRATING TOOL—F. Start, Fossil, Or.  
768,707.—BAND SAWMILL—E. F. Thomas, Tacoma, Wash.  
768,638.—WOOL CONVEYOR—J. H. Tillinghast, Stockton, Cal.  
768,640.—SHOVEL PLOW—W. G. Tower, Corona, Cal.  
768,711.—ELECTRIC MOTOR—F. C. Watkins, Vallejo, Cal.  
768,763.—RAILWAY SIGNAL—Watkins & Bethel, Seattle, Wash.  
768,785.—PIANO ACTION—J. L. Wilson, Los Angeles, Cal.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

OIL BURNER.—No. 768,280. Aug. 23, 1904. F. W. Hitchings and D. B. Ellsworth of Corralton, Cal. This invention relates to improvements in hydrocarbon burners for use in stoves, furnaces and the like. Its object is to provide a simple, compact, attractive and effective burner of the type employing steam to vaporize the oil for use particularly in conjunction with stoves, and which may be arranged outside of the stove, so as to take up the least possible amount of room.

NON-REFILLABLE BOTTLE.—No. 768,794. August 30, 1904. F. Franz, San Francisco, Cal. Assigned to Non-Refillable Bottle Co. of San Francisco, Cal., a corporation of California. This invention consists of a peculiarly shaped casing and a bottle neck so formed that the casing may be permanently locked therein. Said casing has a bottom provided with a central hole with an annular upturned

THE CALIFORNIA DEBRIS COMMISSION having received application to mine by hydraulic process from Jas. C. Hager, in Mount Pleasant Mine, near Spanish Ranch, Plumas county, Cal., draining into Spanish Creek which reaches Feather River, gives notice that a meeting to receive any protests will be held at Room 96 Flood Building, San Francisco, Cal., Sept. 23, 1904, at 1:30 P. M.



# MINING AND SCIENTIFIC PRESS

Whole No. 2304.—VOLUME LXXXIX.  
Number 12

SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 17, 1904.

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## Power in Arid Regions.

One of the most important factors in mining operations is the cost of power. In various districts this problem is solved in different ways. Without doubt free water power is the most desirable, as it is steady, and the cost is reduced to the expense of maintenance, after the installation has been made. Next to free water power is probably water power which is paid for at a stated price per unit of water used—usually the miner's inch or 1.5 cubic feet per minute. Water power is preferable for the reason that the cost of installation is usually relatively cheap, and repairs do not constitute an important item in a well arranged plant. As between steam and electricity, the cost of producing or securing either generally determines which shall be used. In desert regions it is often expedient to resort to still other means for power. An interesting instance is that of the Moctezuma Copper Co., at Nacozari, Mexico. In that case the surrounding conditions determined the kind of plant and the cost of generating power there. While the water supply is sufficient for all purposes during the greater part of the year, during the dry season it fails, and in some seasons no water is visible in the stream beds on the surface. It was known that during the rainy season transportation by wagon from the railroad, then at a distance of 90 miles, was almost impossible and the cost of fuel for power and for smelting operations under existing conditions would be high. The principal fuel supply was limited to scrub oak, but even this was not cheaply available owing to the rugged character of the country. As the amount of wood which could be obtained was evidently insufficient and, although



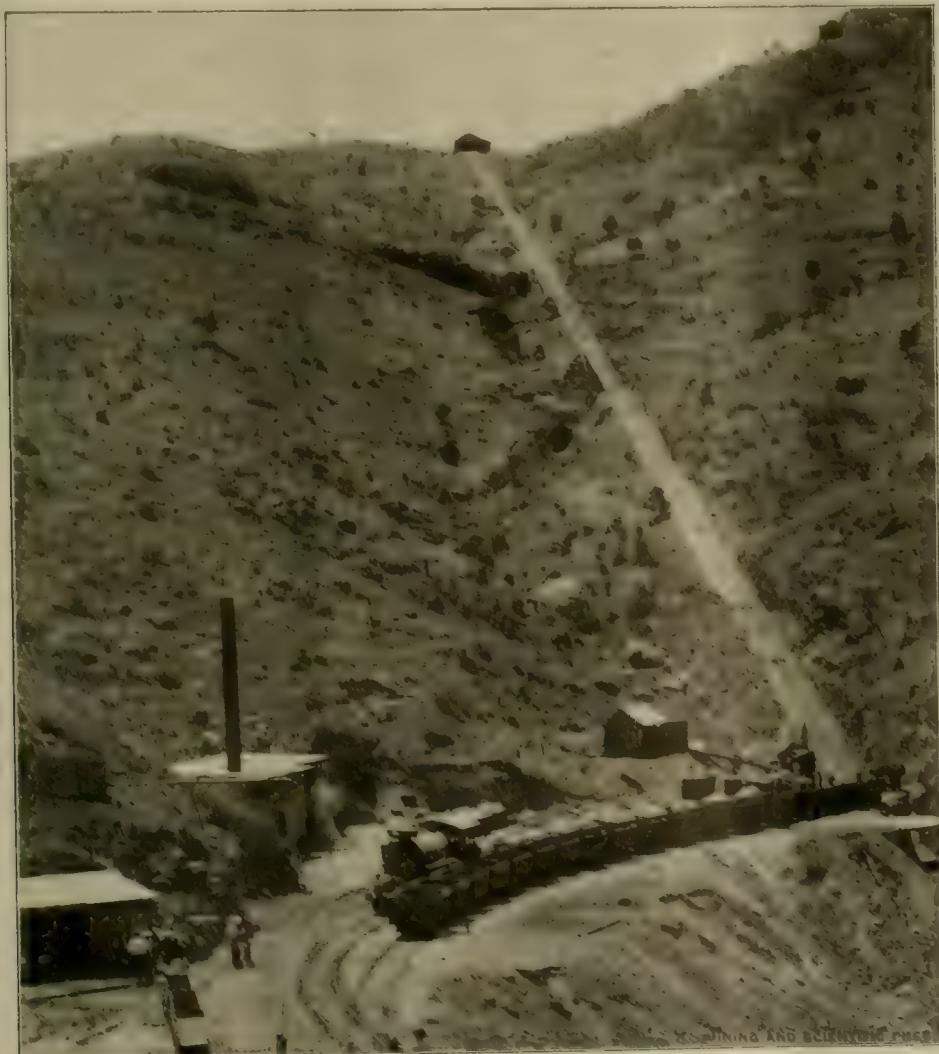
Mine and Concentrator, Moctezuma Copper Co., Nacozari, Sonora, Mex. Co.

cheaper than coal as far as it went, coal would also be necessary, it was determined to ship in all the coal required for all purposes.

After much experimenting, it was determined to adopt gas engines as a means of motive power, and the wisdom of this type of power installation under such conditions as obtained at that time at Nacozari has been abundantly proven. A number of gas engines are employed, each having a single cylinder 18.5 inches diameter and 24 inches stroke, run at 200

revolutions per minute. Each engine is belted to a 65 K. W. direct-current generator. The current is distributed at 250 volts to upwards of fifty motors situated in different parts of the works. These range in power from 5 to 175 H. P. The gas engines are started by compressed air, which has been found a convenient and simple means of accomplishing this, sometimes, troublesome feat. A single air receiver answers for this purpose, the pressure being maintained at about ninety pounds. The compressor is run by a motor and is controlled automatically. As accessory to the compressor is a steam-driven locomotive air pump, with which the plant was started. The water jackets of compressor and engines are supplied with a steady pressure from tanks located outside the building, each engine having its own tank, the water flowing under a 20-foot head. Both inlet and outlet of the jackets are connected by pipes to the bottom of its tank and by this means the water is kept in circulation. The tanks are of large area—18 by 11 feet, and 3 feet deep.

The gas engines are driven by gas made in producers at the works. The producers make both what is known as water gas and producer gas. In making the former steam is employed. When the fires become very hot the steam is turned in and the making of water gas begins. When the steam has cooled the fires to such an extent that the steam passes through without entering into combination with the gas, it is shut off and the making of producer gas continues as before. In this manner the gas making is intermittent. The amount of producer gas made greatly exceeds that of the water gas. A 15,000-cubic foot gas holder takes the producer gas, and one of 5000 cubic feet capacity receives the water gas, the pipe lines being so arranged as to turn the gas into either of the holders. The two gases are admitted into the mains leading to the engines in the proper proportions, to obviate as far as possible great dissimilarity in the quality of gas utilized in power making. The concentrator of the company shown in one of the accompanying engravings has a capacity of 600 tons daily. It is stated that this mill saves about 90% of the original assay value of the ores treated. The machinery of the concentrator is driven by electric motors. The smelter is 5 miles distant from the mines, with which it is connected by narrow gauge railroad. One of the accompanying engravings shows the surface gravity tram at one of the mines and that on page 193 is an illustration of the main shaft of the company. These engravings were made from photos furnished through the courtesy of W. R. Humphries, photographer, of Bisbee, Arizona.



Incline of Moctezuma Copper Co., Nacozari, Sonora, Mexico.



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SAN FRANCISCO, SEPTEMBER 17, 1904.

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## Depreciation of Mining Plants.

A question in which all mine owners, whether individuals or corporations, are interested is: What will be the life of a newly installed plant? Prior to 1890 it was figured that the life of a mill or hoist was practically about ten years, and it was at that time, and has since been, the custom to "write off" about 10% of the first cost annually, and to provide for its renewal it has been the habit of well-managed concerns, where mining operations are profitable, to set aside annually an amount equal to about one-tenth the cost of the mill. As a matter of fact with a properly constructed, modern plant, the life of the greater part of the machinery, and particularly the more massive part, should greatly exceed ten years, while a plant carelessly constructed will not, perhaps, endure one-half that time. Moreover, the personal equation is a large one. A mill man who does not keep his shafting lined up will possibly have to renew the shafting much sooner than ten years from the date of its installation. If the stamps are permitted to drop on the dies instead of on ore the renewal of stems at frequent intervals will be unavoidable. If concentrators are not kept as clean as possible they will prove to be short lived, and they seldom outlast the ten-year limit, owing to the constant and comparatively violent vibrations incident to their operation. Grit is an important factor also. Rock breakers will last a greater or less length of time according to the treatment they receive. The modern heavy mortar with properly arranged liners may last twenty years, or even longer, if no serious flaws or cracks develop in the casting, whereas, the mortar of twenty years ago did well if it remained in constant use for five years before it required renewal. In the matter of compressors and steam engines there is a wide range of endurance. First-class machinery, sufficiently heavy for the duty required of it, may be ruined by bad setting. In this class of machinery the personal equation is even a larger factor than in the care of mill machinery. A compressor set on a light and insecure foundation will not endure, for in a few months, or even weeks, signs of weak-

ness will become evident, and the management may be considered fortunate if breakages do not occur. Anchored to a solid concrete foundation of ample proportions a compressor should show no sign of movement whatever in years. There are other factors equally important, however, in the life of a compressor. These are the government of speed, the lubrication of the cylinders and the free and abundant flow of water through the jackets. Should a compressor run at a speed much beyond the limit for which it is built serious damage may result. Failure to abundantly lubricate the cylinders with the proper kind of oil is also detrimental to the machine, and if the practice is continued it will probably result in a heavy bill for repairs. The same thing may be said of a steam engine. It requires proper setting on a substantial foundation, and in the case of hoisting engines, where the machine is not self contained, and is not wholly on a single bedplate, extreme care is necessary in securing proper alignment of the several parts when setting up or undue heating and consequent wear, with probable breakage of gears, will result. If properly set it must receive care, and its life is likely to be directly proportional to the kind of care bestowed upon it. Boilers will probably not greatly exceed the ten-year limit, though in some instances going beyond it. Boilers have been used steadily for forty years; but long life can only be hoped for where the feed water is free from substances which will corrode the sheets and will not deposit dangerous scale. Other causes of rapid deterioration are the tendency to accumulation of scale, mud or grease on the plates over or near the fire, causing thereby a "bagging" of the plates, leakage seams, and sometimes explosions; the overheating of riveted seams where they overlap, and particularly where they are covered by scale; and hidden defects, due to strains and other causes. Pipe lines, if well protected, will endure many years without material deterioration; but if the wide alternations of temperature, affecting the pipes by contraction and expansion, are not relieved by slip joints, the line is likely to be short-lived, or, at least, to require frequent repairs at stated points. Aerial tramways have greater or less lease of life, depending upon the solidity of the installation and upon the duty they are required to perform. Machine drills, like other machines, have a greatly variable length of life, dependent upon the treatment they receive and the work they do. In some mines machines last much longer than in others, owing to the difference in the hardness of the rock, the pressure under which they operate, and, more than anything else, upon the knowledge and temper of the man who runs it.

On the whole, it may be said that ten years is not too short a time to expect a mining plant to last under constant service and with good care. No account is here taken of the replacing of lighter by heavier machinery, due to the business outgrowing the capacity of the plant. A hoist which will do all that is required at a shaft 700 feet deep, supplying a 20-stamp mill with ore, this being practically the limit of its economic capacity, would be of little service on a 1500-foot shaft where it was required to hoist 1000 tons in twenty-four hours.

THE wisdom and foresight observed in the construction of the Imperial cyanide mill, near Deadwood, South Dakota, is worthy of comment and emulation elsewhere, where dry crushing is in practice, as at the Imperial. The bane of dry-crushing mills is the dust incident to the operation. The annoyance has been reduced to a minimum in the Imperial mill by placing the crushing and pulverizing machinery in a building separated from all other departments, so that the tanks, leaching, precipitation, cleanup, assay and engine departments are free from the objectionable and unhealthy dust.

THE Republic of Mexico is to make operative the law fixing a duty of \$240 per ton (1000 kilos) on dynamite, beginning in October. There are factories operating at Tinaja, which are producing about four tons per day, though said to have a capacity of three times that amount. Two varieties are made, both in the form of sticks. It is said the plant represents an investment of \$3,000,000. The company owns sulphur mines, and manufactures, or intends to make, all the chemicals employed in the manufacture of the explosives.

## Mortar Blocks.

The matter of the proper construction of mortar blocks and the manner of placing and tamping them appears still to be one of personal preference among mill men, although some of the methods employed have nothing to recommend them. If mortar blocks are to be made of concrete only, the best of materials should be used. An inferior concrete, made of poor cement and dirty rock, will not stand the heavy and continuous vibration produced by the dropping stamps. In climates of moderate temperature—that is, where the cold is not so excessive as to cause the frost to disintegrate the concrete—concrete blocks, if well made, have given satisfaction; but for general uses the wooden block is still preferred by many engineers. Of wooden blocks there are several kinds: Those made by a single large piece of timber are solid, and, if the wood be well charged with resinous matter, will not readily decay; but in most regions sticks of timber of the proper size are unobtainable, and often where large enough they are not sufficiently sound to justify their use for mortar blocks.

In some mills the blocks are built of two pieces, as it is much easier to get sticks which will answer for this purpose; but, on the whole, the built-up block, made of 2-inch or 2½-inch selected plank, forms a block which over twenty years of experience has proved to be suited to every condition and probable emergency. The planks are set on end and placed lengthwise of the mortar. The mistake has occasionally been made of setting them transversely of the mortar. By setting them longitudinally, if in the future it becomes necessary to remove the outer planks, which are the only ones likely to suffer decay, the outer two or three layers may be removed and new planks substituted for them. It is always a wise provision to treat the planks to be used with some preservative preparation, which will tend to greatly increase the life of the block. A block of this type of construction may be built up in the pit or it may be built on the surface and lowered into the pit by chain blocks. This is a matter of detail which the builder will settle for himself. If a solid rock foundation is not available, a broad, solid base of concrete is advisable. It should extend at least one foot beyond the block on all sides. The practice of laying heavy timbers on the concrete base in such a manner as to form a mortise to receive a tenon formed on the lower end of the mortar block, has nothing to recommend it. Some New Zealand mills have blocks built in this fashion. The mistake is often made of cutting the pit too small in which the mortar block is set, and in one California mill the pit, already too small, was lined with a concrete wall which comes within 4 inches of the face of the block on all sides, this space being filled with tailings sand, packed tight by turning water into the pit. This renders the making of repairs impossible without first removing the mortar and hoisting the block from the pit after taking out the tamping. There is no loss of stability or rigidity in having the pit of a size which will afford room to work in the space between the walls and the mortar block. This space can be filled with sand, which may be wet down or run in wet. The wet sand packs as tight as rock and is readily removed by shoveling or by means of a hydraulic ejector when repairs are necessary, or if for any reason it is desired to inspect or remove the blocks. Notwithstanding over fifty years of practical experience in mill building, there are still many fallacies in connection with individual ideas of how a mortar block should be built.

THE Japanese government has set aside for the exclusive benefit of the government the area covered by recently discovered gold fields in the province of Iwate. Government engineers who have recently examined that section report that the mines when equipped will become large producers, the estimate of annual output being placed at \$15,000,000.

DURING the present week the American Institute of Mining Engineers is holding its eighty-seventh meeting in the iron and copper region of Lake Superior. This should prove to be one of the most interesting meetings ever held by the institute, as there is much of unusual interest and importance to be observed in that region.



## CONCENTRATES.

WITH 300 feet head there would be, theoretically, 101.38 H. P. developed with 140 miners' inches.

\*\*\*\*\*

A CUBIC FOOT of zinc weighs 437 pounds; of lead, 711 pounds; of mercury, 849 pounds; of gold, 1204 pounds; of platinum, 1342 pounds.

\*\*\*\*\*

A WATER HEAD of 275 feet is equivalent to a pressure of 119.08 pounds per square inch; 0.433 is the pressure per square inch of 1-foot head of water at 62° F.

\*\*\*\*\*

IF the opening in the tank is 18 inches long and 2½ inches high, and the head of water is 24 inches, there would be 133.65 cubic feet of water discharged through the opening per minute.

\*\*\*\*\*

PIPE COVERING and other magnesium fire-proof materials have been manufactured from dolomite in Pennsylvania. The manufactured magnesium carbonate was chemically similar to magnesite.

\*\*\*\*\*

NEITHER copper, manganese or aluminum are magnetic, and yet an alloy of these becomes magnetic. Copper and aluminum alloy is not magnetic, but the addition of manganese gives the magnetic property.

\*\*\*\*\*

COPPER MATTE may be made in a reverberatory furnace as well as in a blast furnace. Some ores can be treated more successfully in a reverberatory than in a stack furnace. Particularly is this the case with ores containing a large amount of fines.

\*\*\*\*\*

A NORMAL fault is one where the hanging wall side of the fault plane has moved downward relatively to the foot wall. A reverse fault, or thrust, is one in which the movement has been, as the name indicates, in a reverse direction—the hanging wall has moved upward.

\*\*\*\*\*

LANDS known to be mineral are exempted from the operation of school land grants. A broad meaning is attached to the word "mineral." All mineral substances which have a value in the markets, whether metals or earthy minerals, are "mineral" in a legal sense.

\*\*\*\*\*

A COMPASS NEEDLE points north and south, because in that position the metal of the compass is parallel to and is carrying more of the lines of the earth's magnetism through it than at any other position. The needle always points in the direction of the magnetic pole unless locally influenced.

\*\*\*\*\*

THE accepted unit of rating of boiler horse power in the United States is that recommended by the American Society of Mechanical Engineers, viz.: One boiler horse power is equivalent to the evaporation of 34.5 pounds of water per hour from a feed-water temperature of 210° F. to dry steam of the same temperature.

\*\*\*\*\*

IN shafts of good size it is advisable to put in ladders, which are inclined, extending the length of two or three sets, providing a platform at the lower end of each section, the ladder beneath being inclined in the opposite direction. This avoids accidents and makes it safely possible for men to climb out of mines from great depth in case of necessity.

\*\*\*\*\*

IN surveying mining claims for patent it is very important that the bearings and distances from certain corners to United States mineral monuments, or to the established corners of the public land survey, be made with great care. This will obviate future expensive complications involving the position of the claim and is as important as establishing the lines of the claim itself.

\*\*\*\*\*

WHERE the dip of a vein departs less than 60° from the horizontal, and the walls of the vein are heavy, it is good practice to sink the shaft in the footwall at a distance from the vein sufficient to avoid the heavy ground. By this means the alignment and angle of the shaft may be kept straight. Where shafts are sunk on the vein in heavy ground they are likely to have trouble with shifting ground.

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THE temperature of carbon monoxide burning in air is estimated at 1400° C. The combustion of carbon monoxide (CO) produces carbon dioxide (CO₂) which is not inflammable, but on the other hand quenches fire as effectually as water. CO₂ is the choke damp of the coal miners. It is found in metal mines as well. Fire damp (also called methane or marsh gas) is light carburetted hydrogen. It is a highly explosive gas, and in some districts flows from driven wells or is collected in swamps, and is employed for heating and lighting.

\*\*\*\*\*

THE locator of a water right must post a notice at the point of diverting the water. This notice must state the quantity of water appropriated and the purpose for which it is taken, and actual work must be begun on the dam and ditch or canal within a specified time, in most of the mining States sixty days, and the work prosecuted with "due diligence," which has been interpreted to mean "reasonable diligence," that is, not in a

desultory manner and at times long apart, but that work be prosecuted continuously, or nearly so, the object being to show the "good faith" of the locator, who is judged by his acts and not by his intentions.

\*\*\*\*\*

MICA is found in a great many crystalline rocks, usually as an essential constituent of such rocks, such as granite and mica schist, but commercial mica is only found in dikes of intrusive coarse grained granite (pegmatite). Mica plates 2 inches square and over are merchantable if of good quality. There is no text book devoted to mica alone. Descriptions of the various kinds of mica are found in all mineralogical text books. The United States Geological Survey annually issues statistical and other information concerning mica and other minerals in the form of bulletins. These may be had upon application to the Director of the Survey at Washington, D. C.

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THE Davy safety lamp used in mines where there is fire damp is an application of the principle that a flame is extinguished by contact with a large surface of a good conductor of heat, such as iron or copper. This principle can be demonstrated by the simple experiment of forming a thin, soft copper wire into a coil like a spring by winding around a pencil, and lowering this coil about the flame of a candle, it will at once extinguish the flame, owing to the rapid lowering of temperature by heating of the wire. If the wire be first heated before placing over the candle flame it will not extinguish the light, because the lowering of temperature does not take place so rapidly. In the safety lamp the flame is surrounded by an iron wire gauze having 700 to 800 holes to the square inch.

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THE application of zinc dust or "zinc fume" to the precipitation of gold from cyanide solutions is limited. It is claimed by most operators that the zinc thread or shavings possess an advantage over the dust, in that by the former the precipitation is continuous and uninterrupted, whereas, in the latter precipitation, it is only effective at the time of adding the zinc fume. Wooden (redwood) tanks may be safely used in dry climates where the tanks are to be shoveled out. Tanks are made suited to these conditions, having a deep groove or channel cut in the top of the staves, and forming a connected ring extending entirely around the top of the tank. The groove is kept full of water, and this reduces the shrinkage to a minimum. The hoops should be of round iron and not flat, as with the latter the friction due to binding is so great that the staves cannot be drawn together upon shrinkage. It is also advisable to have at least three lugs on each hoop instead of one. This permits tightening the staves equally on all sides.

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THE potassium cyanide method of determining the copper contents of an ore or matte depends upon the conversion of the blue color of the copper solution (produced by addition of ammonia in excess to the green nitrate solution) into a colorless solution. It is essentially the measurement of the amount of potassium cyanide solution necessary to decolorize the ammoniacal solution of copper nitrate or sulphate. The reactions taking place are complex. In this method of assaying an increase of temperature increases the intensity of the blue color; a large excess of ammonia has a tendency to vary the color and to give low results; ammonium sulphate gives low results; the presence of hydroxides, bicarbonates, sulphites and nitrites affects the result; salts of silver, zinc, nickel, etc., which will react with potassium cyanide if present must be estimated; ferric or manganese hydroxides should not be present, as they hold copper and affect the final titration.

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WHERE there is heavy side pressure in a stope in which the square set method of timbering is employed the caps should be framed in such a manner that their ends meet on top of the post. These caps should have no "give" at all and be wedged tightly to the walls or sides of the stope, the endeavor being to prevent the ground from starting. If it begins to "come" it is more difficult, dangerous and expensive to support it. With heavy down pressure the timbers must be so framed that the posts meet, the caps and ties resting on shoulders cut in the posts. Where both side and downward pressure are exerted, either style of framing will do, but it may be necessary to put in the supplementary "angle braces," placed in the direction of the greatest compressive force, generally from hanging to foot in a direction nearly at right angles to the hanging wall. Unfortunately the pressure will generally shift from one place to another, or from one direction to another as stopping progresses, and for this reason the filling of large stopes contemporaneously with the extraction of ore is imperative.

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THE amount of water required in milling and concentration of ores depends upon the character of the ore and upon the methods employed. In amalgamation in the battery the amount of water for the best work is reduced to the minimum which will keep the screens from clogging. Careless and inexperienced millmen sometimes shut off the water to such an extent that the crushed pulp accumulates till half the screen is covered, but this is not advisable under any circumstances. If water be so scarce as to afford too small an amount, hang up part of the mill; or, if but one mortar, slow the drop, thus reducing capacity. The mistake is sometimes made of attempting to run the con-

centrators with insufficient water. Again, it is better to hang up a portion of the mill and do good work with that portion which is run. In concentrating mills where no amalgamation is practiced the amount of water varies from 3000 to 5000 gallons per ton of ore crushed. The loss from seepage, evaporation and from other causes, where mill water is settled, pumped back and re-used, is from 25% to 50%.

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THERE are various devices for agitating pulp in the cyanide process. In some instances compressed air is employed for this purpose, and has been found to be an efficient agent for this purpose. When compressed air is used, it has been found that it is not necessary to continuously agitate the solution, but to turn on the air for fifteen or twenty minutes, then shut it off for half an hour or more, then turning it on again and renewing the agitation. Other devices for agitating are revolving barrels with and without diaphragms, and the ordinary muller of the silver mill pan. This latter works well when set in motion and the pulp is introduced by means of a pipe; but should a moment's stoppage become necessary, the pulp quickly settles to an extent that greatly interferes with the renewal of agitation, and with sulphides it is impossible to start up if the agitator is buried even partly. A device which has been successfully used for the agitation of sulphides in cyanide tanks is a screw propeller having two blades. This is keyed to a vertical shaft secured to timbers and set directly over the center of the tank. The shaft is suspended by a collar keyed near the upper end, and held in position by passing through a box bolted to a timber about the middle of the shaft. This lower box acts like the lower guide of a stamp stem. A pulley is fixed to the shaft either at its upper end, or between the upper and lower guides, and the agitator revolved by means of a driving belt, or it may be actuated by means of a gear, though the former is preferable. The propeller is fixed just above the surface of the pulp—siliceous sands or sulphides—whatever it may be, and is submerged by the solution. When the propeller is revolved it quickly causes the pulp to be taken up and held suspended in the solution. It has been found that the rotary motion thus imparted to the pulp has a tendency to cause it to bank up around the inside periphery of the tank. This has been obviated by placing a plank on edge beneath the propeller, and extending entirely across the tank. The result is a perfect agitation and no large accumulation of pulp at any one place. In the case of sulphide treatment, the pulp being very heavy settles and packs hard almost immediately upon the stopping of the screw, but upon restarting it the pulp is again quickly taken into suspension. As in the case of agitation by air, the continuous revolution of the screw is not deemed necessary. The power required is small, and the cost of equipment not excessive. It may be run at any number of revolutions found to accomplish the desired result.

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OF the metallic elements which occur native, the most widely distributed are gold, silver and copper. With the exception of iridosmine (IrOs) and one form of palladium, the native metals crystallize in the isometric system—gold and copper commonly showing "repeated twinning" (parallel repetition or grouping of successive crystals). Gold is seldom found in sharply outlined crystals, when freed from its matrix or vein; because of its softness the edges and angles become more or less rounded. To find a native metal absolutely pure is rare, as all are more or less alloyed with other metals—e. g. gold usually contains silver; silver usually has copper or sometimes platinum, antimony, bismuth or mercury; copper often has silver; platinum is usually alloyed with iron, iridium and osmium. Native mercury (quicksilver) is comparatively rare, but when found is usually associated with cinnabar. There is also a native amalgam containing silver and mercury in varying proportions, its occurrence having been noted at certain mines in Germany, Norway, Sweden, Almaden in Spain, Chile and British Columbia. Lead, native, is of rare occurrence. Besides in Sweden and the Ural mountains, Russia, it has been found at Breckenridge and Gunnison, Colorado, and Hailey, Idaho. But one authentic occurrence of native tin is known—near Oban, New South Wales. Copper and iron are found in the largest individual masses—copper, up to 500 tons, in Keweenaw and Ontonagon counties, Mich.; iron, in basalt, at Blaafjeld, West Greenland, and in meteorites. Meteoric iron is always alloyed with nickel. Copper, while occurring native in small quantities in most of the principal copper-producing districts, is mined almost exclusively in that condition in but one locality—Lake Superior district, Mich. It is also mined, native, in considerable quantities in Bolivia. The Lake Superior copper contains a percentage of silver. Zinc, so far as known, does not occur native. The semi-metals, arsenic, antimony and bismuth, are found native in limited quantities and usually associated with each other. The crystallization is rhombohedral. Of the non-metals the principal native occurrences are of carbon (diamond and graphite) and sulphur. The diamond crystallizes in the isometric system, and with the principal exception of South Africa, its source is largely in alluvial deposits. Graphite has a rhombohedral crystallization and occurs in beds and imbedded masses, laminae and scales. Sulphur is orthorhombic and is found at hot springs, in solfatara, and in volcanic vents, also in beds of gypsum. Selen-sulphur is a native compound of selenium and sulphur. Tellurium has been found native in Transylvania and Colorado.



## The Mother Lode in Tuolumne County, California.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

Throughout the entire length of that portion of the gold belt occurring in Tuolumne county, and known as the Mother Lode, there are definite and striking geological and mineralogical characteristics which distinguish it. The lode does not outcrop continuously through Tuolumne county, but the aggregate of the several disconnected outcrops will cover a distance of several miles. The striking features of the lode in this section are large masses of snow-white quartz, standing often several feet above the surface, and in some instances forming prominent hills, as at Quartz mountain, at the Golden Rule hill near Stent, and less prominently Whiskey hill near Jamestown. In some instances these outcrops look like huge white walls, as on the Eagle-Shawmut mine near Jacksonville. These quartz masses are always found accompanied by broad zones of rock consisting of the carbonates of lime and magnesia and sometimes of iron. In the absence of the iron carbonate the rock is essentially dolomite, but with the addition of the iron carbonate the rock becomes ankerite. This dolomitic rock is also a characteristic of the Mother Lode in Mariposa county, and in the southern part of Calaveras county. It is usually found in Tuolumne to be ankerite rather than dolomite, and the decomposition of the iron carbonate, aided to a certain extent by the oxidation of the pyrite occurring in the normal rock, has resulted in the formation of great masses of hematite and limonite, which resemble the iron gossan of some cop-



Cross Section of Table Mountain, Tuolumne County, Cal.

per lodes. This ankerite is usually accompanied by the green chrome mica mariposite, and it was doubtless the occurrence of this bright green mineral with the iron oxide that led early prospectors to explore some of these outcrops for copper.

The wall rocks of the lode vary somewhat from one point to another along its length, but generally speaking they are amphibolite schist, and serpentine, with occasionally black clay slate, diorite, diabase, and feldspathic dyke rocks of granitic type—these latter in the southern end of the county. The ankerite is usually found seamed with quartz veins, great and small, forming a sort of "stock works." The rock usually carries some gold, and in at least one mine, the Rawhide, it was found rich in coarse gold. In the northern end of the county there has been considerable work done of an exploratory character on this zone, but these mines have thus far not proven to be rich. Large masses of gold-bearing rock have been developed which is relatively low grade, though in character what is known as free milling, which in California means that a high percentage of value can be saved by plate amalgamation and concentration of the sulphides. In this vicinity, near Tuttletown, is Jackass hill, one of the most noted pocket mining sections in California. The rocks of this eminence are chiefly amphibolite schist, and the gold occurs for most part at the intersection of seams and small veins. The distribution of the gold has been very erratic, and ranges from a few "colors" to accumulations worth many hundreds of dollars. In the aggregate the pocket mines of Jackass hill and vicinity have produced several hundred thousand dollars, and new discoveries continue to be made frequently. The "pocket" zone lies a few hundred feet east of the Mother Lode, in the schists forming the hanging-wall country. Along the main lode pockets and disseminated gold are found, but between the Stanislaus river and the Rawhide property no largely profitable mine has as yet been developed, though there are several shafts 500 to 1000 feet deep with extensive lateral development. Some of the surface installations were unnecessarily elaborate and premature, but although exploration of this section of the lode has been somewhat disappointing, there are long reaches of the lode wholly unprospected, except in the most superficial manner. There are numerous indications of profitable possibilities in the schists and slates of the hanging wall country, which is found in places seamed with quartz stringers, and these have scarcely been prospected, to say nothing of being developed. The Alameda mine is one of those which have been developed to considerable extent, but although there was a promising ore shoot at the surface in the form of a gold-bearing quartz vein in the ankerite mass it proved unprofitable to the depth reached by the shafts—about 1000 feet—though in other mines of the lode rich ore is found far below the 1000-foot mark. The most profitable mine on this

part of the Mother Lode has been the Rawhide (see accompanying illustration). The outcrop of this mine consists of large masses of white quartz accompanying the ankerite. Physically and geologically, it is not unlike the other mines on the lode in the vicinity. There was a pay shoot on the Rawhide, however, at the surface, and though this surface shoot was exhausted at comparatively shallow depth, other shoots were found below. The mineral zone of the Rawhide mine is from 50 to 150 feet wide. Within it occur numerous large quartz masses, carrying auriferous pyrite. The amphibolite schist also con-

would be anticipated. South of Rawhide No. 2 is the noted Table mountain—an ancient river channel capped with black basalt. Table mountain has for fifty years served in geological text books as the type of lava-covered ancient channels in California. The sketch of its cross section has become familiar to all students of geology. The channel is gold bearing throughout its entire length as far as explored, and where it has been possible to drain it, it has generally been worked profitably. The gold in the upper end of the channel, which takes its rise, as it were, in Calaveras county, derived its gold from the



The Rawhide Mine, near Jamestown, Tuolumne County, Cal.

tains gold-bearing sulphides, as well as the ankerite. It was in the Rawhide mine that the rich gold-bearing ankerite, almost destitute of quartz, was discovered in 1893. This occurrence may be called the anomaly of the lode, for although, as previously stated, the ankerite is usually auriferous, it has nowhere else along the entire length of the lode, in a distance of 120 miles, been found as rich as this single shoot of the Rawhide. At the Rawhide the wall rocks are variously black slate, amphibolite schist, diorite and serpentine. The serpentine, which at

numerous veins of the east lode. The channel was still further enriched by passing through the "pocket country" lying between the East Lode and the Mother Lode, and the latter undoubtedly contributed still further to the golden stream. The lode passes beneath Table mountain almost at right angles to the channel, in what is known as the Omega claim. This property is about to be developed by sinking a vertical shaft 500 feet near the base of the northern slope of the mountain, on the Rawhide side. From this shaft drifts will be run



Open Cut of the Alabama Mine, Near Jamestown, Tuolumne County, Cal.

the south end of the property lies on the hanging wall side of the lode, near the north end swings westward and crosses the course of the vein, forming the foot wall for a short distance. The fissure continues straight through the serpentine, however, not an unusual occurrence on the lode, where it is often seen that the fissure maintains its direction regardless of changing course and character of wall rocks.

The section adjoining the Rawhide on the south, Rawhide No. 2, is developed to only a limited extent, having a shallow shaft sunk on a shoot of quartz carrying gold and tetrahedrite (gray copper). The occurrence of this mineral in the mines of the lode is usually considered by the miners a good indication of payable values, though experience has shown that it is not an infallible index of such condition. The property referred to lies in flat meadow-like ground and requires hoisting machinery. The Rawhide mine, although lying in a basin-like valley, makes a surprisingly small amount of water—much less than

along the vein to explore for pay shoots. This proposition is one of those, owing to physical conditions, wherein the outcome is purely speculative, yet the owners feel sufficiently sanguine of success to equip the mine with the necessary machinery and to furnish means to do the work of development. It is also the intention to work the gravel of the ancient river by running a drift from the shaft at a level which will drain the channel, the water to be raised about 100 feet to a tunnel level through which it will drain.

South of the Omega is the Alabama mine, which has been developed extensively, but has been idle for some years. It was at one time equipped with a 20-stamp mill and produced considerable gold. One of the accompanying illustrations is that of an open cut on the Alabama mine. It shows the structure of the vein and its relation to the auriferous slates and schists of the hanging wall. The ankerite mass is a prominent feature of the Alabama mine.



## The Mining Industry of Nevada.

Nevada, the Silver State, has always been noted for the enterprising character of her citizens, and the recent publication under the auspices of the Nevada Chamber of Commerce of a handsome pamphlet for gratuitous distribution and entitled "Greater Nevada," shows that the same enterprise and energy is still found in that State. Among other features of interest in this book, descriptive of the various resources and industries of Nevada, that referring to the mining industry, written by W. T. Moran of Virginia City, is one of the most interesting. In a few brief paragraphs is given an epitome of the industry as it exists to-day in that State. Although known as the Silver State, the output of gold now far exceeds that of silver. The author of the contribution above mentioned writes as follows:

It being impossible within a brief space to give an exhaustive description of the mining industry of Nevada, the writer must content himself with making a few statements regarding the mining in the past and present within the State, and offering a few facts to prove the statement which has often been made, viz., that the mining and prospecting already done has merely been scratching. When a map of Nevada is examined, it will be noticed that the topography consists of not less than sixty distinct ranges of mountains, all of which have been named, besides many other lesser chains and isolated peaks, divided from one another by valleys more or less fertile. These ranges vary from 10 to 50 miles in length, and gold and silver are found on every one of them. The mountain ranges run nearly north and south, but in some cases the mineral belts run east and west; one in particular, in Elko county, extending east and west, is nearly 40 miles wide and 1-0 miles in length; gold in placers and ledges has been found in paying quantities throughout its entire length. The area of Nevada is 71,000,000 acres, mostly mountainous. Every day new discoveries are being made. No one ever heard of Tonopah until late in 1900, nor of Goldfields until two years later. It is therefore reasonable to suppose that many more equally rich and productive districts will be discovered from time to time when the ubiquitous prospector reaches them. It is not to be supposed that no prospecting has been done along these ranges; they have all been more or less traversed by eager seekers after gold and silver, but various causes led to many promising ledges and placers being abandoned for the time being; among these causes may be mentioned inaccessibility, scarcity of water, lack of transporting facilities, lack of funds, etc.

**CHURCHILL COUNTY.**—The gold discoveries in this county are rich, and several extensive copper mines are turning out and shipping matte. In the eastern part of the county are several high ranges of mountains, notably Carson Sink, Augusta and Sinkavata mountains. These mountains, like all others in Nevada, are seamed with ledges, carrying gold and other metals. Many rich veins of gold and silver have been discovered and have produced a large amount of bullion. Most of the discoveries are of recent date and give good promise for the future.

**DOUGLAS COUNTY.**—Is generally mountainous, with rugged high peaks. The Pine Nut mountains in the eastern part of the county are seamed with ledges of quartz, rich with precious metals. There are also rich placer mines, which have been worked profitably in a small way, the scarcity of water preventing more extensive operations. In the southern part gold mines have been worked for many years profitably.

**ELKO COUNTY.**—This county contains 10,972,000 acres of land, or over one-seventh of the entire State of Nevada. Its length is 155 miles and width 129 miles. It is not considered a leading mining county, but the net proceeds of its mines hold a respectable relation to the net proceeds of the mines of the State. The mountains cover one-half the area of the county, and are from 8000 to 12,000 feet high. These mountains are rich in minerals, but were never thoroughly prospected. Tuscarora, the leading mining camp of the county, was one of the first discovered, and has been worked continuously since. The placer mines there discovered are also being worked. Afterwards silver ledges were developed and have turned out \$10,000,000 worth of silver. The gold ledges in the district have been recently opened up and are now being profitably worked.

**ESMERALDA COUNTY.**—The mines of Esmeralda principally produced silver; but since the decline in the value of that metal, gold production has received more attention, and many rich ledges have been opened. The principal districts in this county are Aurora, Pine Grove, Hawthorne, Palmetto, Silver Peak, Candelaria, Silver Star, Tule Canyon, Montezuma and Cambridge. These camps have produced not less than \$20,000,000. In the county is also situated the new camp of Goldfields and a part of the camp of Tonopah. A few words about the Goldfields district will not be out of place here. Scarcely two years old, it has developed into a very promising camp, and bids fair to rival its sister camp, Tonopah,

from which it is distant 26 miles. The principal mines are the Jumbo, surface average \$275 per ton, at 50 feet average \$1467, Combination (ore goes \$200 to \$400 in gold), and January and Florence.

**EUREKA COUNTY.**—Eureka district was discovered in 1864. This district ranks second only to the Comstock in Storey county. The mines have produced \$125,000,000, and only a few ledges known to exist in this district have been worked and very little deep mining has been done. In this camp, as in many others, the cyanide process of treating ore and tailings has caused a great revival and worked a wonderful transformation. Lead is largely produced from the mines of Eureka district. Iron is found in abundance, and near Palisade, in the northern part of the county, is a large deposit of magnetic iron ore now being worked. The mining camps are Eureka, Cortez, Mineral Hill and Safford.

**LANDER COUNTY.**—Silver and gold were first discovered in 1862, and since then mining has been the principal industry of the county. The most important mining districts of this county are Austin, Galena, Lewis, Bullion, Pittsburg, Kingston, Marysville, New Pass and Yankee Blade. Good prospects have been found in every mountain range in the county, and throughout the county are many rich undeveloped prospects of gold and silver. About 12 miles southward from Austin, in the Toiyabe mountains, are the Big Creek antimony mines, which, with similar ones in Humboldt and Churchill counties, enjoy the distinction of being the richest mines of this metal in the world. The ledge is very wide and about 2 miles of its length has been traced. Lander county has produced over \$36,000,000 in precious metals.

**LINCOLN COUNTY.**—Contains 19,000 square miles, or 12,250,000 acres. It was organized in 1866, and has produced \$30,000,000 in gold, silver, lead and copper. And much more remains to be extracted, as in fact mountains of mineral lie practically untouched in this county. Other metals besides gold, silver, copper and lead exist in large quantities in this county. In the Raymond & Ely mine alone over \$5,000,000 worth of zinc is said to exist, which could be extracted with profit were transportation cheap.

**LYON COUNTY.**—In this county is situated Silver City, one of the richest mining districts in Nevada. Many millions in gold and silver have been taken out, and at present all or nearly all the mining claims are being worked with more or less profit. Here, too, cyaniding has worked wonders, and is being carried on on a large scale. The mines in this district carry a large proportion of gold. The great drawback to mining in this district is the presence of water within 100 feet of the surface preventing deep mining. This obstacle will be removed when the system of drainage contemplated and now being constructed is completed. In the central and southern parts of this county promising gold and silver quartz ledges have been found, notably at Como. In the eastern part many copper mines are being worked at a profit.

**NYE COUNTY.**—Many rich mines of gold and silver have been discovered in this county and have yielded an enormous amount of bullion, but as in other portions of the State cheap transportation facilities are almost absent and retard the development of the county. When more railroads come all this will be changed, and it will be profitable to work low-grade ores. A railroad has been built from Sodaville to Tonopah, which will give cheaper transportation and open up a vast territory containing many rich mining camps.

Four years ago, in 1900, James Butler discovered Tonopah, and at present writing there are over 4000 people in the camp. From its discovery up to the last day of December, 1901, \$4,500,000 was produced. The mineral zone is 7000 feet long by 5000 feet wide. Besides gold and silver, copper, lead, antimony, zinc and quicksilver have been found in quantity in this county; also gypsum, fireclay, chalk, soapstone, borax and alum.

**ORMSBY COUNTY.**—There is little or no mining being carried on in this county, but many of the wealthy mine owners of the State have their residences in Carson, the capital, which is a beautiful and attractive city.

**STOREY COUNTY.**—This is essentially a mining county, and has produced the greater part of the gold and silver that has been taken out of the State. No group of mines in the world have taken out more. The amount is \$600,000,000. It is the only place in the State where deep mining has been carried on to any extent. The workings are down 3300 feet, and some of the most expensive pumping and hoisting machinery in the world are in operation in the mines of the Comstock. These mines are as modern and up to date in their equipment and operations as any in the world, and the use of electricity for airing and lighting the mines is almost universal. Electricity is also used for hoisting in some of the mines, and for pumping in the C. & C. shaft of the Con. California & Virginia mine. The entire mine is lighted by electricity, 250 sixteen candle power lamps being used in the drifts, stopes and crosscuts and stations. Electricity is also used to compress air to drive the drills and to run the fans used in keeping the mine cool. Previous to the introduction of electricity into the

camp the cost per horse power was \$20; this has been reduced to \$7 per month.

**WASHOE COUNTY.**—The leading industries of this county are agriculture and manufacturing, but recently discoveries have been made of rich mineral deposits, notably at the Wedekind mine, near Reno, where in apparently unproductive rock values as high as \$700 per ton have been found, and extensive bodies of very rich rock have been blocked out in the various mines on the Wedekind lode. Gold and silver have been universally mined in various other parts of this county, which contains also rich veins of copper, iron, sulphur and borax; salt and soda are to be found in large deposits north of Pyramid lake. There are mines of quicksilver also in this county.

**WHITE PINE COUNTY.**—Some of the richest silver mines in the State exist in this county, and were universally and profitably worked up to the time when silver declined in value. Lately many rich discoveries of gold have been made and new ones are being constantly found. The principal mining districts are Hamilton, Ely, Eberhardt, Treasure City, Mineral City and Osceola. At Osceola extensive placer mines are being worked by hydraulic process, and annually yield a large amount of gold.

**SUMMARY.**—Nevada is one of the richest States. It is no longer a silver State only. Employment can be found for more men in mining for gold than silver mining afforded in the past, and a greater amount of wealth can be returned every year. The Comstock ore is about 45% gold. Eureka ore carries about 30% gold. Lincoln county ore is mostly gold. Esmeralda ore, except at Candelaria, is all gold. Silver Peak has a gold ledge 45 feet wide and miles in length. Pine Grove ledge in Esmeralda has produced \$2,000,000 in gold, it is 200 feet wide and traceable for miles, and is practically untouched. Hawthorne is also a gold-bearing district.

## The Father Lode Extended.

TO THE EDITOR:—I have read with interest the article entitled "The Father Lode of California," in the issue of Aug. 27, and wish to make a slight addition thereto. The author of that article seems to consider that the belt of mineralized country described ends at, or near, Minnesota or Alleghany, Sierra county. While my acquaintance with the locality is somewhat limited, I think that the belt may safely be considered to extend at least 10 miles farther to the north. The contact between serpentine and slates crosses the north fork of the Yuba river at a point only a little below Downieville (noted in early days for its exceptionally rich placers), and at several places between Downieville and Fir Cap mountain it may be recognized. The hills here are nearly all covered by lava flows, so that the contact cannot be followed from one point to another.

A mine on the south side of Fir Cap mountain has undoubtedly opened one of the veins of this belt. It was accidentally found by drift miners while tunneling for gravel. The apex of the vein being probably 600 feet under the surface of the mountain, the tunnel would have passed over it had it been driven a few feet higher. The foot wall is serpentine and the hanging slate. The vein itself is more a zone of fissured rock and "talc," containing small quartz veinlets and mineralized by arsenopyrite, than a true vein. It is very little developed as yet, and its value below the zone of oxidation problematical, but near the apex (the, at one time, surface) free gold is found in crystals, and the arsenopyrite shows indications of secondary concentration.

Another mine, on the opposite side of the Yuba, near Mountain House, is on the same contact, and shows the same characteristics as the one on the north. Standing at Mountain House one looks down an almost straight valley to the Yuba river, and up another equally straight valley to the mine on Fir Cap mountain. When this region has been more fully developed it will probably be found that the contact has here been an easily eroded area, and has resulted in the present valleys. At the point where the axis of the two valleys cross the Yuba river is found the old and famous placer camp, Goodyear's Bar.

As I said at the beginning, my conclusions are the result of only a few days' observation while in that part of the country some time ago, and may be entirely at fault. However, it seems as if this district must be included within "The Father Lode."

I agree with your correspondent, that this district can be looked to with advantage. It seems as if this particular district had stood still since the days of '49, and is now ripe for development at the hands of Capital and Transportation. L. W. TRUMBULL.

Laramie, Wyo., Sept. 5.

## California Mineral Output.

Statistical tables issued by the State Mineralogist of California, showing production of all minerals produced in California for seventeen years from 1887 to 1903, inclusive, and also the production by counties for 1903, have been received. The total output for 1903 was \$37,759,040, against \$35,069,105 for 1902. The total output for seventeen years is stated to have been \$418,851,833.



## Milling of Auriferous Ores in New Zealand.\*

Written by H. A. GORDON.

In dealing with the pulverization and treatment of auriferous ores, it may be stated that there is not one system of treatment applicable to all classes. In the southern portion of New Zealand the ores generally contain free gold, with scarcely any impurity—that is, it is found in an almost pure state, without alloy, and its dissemination among the matrix is generally in coarse particles. The only difficulties the millman has to contend with are the economical concentration of pyrite, which in some of the lodes is rich in gold, and the extraction of the gold the pyrite contains. In some of the lodes there is what may be termed float gold—that is, the particles of the precious metals are so finely divided that they pass over the quicksilver tables—and, unless there are some other appliances for saving them, this class of gold is lost. It is only within the past few years that any attention has been given in the southern portion of the colony to saving the fine gold that has passed the amalgamating tables.

In the North Island the ores are very complex; there are scarcely two mines, although they may be adjoining each other, where the bullion is of the same character. On every field the gold is alloyed with silver, and in combination with other metals and mineral substances, such as copper, zinc, antimony, galena, iron, sulphur, arsenic, etc., and in some instances cinnabar, as in the case of the Champion lode at Tui creek, Te Aroha. Ores of this class are extremely difficult to treat satisfactorily. Shipments of ore from the lode referred to have been sent to the smelting works at Swansea, also to Freiberg, and at both these works only a comparatively small percentage of the assay value of the ore was obtained. With ores of this character the difficulties the millman has to contend with are very great, and have led to many experiments being made in the treatment of auriferous ores in the North Island. Ten years ago milling and treatment of ores was carried on by rule-of-thumb; no assays were made to ascertain the value of the ore, and every one in charge of milling operations would confidently assert that he was saving 80% of the gold, where in reality the extraction would not exceed 50%. So long as mines could be made to pay for working, and in some instances so long as calls could be got from shareholders, this system of treatment was carried on, always hoping against hope that a rich bonanza of ore would be struck to recoup them for the outlay.

The values of the bullion on North island fields differ considerably. On Coromandel the maximum value of bullion does not exceed \$15.30 per ounce; on the Thames the average value is about \$12 60, and in the Ohinemuri field the value is in some instances below \$6 per ounce. The gold is in extremely finely divided particles, disseminated through the matrix; in many instances no fine gold can be seen in ore having value of \$50 per ton. The value of the ore can only be obtained by careful sampling and assay.

**MILLING.**—For several years there was a controversy among millmen in the northern goldfields as to whether dry crushing would not be the more advantageous system to secure a higher percentage of the bullion in the ore. The Waihi G. M. Co. at Waihi was the first to erect a 60-stamp mill for dry crushing. This was previous to, or nearly at, the same time as the introduction of the MacArthur-Forrest cyanide treatment. When this mill was erected the bullion was saved by amalgamation. The pulverized ore was collected in a chute with a spiral conveyor, collected along each battery of thirty stamps, in front of the screens, so that the dust forced through the screens was conveyed into a chamber from which a set of bucket elevators lifted it into bins, and from the latter it was conveyed by trucks to combination amalgamating pans. These pans were 5 feet in diameter and about 2 feet 6 inches in depth. Each pan contained from 200 to 250 pounds of quicksilver. They were worked in charges of about 18 to 20 hundred-weight of the pulverized ore. These charges took about four hours. The first two hours the ore was ground with quicksilver, with a sufficient quantity of water to make it into a moderately thick pulp. This was heated with steam to a temperature of about 120°, a little salt and sulphate of copper being added to each charge. After grinding the ore for about two hours, the miller was lifted and kept revolving for an additional two hours with more water, after which the charge was run into a settler and worked in it for such a length of time as to collect the small particles of globules of quicksilver. With this system of treatment about 68% of the gold was saved, and about 45% of the silver.

Other mills were erected to also crush the ore dry; but it was found a much more expensive system of treating the ore than by wet crushing. Moreover, the dust about a dry crushing stamp mill proved very injurious to the workmen, besides wearing away the bearings of the working parts considerably, and, as the cyanide treatment became generally understood, wet crushing was again resorted to. Improvements will continue to be made in the system of economically treating auriferous and argentiferous ores, whereby the expense of treatment will be reduced and a larger percentage of the bullion extracted.

To collect the dust floating about the dry crushing mills, ventilators and exhaust fans were used to draw it into bins near the roof of the building; but even with these appliances dust still keeps floating about the mill. It was almost impossible to get a clean, clear atmosphere inside the building, although the fans and ventilators removed a large quantity of dust from the stamps. The lifting of the pulverized dry ore into bins, drawing it off, and depositing it in the vats always raised the fine minute particles, which presented a slight misty appearance in the building.

In regard to the best and most economical method of reducing auriferous ores to a finely pulverized condition, some millmen prefer one machine and some another; but the consensus of opinion here is in favor of a stamp mill, having either a Gates or Blake-Marsden crusher, to reduce the ore to about 1½ inches in diameter before depositing it in the ore bin for supplying the stamps. Other mills have been tried in this colony, but stamps have generally replaced them. The Huntington mills are also in use, crushing through 40 to 60-mesh screens. One or two of these mills were erected at the Kauri Freehold Co.'s plant at Opitonui to grind the coarse sands from the spitzkasten before subjecting them to cyanide treatment.

Cornish, Cyclone and Krom rolls have been tried, but the great objection to rolls of this description is that the rolls wear more at the center than at the ends, and thereby their efficiency is destroyed. The pounding of ore by stamps in a mortar produces far more slimes than the same ore would do if crushed by rolls.

For dry crushing the tube mill is an efficient machine; it will pulverize from 16 to 18 tons per day of average hard ore. As soon as the crushed particles are fine enough they pass through the screen during the revolution of the mill, and the sands for treatment are more evenly granulated.

At the time when the MacArthur-Forrest Co. introduced the cyanide treatment into this colony that company sent out a crushing mill to pulverize the ore for cyanide treatment; but, although it was a good grinding machine, the wear and tear was great. It was a machine not suitable for hard ore, nor for wet crushing. All the ore had to be dried before being put through the mill.

In constructing a stamp mill the great desideratum is to have good foundations. If a good rock bottom is not obtainable, a rectangular trench is sunk until firm material is met, after which a bed of concrete is made about 2 feet thick, of four parts gravel and clean, sharp sand to one part Portland cement. On the top of the concrete bed two longitudinal pieces of wood, about 10 inches by 12 inches, are laid, about 1 foot apart, having filling blocks at ends and in the space between the batteries. The open spaces left form mortise holes for tenons on the lower end of the mortar blocks.

Where the mortar blocks can be got having the necessary cross-section, about 5 feet 2 inches by 2 feet 4 inches, all in one piece, they are used. Solid blocks of these dimensions can be procured, especially in the North Island, of kauri timber. The mortar blocks for the Moantairi mill at the Thames have this cross-section, and are 18 feet in length. Concrete walls are built on each side of the trench above mentioned to take the ends of the cross-sills at each end of the mortar blocks into which the battery frames are tenoned. Where the blocks are not obtained in one piece, upright planks or balks of timber are bolted together. The top of the blocks is made level, and a rubber sheet, ¼ inch in thickness, is laid on the top below the mortar box. The mortar box is held to the upright block with strong holding-down bolts in the usual manner.

The battery posts or frames are made of timber 12 inches by 24 inches. The posts are mortised into the sills, and recesses cut for the bearing blocks of the cam shaft, on one side, at the necessary height. The frames or posts are generally braced either from the front or back of the battery, according to the way the power is transmitted to the cam shaft. Above the top of the mortar box is one set of wooden guides, and another set is placed above the cam shaft. These guides are about 7 feet 9 inches apart, and are made of plank 4 inches thick and 15 inches wide. In some instances, when the guides are new, thin slats of wood are put in between the guides, and, as they wear, the slats are dispensed with.

The milling plants in this colony consist of stamps with rock breakers; but each millman has different ideas as to the weight, speed, and drop of stamp, and also as to the depth of the mortar. The most modern plants are constructed so that the ore coming from the mine is dumped on a grizzly, made of longitudinal bars, 3 inches by 1 inch, and about 12 inches in length, the fine material passing through the grizzly into the ore bin, and the large pieces falling on the floor, where rock breakers are placed, and the ore passing the breakers falls into the same ore bin as the ore that went through the grizzly. In some of the mills ore feeders are made fast to the front of the ore bin, and at others Challenge feeders

are used. Where ore feeders are made fast to the front of the bin there is less space required between the ore bin and the mortars. The chutes from the feeders are made so as to fold up against the bin when any work requires to be done on that side of the battery.

A desideratum in constructing a stamp battery is to have large bins for holding a fair supply of ore. The height from the bottom of the mortar to the floor where the ore is deposited on the grizzly should be at least 40 feet, and from the mortar all the pulverized ore should pass over the tables and through all the different processes of treatment by gravity.

(TO BE CONTINUED.)

## Exploration of the Lower Depths of the Earth.

A somewhat startling, if not amusing, statement was recently made by C. A. Parsons in his presidential address to the engineering section of the British Association, in discussing a proposition to investigate the interior of the earth to great depth, for purely scientific purposes, and in no way connected with mining, though the estimates made were based upon experience gained on the Rand. Concerning this novel and interesting proposition, he said:

There were many problems of the highest importance in physics, engineering, chemistry, geology and the arts of which the investigation might probably prove of great benefit to the human race, but would involve considerable—sometimes very great—monetary cost. In many cases no patents would give adequate protection; in some there was no subject matter of novelty and importance involved. In others the probable duration of the investigation was so long that any initial patents would have expired before a commercial result could be reached. In any of these circumstances there would be no inducement to business men or financiers to undertake the risk. As an illustration of his meaning he took two investigations. One was the problem of aerial navigation. Another, and perhaps more important, investigation, which had not been attacked to any material extent, was the exploration of the lower depths of the earth. At present the deepest shaft was, he believed, at the Cape. It was a little over 1 mile in depth. The deepest borehole was one made in Silesia by the Austrian Government, of about the same depth. What would be found at greater depths was at present a matter for conjecture. To sink a shaft to a great depth presented no unsurmountable difficulties beyond those incidental to an enterprise of considerable magnitude involving the ordinary methods of procedure and the ordinary methods adopted by mining engineers. That there would be some departures from ordinary practice, on account of the great depth, it was true, but these were more of the character of detail. On the design of this boring he had consulted John Bell Simpson, the eminent authority on mining in the north of England. The shaft would be sunk in a locality to avoid, as far as possible, water-bearing strata and the necessity of pumping. It would be of a size usual in ordinary mines or coal pits. The exact position of such shaft would require some consideration as to whether it should commence in the primary or secondary strata. It would be sunk in stages, each of about ½ mile in depth, and at each stage there would be placed the hauling and other machinery, to be worked electrically, for dealing with each stage. The depth of each stage would be restricted to ½ mile in order to avoid disproportionate cost in the hauling machinery and the weight of rope, as well as increased cost in the cooling arrangements arising from excessive hydraulic pressures. At each second or third mile in depth there would be air locks to prevent the air pressure from becoming excessive owing to the weight of the superincumbent air, which at from 2 to 3 miles would reach about double the atmospheric pressure at the surface. A greater rise of pressure than this would be objectionable for two reasons—first, from the inconvenience to the workmen; second, from the rise of temperature due to the adiabatic compression of the circulating air for ventilating purposes. The air pressure immediately above each air lock would thus reach to about two atmospheres, and beneath to one atmosphere. In order to carry on the transfer of air through the air locks for ventilating purposes, pumps coupled to air engines would be provided, the energy to work the pumps being obtained from electro-motors. To maintain the shaft at a reasonable temperature at the greater depth, powerful means of carrying the heat to the surface would be provided. The amount of heat conducted inwards through the rock wall and requiring to be absorbed and transferred to the surface depended on the temperature and conductivity of the strata. But there was no doubt that it would be possible to maintain a moderate temperature in the shaft to the depth of 12 miles. During the process of sinking at the greater depths the shaft bottom would require the application of a special cooling process in advance of the sinkers, similar to the Belgian freezing system of M. Poesche, used for sinking through water-bearing strata and quicksands, and

\*Abstract from Trans. Australasian Inst. Min. Engrs.



now in general use. A number of boreholes were driven in a circle outside the perimeter of the shaft to be sunk, and through these very cold brine was circulated, thus freezing the rocks and quicksands and the water therein. When this process was completed the sinking of the shaft was easily accomplished.

As to the cost, rate of boring and normal temperature of the rock, an approximate estimate had been made, based on the experience gained on the Rand, but including the extra costs for air locks and cooling:

Depth, Miles.	Cost, \$.	Time in Years.	Temperature of Rock
1	500,000	10	122° F.
2	1,100,000	25	132° F.
3	1,800,000	40	152° F.
4	2,700,000	55	211° F.
5	3,700,000	70	242° F.
6	5,000,000	85	272° F.

## The Desert Dry Lakes of California.

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS by  
G. E. BAILEY, E. M.

**THE LAKE AREAS LIMITED.**—Some may think that these dry lakes of the desert are so numerous as to practically destroy their value, when the very reverse of this is the case. The lakes are comparatively few in number, and, with the exception of Death valley and Salton sea, they are of small area. In fact their total area is very small indeed when

Buckhorn lake, two townships; Danby lake, one township; Bristol lake, three townships; Cadiz lake, two townships; while the rest vary from less than a township to a single section in size. In other words the eight largest dry lakes have a total area of twenty-eight townships; while the rest probably do not have a total of over thirty townships. In brief it is wholly probable that the total wealth of the salines of the dry lakes of California are contained within an area equal to less than sixty townships of land. It will be seen later on that California contains in her dry lakes the main source of supply of borax, etc., of the United States. This fact taken in connection with their limited area give them a value that should be recognized and guarded both by the State and the Nation.

**SALINES CONFINED TO "DRY LAKES" AND THEIR BEACHES.**—The borax, sodas and niter of California and Nevada are found only in the "dry lakes," or in the remnants of the "old beach" lines of one or two of the deepest "ancient lakes," viz., Death Valley, and its neighbors, Resting Springs, and Panamint Valley. An examination of the last map in Bulletin No. 24—a general map of the State of California, showing the location of the salines—shows that nearly all of the niter locations are in the northern portion of San Bernardino county, or in the southern portion of Inyo county, in the Death Valley region. It will be noticed, also, that the presence of borax, salt and other sodas are marked at the same points. Bulletin No. 24 says:

Nearly all of the niter beds, so far as discovered, are



Salt Making on Dry Lake Near Oceanside, San Diego County, Cal.—Brine Pumped From Wells Through Single Main Pipe Line, Arranged so One or All May be Pumped at One Time.

compared with the total area of the salt marshes reserved along the tide waters of California, and wholly insignificant when compared to the timber reserves, irrigation lands or mineral lands.

In Bulletin No. 24 is given brief mention of the following dry saline lakes:

- Inyo county—Resting Springs lake; Saline valley, Salt Wells valley, Tecopah lake.
- Kern county—Buckhorn lake, China lake, Kane lake.
- Riverside county—Salton sea.
- San Bernardino county—China lake, Coyote lake, Danby lake, Soda lake, Palma lake, Searles lake and Willards lake; a total of fourteen dry lakes.

On pages 66 and 67 of the same bulletin is given the location, by township and range, of fifty-three other lakes, most of which have no names and are design-

situated in the northern part of San Bernardino county, and extend across the boundary line into the southern part of Inyo county. They are found along the shore lines, or old beaches, that mark the boundary of Death Valley as it was during Eocene times. The few outlying beds so far discovered are also located along the shore line of some one of the numerous lakes that were formed by the drying up of Lake Aubury. \* \* \*

The formation of the niter-bearing clay hills occurred, undoubtedly, in the Eocene-Tertiary, during the long intervals of subsidence characteristic of that period, and are the results of sedimentary deposits slowly accumulating in layer after layer of fine clays to a depth of probably 1000 feet or more, bedded on the upturned rocks below in horizontal strata, and subject to very little disturbance since their deposit.

Under the head of "Niter Deposits," Bulletin No. 24 describes the following places where niter is



Bartell's Borax Works, on a Dry Lake South of Calico, San Bernardino County, Cal.

nated by numbers, making a total of sixty-seven lakes known. I do not believe that there are seventy-five dry lakes all told in the desert portion of California; and I do not believe that there are any dry lakes or saline lakes of an area exceeding 1 square mile, or 640 acres, in the deserts of California that are not included among the sixty-seven mentioned in Bulletin No. 24, and shown upon the maps accompanying that bulletin. An examination of these maps shows that these lakes cover quite a limited area. The sink of Death valley is included in eleven townships; Salton sea has an area of about six townships; Saline valley a little over two townships; Panamint lake, one and one-half townships;

found in the beach formations: "Upper Canyon Beds," "Confidence," "Lower Canyon Beds," "Round Mountain" and "Pilot."

Under the head of "Borates," these same "beach beds" are described as also containing borax, or borate of lime, as follows: "Confidence," "Upper and Lower Canyon Beds," "Lower Canyon," "Owl Springs," "Pilot Beds." Under the head of "Chlorides," the same beds are described as carrying salt.

No attention has been paid in the above to niter found in the playa lakes, only the beach deposits being noted. It is clearly evident to anyone who will examine this evidence that California's valuable deposits of borax, sodas, rock salt and niter are con-

fined wholly to the dry lakes of the desert and to the old beach lines of Death Valley, and its neighbors.

**STATISTICS OF PRODUCTION.**—In considering the value of the rare salines of the State, one should first examine their record and judge of their future by their showing in the past. Fortunately for this purpose the statistics are complete, and even a cursory examination brings out most interesting facts. Borax may be taken as an illustration, using the full statistics of production, value, imports, etc. In 1864 the first borax production in the United States was made at Borax Lake, in California, the total amount being 24,304 pounds, or 12 tons, worth 39 cents a pound, or \$780 a ton. The following table of the annual production is taken from Bulletin No. 24:

BORAX PRODUCTION IN CALIFORNIA.					
Year.	Production.	Value per lb.	Value per Ton	Total Value	REMARKS.
	Pounds.	Cts.	\$		
1864.	24,304	39	780	9,178	Lake Co., Borax lake.
1865.	251,092	37½	750	91,000	Lake Co., Borax lake.
1866.	401,682	33	660	132,538	Lake Co., Borax lake.
1867.	439,824	35½	710	156,137	Lake Co., Borax lake.
1868.	64,513	33½	600	22,384	Lake Co., Borax lake.
1869.	Nil	35	1-5	704	Nil None produced.
1870.	Nil	30	1-5	604	Nil None produced.
1871.	Nil	31½	625	Nil	Nil None produced.
1872.	280,000	32	640	89,600	Lake Co., Lake Hachinhama.
1873.	1,030,000	24 4-5	496	255,440	San Bernardino Co., 750,000 lbs. Other counties, 280,000 lbs.
1874.	1,829,771	4 1-5	284	259,427	San Bernardino Co., 1,729,891 lbs. Other counties, 99,880 lbs.
1875.	2,336,000	12½	247½	280,080	San Bernardino Co., 2,147,000 lbs. Other counties, 189,000 lbs.
1876.	2,878,909	10½	301½	312,537	San Bernardino Co., 2,752,000 lbs. Other counties, 126,909 lbs.
1877.	1,986,970	9½	195	193,705	San Bernardino Co., "marshes."
1878.	746,840	8½	161½	66,257	San Bernardino Co., "marshes."
1879.	727,146	9	180	65,443	San Bernardino Co., "marshes."
1880.	609	12½	245	119,245	San Bernardino Co., "marshes."
1881.	690	13½	275	189,750	San Bernardino Co., "marshes."
1882.	732	13½	375	201,300	San Bernardino and Inyo Co., "marshes."
1883.	900	14½	95	265,500	San Bernardino and Inyo Co., "marshes."
1884.	1,019	9½	195	198,705	San Bernardino and Inyo Co., "marshes."
1885.	942	8½	165	155,430	San Bernardino and Inyo Co., "marshes."
1886.	1,385	6½	135	173,475	San Bernardino and Inyo Co., "marshes."
1887.	1,015	5½	115	116,725	"marshes."
1888.	1,405	7	140	196,630	San Bernardino, Calico district, Ventura Co.
1889.	905	7	140	145,473	San Bernardino, Calico district, Ventura Co.
1890.	3,201	6	120	480,153	*Inyo Co., 115 tons. *San Bernardino Co., 1487 tons.
1891.	4,267	7½	150	640,000	San Bernardino and Inyo counties.
1892.	5,525	7½	150	838,787	San Bernardino and Inyo counties.
1893.	3,955	7½	150	593,292	San Bernardino and Inyo counties.
1894.	5,770	7	140	807,807	San Bernardino Co., 5189 tons. Inyo Co., 581 tons.
1895.	5,959	5	100	595,901	San Bernardino Co., 5559 tons. Inyo Co., 400 tons.
1896.	6,754	5	100	675,400	San Bernardino Co., 6505 tons. Inyo Co., 249 tons.
1897.	8,000	6½	135	1,080,000	San Bernardino and Inyo counties.
1898.	8,300	6	120	1,153,700	San Bernardino Co., 200 tons. *Kern Co., 27 tons.
1899.	20,357	6	120	1,139,882	*San Bernardino Co., 5880 tons. *Ventura Co., 250 tons at \$28.
1900.	25,837	5	100	1,013,251	San Bernardino Co., 14,000 tons.
1901.	22,231	7½	145	894,505	San Bernardino, Ventura and Inyo counties.

\* Refined. † Crude.

**RAPID INCREASE OF CONSUMPTION.**—The following is a condensed tabulation from the table just quoted. Special attention is called: (1st) to the rapid increase of the amount produced; and (2nd) to the equally rapid decrease in the cost to the consumer.

Year.	Tons.	Value Per Ton.	Value Per Pound.	Total Value.	Average.
1864....	12	\$780	.39	\$ 9,478	1 ton per month.
1874....	914	284	.14 1-5	259,427	76 tons per month.
1884....	1,019	195	.09½	198,705	85 tons per month.
1894....	5,770	140	.07	807,807	480 tons per month.
1901....	22,231	145	.07¼	894,505	Nearly 2000 tons per month.

During the first ten years of the growth of the industry the output increased from an average of one ton a month to seventy-six tons per month; in the next decade this was increased to eighty-five tons per month, an increase of over 12%; in the third decade it had increased 480 tons, an improvement of over 500% on the preceding decade; and in the seven years of the fourth decade of the existence of the industry, it has reached an average production of nearly 2000 tons per month, or over 400% on the preceding decade. Anything like this increase during the century to come would tax the resources of all deposits almost beyond computation, or belief. The lowering of prices was, until 1888, due to the competition between the Nevada and California producers.

In 1888, the Pacific Coast Borax Co. formed a combination of the various works of California and



Nevada, maintaining steady prices. The rapid increase of production is due to the extension of the sphere of usefulness of boracic acid and its compounds in the various fields of industry and art. Special attention will be called to this farther on, as it has a most important bearing upon the question of the value of these "dry lakes." In connection with the increase of consumption, demanding an ever increasing production, one should not forget the rapid increase of the population of the United States.

The following table from Bulletin No. 24 shows the amount and value of the borates imported into the United States from 1867 to the end of 1901:

IMPORTS OF BORATES INTO THE UNITED STATES.						
Year.	Boric Acid.		Borates, Crude.		Borax.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1867.....	770,756	\$73,396	5,672	\$711	49,652	\$6,601
1868.....	243,993	22,845	22,293	2,985	79,183	10,127
1869.....	998,033	109,974	54,822	8,011	89,695	12,799
1870.....	1,166,145	173,806	2,616	322	97,078	14,511
1871.....	1,204,049	185,477	5	1	134,927	20,705
1872.....	1,103,974	191,575	22,500	8,000	33,542	6,288
1873.....	1,232,006	255,186	Nil	Nil	9,284	2,152
1874.....	233,255	52,752	Nil	Nil	3,860	1,253
1875.....	41,742	6,280	588	78	5,153	1,224
1876.....	137,513	15,771	Nil	Nil	3,145	691
1877.....	107,468	11,231	55	12	3,500	676
1878.....	22,839	651	286	31	3,492	514
1879.....	306,652	21,888	Nil	Nil	3,472	490
1880.....	243,723	18,473	22,122	742	15, 78	2,011
1881.....	157,058	15,771	Nil	Nil	4,136	865
1882.....	536,335	71,341	Nil	Nil	10,664	3,062
1883.....	4,334,432	580,171	Nil	Nil	5,611	1,359
1884.....	44,512	4,484	142	84	7,332	1,691
1885.....	48,517	4,035	Nil	Nil	240	41
1886.....	430,655	26,248	4	4	.....	.....
1887.....	376,184	19,885	33	4	.....	.....
1888.....	457,777	26,394	455	38	.....	.....
1889.....	676,736	36,814	Nil	Nil	.....	.....
1890.....	867,802	49,967	29,608	800	.....	.....
1891.....	666,765	41,019	414,151	17,681	.....	.....
1892.....	701,625	39,418	40	6	.....	.....
1893.....	771,775	40,568	543,967	13,659	11,390	1,327
1894.....	398,990	19,282	441,066	11,427	3,512	425
1895.....	925,158	42,056	4,234,261	105,604	612,730	26,429
1896.....	555,769	21,899	4,307,100	104,951	11,376	796
1897.....	.....	.....	5,204,612	79,268	19,087	1,122
1898.....	.....	.....	4,235,856	92,108	10,232	962
1899.....	582,002	20,560	42,165	2,979	51,221	3,508
1900.....	473,251	17,436	58,294	4,306	273,706	9,957
1901.....	725,005	26,629	99,692	8,953	545,045	20,643

An examination of this table shows that the amount of "boric acid" imported into the United States in 1901 was less than that imported in 1867; the amount imported in 1867 being 385 tons against 362 tons in 1901, while the value had dropped from \$73,396 in 1867 to \$26,629, or less than one-third of the value imported in 1867. The amount of "crude borates" and refined "borax" imported in 1901 was only 321 tons, worth \$29,626, against a home production of 22,221 tons, worth \$894,505, for California alone. The production of borax, therefore, shows a phenomenal increase in the demand each decade. Its price has fallen to a point that permits its use in a wide range of industries. This vast trade is being almost wholly supplied from the raw material of California; only a small amount being produced in Nevada. The imports from abroad have fallen to insignificant amounts. America protects her coal fields and her salt beds from exhaustion, although they exist in nearly every State of the Union in huge areas that measure into thousands of square miles; and she

should protect the deposits of rare, unique and useful salines whose existence is confined to certain dots on the desert along the border line of California, Nevada and Oregon.

(TO BE CONTINUED.)

### Gypsum at Nephi, Utah.

The United States Geological Survey has recently published a description of the occurrence of gypsum at Nephi, Utah, which cannot fail to interest those in the vicinity of gypsum deposits elsewhere. It is included in a bulletin (No. 225) under the title "Contributions to Economic Geology, 1903." The author of this paper is J. M. Boutwell, who, in December, 1902, visited this immense deposit of rock gypsum in Juab county. It is the largest well-known deposit of rock gypsum in Utah, and forms the entire mass of a prominent spur at the entrance to Salt Creek valley. The exposed portions of this body are about 300 feet thick, 500 feet high along the bedding, and at least 700 feet long on the strike. The present paper is a portion of a more comprehensive report by Mr. Boutwell on "Gypsum Deposits in Utah," included in Bulletin No. 223, entitled "Gypsum Deposits in the United States." Both bulletins (Nos. 223 and 225) are published for gratuitous distribution and may be obtained on application to the Director of the United States Geological Survey, Washington, D. C.

The most important fact shown by analyses of samples taken from the deposit at Nephi, next to the determination of their high gypsum content, is that the first-class rock, as well as the "waste" rock, includes between 22% and 23% of anhydrite. It is thought that the presence of anhydrite might retard the "setting" of the gypsum, as the former acts like artificially dehydrated gypsum, which takes up water very slowly and without hardening. It is highly probable that anhydrite occurs in a large per cent of other gypsum deposits, so that it would be advisable to have further reliable analyses of other gypsums that have proved suitable for the manufacture of plaster of good setting quality.

Several other deposits of value are known in the Salt Creek valley, east of the main body. The most important of these is on the north side of the creek, about ½ mile east of the Nephi plaster mill. They include rock gypsum of good grade and impure varieties. The great body at the mouth of the valley is, however, the only gypsum deposit in Utah now exploited to any considerable extent. It was known before the town of Nephi was settled, and has probably been known to the whites for nearly eighty years. About thirty-five years ago a claim 600 by 1500 feet in dimensions was formally located, and in 1882 this was patented by John Hague and others under the name of the Juab Plaster & Mining Claim. Small intermittent shipments were made to Salt Lake City, in 1887, under the management of Messrs. Hyde, Hague & Whitmore, and later rock gypsum was quarried and burned in sorghum pans for local consumption. During the following year, encouraged

by the rapidly increasing demand, these parties incorporated their company and erected the nucleus of the present efficient plant, which, though not extensive, is very complete. Its output averages thirty-six tons of plaster a day, and between 7500 and 10,000 tons a year. This includes dental, casting, finishing, land, and hard plaster, each appropriately prepared for its special uses. A large and increasing demand is supplied throughout the Great Basin region, and shipments are made as far as Grand Junction on the east, Los Angeles and Hawaii on the south and west, and Victoria on the north.

### THE PROSPECTOR.

It is an easy matter to mistake one mineral for another, but the principal thing with the prospector is to find minerals and ores which he can turn to good account commercially. The really valuable ores which occur in considerable quantities are comparatively few, while the mineral species number several hundred, the greater number of which have relatively small commercial importance owing to their scarcity, or to their great abundance. The advice once given by a noted mineralogist to a prospector who had brought a score of small pieces of minerals labeled with the names of rare species was: "Look for gold. Not one of these specimens are what you take them to be, and even if they were of what use would they be to you. Look for gold. Look for something which can do you some good if you find it."

The mineral specimen from Hedley, B. C., is smallite, a cobalt diarsenide with iron and nickel, an unusual ore to carry gold in paying quantities.

The mineral specimens from Aguanga, Riverside county, Cal., are: 1. Galena (lead sulphide); 2. chalcocite (copper glance), in quartz gangue.

The rocks from Austin, Or., are: No. 1, black diorite, containing a large amount of magnetite in very fine crystals, also finely disseminated pyrite; No. 2 is a diabase in which the olivines have become serpentinized. The other minerals are still fresh, particularly the lath-like feldspars. No. 3 is a strip of aplite dike to which is attached quartz with iron sulphide. It is probably gold bearing.

At Lake Isabel, 32 miles east of Everett, Wash., work has begun on the May creek power plant by the Everett Railway & Electric Co. The head of water is unusually great. It is designed to furnish 15,000 H. P., to be carried to Everett for light and power. The intake for the 32-inch steel pipe will be 30 feet below the surface of Lake Isabel. The pipe will be carried 12,000 feet, with a fall in that distance of 2500 feet. The pressure on the pipe is 1100 pounds to the square inch. The speed of the water leaving the nozzle is 25,000 feet, or more than 4 miles, per minute. The cost of the plant will be about \$600,000.



Main Shaft of the Moctezuma Copper Co., Nacozari, Mexico.—(See Front Page).



Reduction of Copper Ore Containing Heavy Spar.

The report of the Tye Copper Company, in the Victoria division of British Columbia, published in the annual report of the Minister of Mines for British Columbia, gives an interesting account of operations there under unusual conditions. Over 42,000 tons of Tye ore were treated in the smelter at Ladysmith (shown in the accompanying illustration), producing 4498 tons of matte, which contained 3,604,474 pounds of copper, 121,932 ounces of silver and 6620 ounces of gold. The net value of this was \$562,890. In addition to the above a large amount of custom ore was treated.

The report of Superintendent E. C. Musgrave gives details of cost of mining at the Tye mine on Mount Sicker:

WAGES PAID.			
Underground:—			
Machine miners.....	\$3 50 per day of	8 hours	
Miners (hand drillers).....	3 00 per day of	8 hours	
Timbermen.....	3 25 per day of	8 hours	
Muckers and trammers.....	2 50 per day of	8 hours	
Above ground:—			
Carpenters and timber framers, loggers, mechanics, hoist engineers and blacksmiths.....	3 50 per day of	9 hours	
Surface hands (white).....	2 50 per day of	10 hours	
Surface hands (Chinese).....	1 00 per day of	10 hours	

COST OF MINING PER TON OF ORE SHIPPED.	
	Per Ton.
Stoping.....	\$1 359
Proportion for exploration.....	469
Surface work.....	124
Ore sorting.....	641
Transportation to railway (aerial tram).....	150
Total cost of ore delivered at E. & N. Railway.....	\$2 173

Other receipts were as follows:

	Tons.
Schistose flux ore.....	1,340 9
Sandstone.....	396
Iron ore.....	551
Coke.....	2,346

BURNED ORE.—The average analysis of the burned ore delivered to the smelter was as follows:

	Per Cent.
Iron.....	10 44
Zinc.....	8 14
Alumina.....	3 61
Barium sulphate.....	34 08
Magnesia.....	Trace
Lime.....	3 46
Silica.....	22 51
Combined sulphur.....	7 42
Total sulphur.....	13 86

During the last quarter of the year (fiscal) the burned ore showed on analysis an increase of: Iron, 1.86%; zinc, 0.93%; barium sulphate, 7.66%; lime, 0.5%; combined sulphur, 0.54%; and a decrease in silica of 11.49%.

SMELTING OPERATIONS.—The furnace “blew in” on December 16, 1902, and had run 107 days (of twenty-four hours) and smelted as follows:

	Tons.
Burnt ore.....	13,853 841
Green ore.....	2,237 624
Schist.....	539 636
Silica flux.....	774 687
Slag.....	338 198
Iron ore.....	301 653
Matte.....	963 818

Total mixture.....19,009 367  
Coke used, long tons.....2,116 313

Showing an average per day of 150.387 tons of ore, or 177.657 tons mixture. The ratio of coke to ore was 1 to 7.428, or of coke used to burden 1 to 8.775.

The matte produced in 107 days’ run amounted to 1394.3 tons, showing an average assay of: Copper,

ing this period, which also includes custom ores, was as follows:

Au. Oz. Ag. Oz.										
Cu.	Per Ton.	FeO.	ZnO.	BaO.	CaO.	SiO <sub>2</sub> .	Al <sub>2</sub> O <sub>3</sub> .	MgO.		
37	12	Trace	17 68	0 44	26 16	7 92	33 34	10 75	Trace	

The improvement in the slag assays for copper over the previous year is due in part to the increased settling capacity of the receivers at the furnace; in part to a reduction in the specific gravity in the slags by the admixture of suitable fluxing ores, which were not procurable in the earlier stages of our operations; in part to the lesser amount of ZnO in the slags, as a result of the admixture of other ores referred to; and in part to altered furnace practice, as a result of experiment with such ores. The specific gravity of the mattes was between 4.7 and 5.0 and of the slags between 3.6 and 3.8.

Of the total ore smelted, 62.8% was burned ore, 22% raw sulphide ore and 15.2% raw custom ore—or 62.8% burned ore and 37.2% raw ore, from which a shipping matte of from 40% to 45% copper was produced in one smelting operation. Comparing the furnace work of the past six months, as shown above, with the last annual statement (the figures previously given), it will be seen that the capacity of the furnace has been raised from 177 tons to 249.6 tons—an average of 72.6 tons per day.

An Electrolytic Process for Copper.

The Siemens & Halske process of copper extraction consists in leaching finely pulverized, roasted ore at 90° C. with ferric sulphate solution containing free sulphuric acid. The ferric sulphate is reduced to ferrous, and copper is dissolved as sulphate. Electrolysis of the solution in a diaphragm cell gives copper at the cathode, and oxidizes ferrous sulphate to ferric at the anode. This is an old process, having



Smelter of the Tye Copper Co., at Ladysmith, B. C.

The total amount of development work done during the (fiscal) year has been: Drifting, 1095 feet; cross-cutting, 511 feet; sinking, 193 feet; upraising, 319 feet. The average costs per lineal foot have been: Drifting, \$9.15; crosscutting, \$6.77; sinking, \$18.31. upraising, \$11.59.

The total tonnage of ore delivered to the smelter during the period under review was 21,565 tons, of which 20,688½ was first-class ore and 877 tons copper-bearing schists (for flux). Of the ore, 2930 tons were sent from the dump and 17,758½ tons from the mine. The assay values of the ore are given in the report of the smelter.

SMELTER REPORT.—The report of the manager of the smelter at Ladysmith, Thomas Kiddie, is exceedingly interesting from a metallurgical standpoint, as showing the practical results obtained in smelting an ore carrying over 35% of barium sulphate—a problem, as far as can be learned, not met with outside of this camp. The following figures show the results of the first few months’ run on this ore, which, as just intimated, is unique in character, and concerning which no previous results were obtainable as a guide; consequently, as must be recognized, the work was largely experimental:

ORE RECEIPTS FROM SEPTEMBER 22, 1902, TO APRIL 30, 1903.	
	Tons.
Copper-bearing ore (roughs).....	15,069.725
Copper-bearing ore (fines).....	5,173.785
Total.....	20,243.510

The average assay of this ore was:	
Copper (wet assay), per cent.....	4.43
Silver (ounce), per ton.....	2.76
Gold (ounce), per ton.....	0.12

41.95% (dry); silver, 29.67 ounces per ton; gold, 1.483 ounce per ton. The yield per ton of ore was:

Copper (dry).....	3.63%, valued at 11.5c per pound =	\$8.349
Silver.....	2.57 ozs. per ton, valued at 50.82c per oz. =	1.306
Gold.....	0.123 oz. per ton, valued at \$20 per oz. =	2.576

Yield value per ton of ore.....\$12.231

SLAGS.—The following is the average analysis of the slags produced:

	Per Cent.
Copper.....	6 65
Iron.....	15 71
Silica.....	25 79
Alumina.....	11 51
Zinc oxide.....	10 43
Barium oxide.....	30 55
Calcium oxide.....	3 38

Experience and experiments with the ore have materially improved the practice. Mr. Kiddie has furnished the following absolute average figures of the results of the last six months’ work. He says, under date April 29, 1904:

Answering yours of the 27th inst., I herewith enclose a statement covering the smelter operations during the last six months. During this time the furnace was in blast 123 days of twenty-four hours each—an average of twenty days per month—and smelted 30,703 tons of material, of which 28,290 tons were ore, making a daily average of 249.6 tons of material and 230 tons of ore per day, from which we shipped, in the form of matte, 2,275,997 pounds of copper, 72,207.8 ounces of silver and 4592.18 ounces of gold. A general analysis of the burned ore used during this period is as follows:

Fe %.	SiO <sub>2</sub> %.	Zn %.	BaSO <sub>4</sub> %.	S (in Sulphides, %).
11.45	19.36	6.97	38.87	6.56

While the general analysis of the slags produced dur-

been described in British patents 14,033 of 1886 and 3533 of 1889. M. DeK. Thompson Jr. has studied the reactions (Electrochemical Industry). Raw copper pyrite is not appreciably attacked by ferric sulphate, but after roasting is readily soluble. Copper can be deposited from an acid solution of ferrous and copper sulphates until the concentration reaches a low value—that is, with a current density of .47 ampere per 100 square centimeters until the concentration of copper in solution is .5%, at which point spongy copper begins to form. Using carbon electrodes, the oxidation at the anode is at first very efficient, but as the concentration of ferrous sulphate decreases the process gradually falls off in efficiency.

Pitchblende at Cripple Creek, Colo.

A vein carrying yellow oxide of uranium and black pitchblende has been discovered in the south slope of Rhyolite hill in Cripple Creek district in the property of the Rhyolite-Beacon Mining Co. The vein is 2 feet wide in a shaft 35 feet deep and appears to be continuous. Samples of the ore are at present in the hands of assayers. With only one and a half ounces of the crude ore, separated from the plate by twenty-four sheets of black paper, very good photographs have been made on a forty-eight-hour exposure. It is reported that this ore has been found in three different places. Thus far this remarkable property of uranium ores has not been put to practical use, but it will probably be employed in the photographic art and otherwise.



# Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 6, 1904.

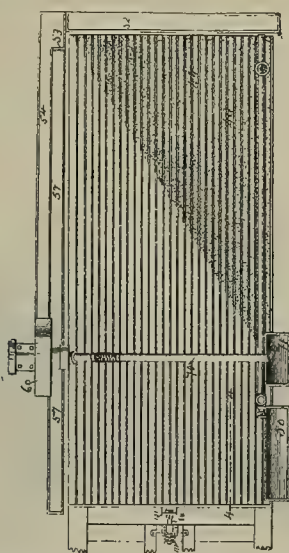
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE CONCENTRATOR.—No. 769,231; G. E. Perkins, Providence, R. I.



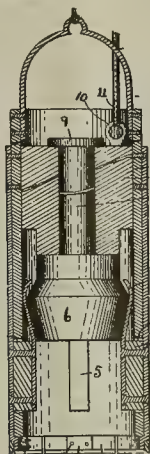
Device comprising concentrating table, distributing trough arranged near one side thereof and having perforations in outer side, trough being elevated, whereby middlings may pass thereunder; second trough elevated above plane of discharge trough and terminating at point beyond outer side of latter and nearer concentrate discharge than initial pulp feed, means for collecting middlings from table and delivering them to elevated trough and means for supplying water to distributing trough.

ORE CONCENTRATOR.—No. 769,431; I. A. Cammett and F. E. Shepard, Denver, Colo.



In combination in concentrator table, riffles, and separating pieces 42 forming table surface and between which riffles are placed, riffles lying between and projecting above separating pieces for portion only of their length and merging into and continuing between separating pieces toward tail end; in the end-shake mechanism for concentrator, pivotally mounted oscillating frame or member thereof provided with two adjusting screws, each having screw-threaded box thereon, crank and pitman actuating one of boxes, and link actuated by other of boxes and connected to parts to be shaken, screws acting to adjust boxes toward and from center of motion from frame or member to vary operation of mechanism.

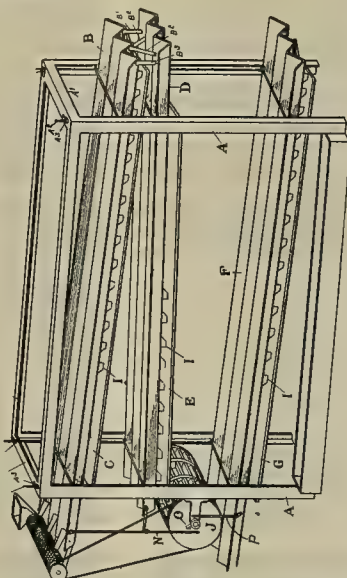
APPARATUS FOR BORING WELLS.—No. 769,371; J. C. Adkins, Stockton, Cal.



In apparatus of kind described combination of suitable casing provided with plurality of vertical slots near bottom thereof, steel springs riveted to outside top of casing and extending downwardly over slots, springs being bent inwardly into inverted L shapes at bottom of casing, steel blocks riveted to springs

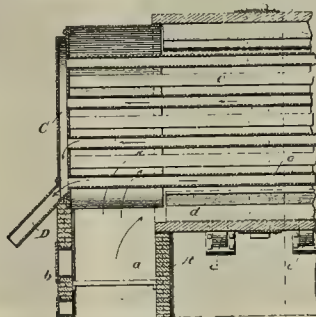
and extending suitable distance through slots, steel springs riveted to blocks inside casing and extending suitable distance upward therein, suitable driving key mechanism fitted between and above last-named springs, and suitable chisels fastened to inverted L shapes on first-named springs.

DRIP CONCENTRATOR.—No. 769,211; C. F. Du Bois, Denver, Colo.



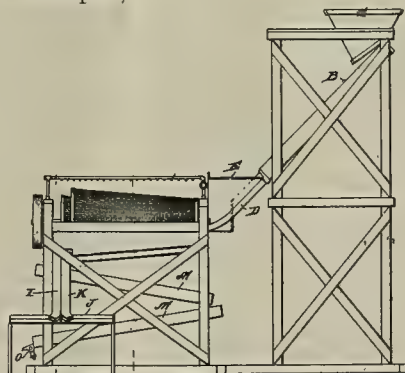
Drip concentrator, consisting of series of troughs having perforations or apertures provided in bottoms thereof, series of troughs inclined in opposite directions suitably suspended within frame, each series of troughs except lowest discharging into lower one, series of platforms secured within frame upwardly inclined toward middle, one of platforms placed beneath each series of troughs, movable needles, points of which are adapted to operate within apertures being secured to bottom of troughs, drum water wheel placed beneath lower end of one of series of troughs, revolving screen secured to frame at upper end of top series of troughs, water wheel adapted to impart revolving movement to revolving screen by means of suitable belt or cable operating around sheaves.

PROCESS OF UTILIZING WASTE FURNACE GASES AND SIMULTANEOUSLY REDUCING ORES.—No. 769,263; J. Herman, Bisbee, Ariz.



Process which consists in subjecting metallic oxide to action of furnace gases to reduce metallic oxide to lower oxide or metallic state, burn carbon monoxide present to carbon dioxide and recover heat values lost by incomplete combustion of fuel at one and same time, utilizing heat values so recovered for extraneous purpose, and admitting air to metallic oxide at intervals to adapt same to do its work continuously.

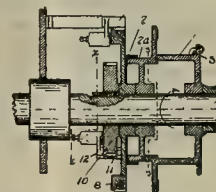
PLACER MINING MACHINE.—No. 769,489; N. W. Pulsifer, Philadelphia, Pa.



In machine of character described, hopper supported in elevated position by suitable framework, inclined grizzly leading therefrom, in position to receive material discharging from hopper, chute into

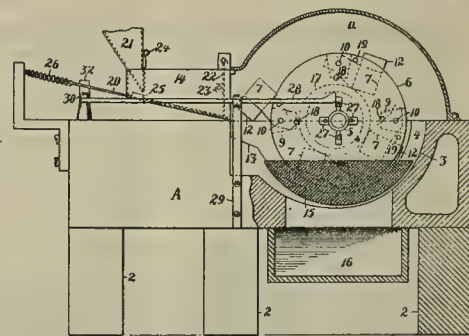
which grizzly discharges, series of conical shaped screens suitably mounted to receive material from chute, extended assorting table suitably positioned with relation to screens, lateral chutes steeply inclined having upper ends adapted to receive material from screens and having lower ends oppositely curved and downwardly curved, with discharge ends extending in direction parallel with assorting table, and adapted to spread material thereover by impetus.

TAKE-UP DEVICE FOR HOISTING BUCKETS.—No 769,232; E. B. Perry and W. Bassett, Bay City, Mich.



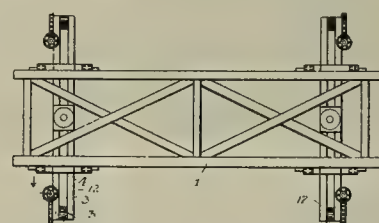
In steadying device for hoisting-buckets and like, combination of cable secured to bucket; winding drum for cable; drum being loosely mounted on revoluble shaft; brake band engaging drum; ratchet wheel loosely mounted on shaft and carrying ends of brake band; pawl carried by fixed support and engaging ratchet wheel; pawl pivotally mounted on ratchet wheel; together with second ratchet wheel keyed to shaft and adapted to be engaged by pawl.

QUARTZ MILL.—No. 769,610; C. E. Humphreys, Walker, Cal.



In quartz or like mill, combination with rotatable support and series of pivoted hammers hung thereon, of segmental die having anvil formed upon receiving end thereof and projected into range of action of striking face of hammers whereby hammers are capable of striking percussive blows upon anvil, means whereby hangers after striking blows turn about pivots and drag over curved face of die, means whereby centrifugal force of grinding hammers is augmented by weight of temporarily idle hammer, and means for feeding ore upon anvil between strokes of hammers.

MINING MACHINERY.—No. 769,461; E. S. Bennett, New York, N. Y.



In combination with car body, vertically moving rack bar arranged to one side of same, and working in support connected with car body, gear wheel meshing with rack bar, worm wheel on shaft of gear wheel and vertically extending shaft and worm thereon meshing with worm wheel and means for operating vertically extending shaft.

PROCESS OF EXTRACTING GOLD FROM ORES, ETC.—No. 769,280; H. S. Stark, Johannesburg, Transvaal.

Process of extracting metallic gold from acid pyritic auriferous ores, consisting in treating crushed ore with solution of sulphocyanide of alkali metal, in presence of oxidizing agent, including atmospheric oxygen, whereby gold is dissolved out by nascent cyanogen and hydrocyanic acid; produced in presence of acid in such ore by mutual reaction of sulphocyanide and oxidizing agent; and afterward separating gold from solution thus formed.

METHOD OF EXTRACTING PRECIOUS METALS FROM THEIR ORES.—No. 769,254; S. C. C. Currie, New York, N. Y.

Step in art of treating ores containing precious metal and sulphur, which consists in subjecting ore to action of hot vapor containing hydrogen, and withdrawing sulphureted hydrogen gas therefrom, then roasting ore in presence of air.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

## ALASKA.

A mineral strike has been made by the graders of the Alaska Central Railroad, 14 miles inland from Seward, the coast terminus. A. W. Swanitz, chief engineer of the road, says copper and gold ore has been found in two veins on the line of railway. In blasting out a 30-foot cut a fissure vein from 10 to 14 feet wide has been opened. With Eastern men, Swanitz will put in a stamp mill and other machinery to start mining.

The Bartels Co., at Tin City, near Teller, has built a tin concentrating plant. The tin belt is being developed by several companies.

Superintendent B. Thane of the Eagle River M. Co. of Macon, Ga., operating at Eagle, says during the past year they have put up buildings at Eagle cove, near Juneau, built 3 1/2 miles of car tram, several miles of wagon road to the upper camp, run 550 feet of tunnel, built a sawmill, assay office, 10-stamp mill, with aerial tram, flumes, water pipe, etc. Superintendent Thane has thirty-five men at work.

## ARIZONA.

### Cochise County.

The Copper Queen's Holbrook mine at Bisbee will operate a six-compartment shaft, says the Bisbee Review. At present it is running a four-compartment. This was some time ago found inadequate. The old compartment will be used for sinking, pumping and handling of timbers. The Holbrook shaft is down 500 feet. A 100-foot winze practically gives it the 600-foot level. At the 400, 500 and 600-foot levels there are ore bodies being worked. New work proposed will carry the shaft down to the 1000-foot or 1200-foot level. For this work a 750 H. P. engine will be put in, also a battery of marine boilers. Foundation has been made at the Gardner for boilers and heavier hoist.

### Maricopa County.

(Special Correspondence).—The Phoenix mine, at Cave Creek, is being sampled, and work will be resumed next month. A few men are working at the Union mine, 18 miles north of Phoenix. Preparations are being made to work a bismuth prospect a few miles east of Phoenix. A. S. Mills has organized a company with Eastern men to work a group property in Cave Creek district.

Phoenix, Sept. 10.

The Oriental C. Co. has been incorporated by N. M. Clemens et al. of St. Louis, Mo., with E. Ganz and W. T. Smith of Phoenix, and has bought the Oriental group of copper mines at Cave Creek, north of Phoenix. The group consists of eleven claims and a millsite. N. M. Clemens is president and A. S. Mills is superintendent.

### Mohave County.

W. H. Cushing, president of the Stockton Hill M. Co. at Stockton Hill, says the mine is opening up lead and zinc ores. The company will build a milling plant on Stockton Hill.

Gold Roads reports says a strike of ore has been made in the crosscut from the 500-foot level in the Gold Roads mine, near Acme. Drillings from the vein on the foot wall run \$100 per ton and 8 feet of ore penetrated by the crosscut show payable values. Several machines will be put in to drive the drifts and open up the ground.

### Final County.

(Special Correspondence).—B. Pearman will continue shipments of silver-lead ore from his mines, near Silver King.

Silver King, Sept. 10.

### Santa Cruz County

Twenty-five more miners have been put to work at the Mowry mine, near Harshaw, which increases the number to 100 men, and two more steam pumps will be put in, the increased flow of water on the 400-foot level having taxed the machinery now in operation.

### Yavapai County

D. E. Dumas of Prescott says the Producer mine, near Palace station, is opening up values in gold, copper, silver and lead. Further equipment is needed.

Superintendent C. K. Tibbets of the Pfau G. M. Co., operating at Cherry Creek, says he will put in additional machinery.

M. Murphy of the Oro mine on Minnehaha flat, says the double-compartment shaft is down 500 feet. The ore bodies are 5 feet wide, free milling, and will average \$6 a ton in gold. Water has slightly increased as depth is attained. There are twenty-five men at work, but more will be put on and drifting started. The property is equipped with two mills—a Chilean

and a 20-stamp -- having combined capacity of 200 tons a day. The Oro mine (formerly the Boaz) is 45 miles from Prescott and 9 miles south of Crown King.

## ARKANSAS.

### Marion County.

Yellville reports say the Dennison mill is in full operation and several mines around it are keeping it busy. The Anna mine is working a full number of men and the Hill Fontaine mine is getting out ore. I. C. Hay, who has a fifteen-year lease on the Dennison mill and mine, says he has opened up one of the old shafts of the Dennison and has struck a 7-foot face of ore. The Silver Hollow mine is shipping zinc concentrates. The mine is working thirty-five men and turning out an average of fifteen tons of zinc ore daily. The superintendent expects the mine alone will ship two cars of ore each week.

### Newton County.

It is reported the Speers M. Co. will absorb the Flynn M. Co. Both companies have holdings in Newton county, near Ponca, and Boone county, near Harrison.

The Ponca City mines at Ponca are turning out satisfactorily, says Superintendent J. W. Clemmer. A number of short tunnels and shafts have been made along a fault and a vein of carbonate of zinc has been opened up.

## CALIFORNIA.

### Amador County.

(Special Correspondence).—The Julianne and Diana mines, 6 miles east of the town of Sutter Creek, are being worked by a Seattle, Wash., company. These claims had been idle several years. A 6-stamp mill is on the ground. It is the intention to sink a new shaft and develop the property. A shoot of ore cropping in the bed of Sutter creek shows gold. At the South Eureka mine twenty stamps of the Balli mill, near Sutter Creek, are being set up. The lower levels of the South Eureka are reported to show improvement.

The Wildman-Mahoney mine is laying in a stock of mining supplies, timber, etc., and it is reported operations are to be resumed on a large scale. The principal work will be through the shaft of the Lincoln mine, which is down 2000 feet, about 600 feet below the deepest workings of the former mine. The electric railroad from Ione to Sutter Creek and Jackson is under construction. It is expected to have it running in December.

Sutter Creek, Sept. 13.

C. Glenn, A. B. McLaughlin and M. Robinson of Volcano have leased the Whitmore mine of that place and will operate it.

Sinking continues at the Argonaut mine near Jackson. The shaft will go to 2500 feet. Ore is being stored, but the mill will not be started until sinking operations are completed. W. F. Detert is president and manager.

Sinking at the Argonaut mine, near Jackson, will be continued to depth of 2500 feet from 2400 feet. Several thousand tons of ore have been piled on the dumps. It is intended not to start the mill until sinking operations are completed and levels opened.

At the Fremont Co. mine at Amador City the mill is running full capacity, and 100 men are employed in mine and mill. The non-union crew is reported giving satisfaction.

The Standard Electric Co. has started improvements at Electra. About 100 men are cutting a trench in which to lay another pipe line from the penstock to the power plant. Additional generators will be put in equal in capacity to those now in use. The ditches will also be improved.

### Butte County.

Men are at work sinking shafts on a flat on middle fork of Feather river, near Cromberg, near Oroville, for prospecting the ground for dredging process. The work is being done for W. P. Hammon of Oroville.

### Calaveras County.

The work of extending the electric wires to the Marshall mine, near San Andreas, is under way. The works at the mine will be run by electric power and the plant is being put in place. The Marshall mine is being operated by the California Gold Placer M. Co.

### El Dorado County.

At Coloma, on the south fork of the American river, W. A. Bell will prospect the river gravels with a Keystone drill. A dredger will be built to work the ground.

F. B. Norton, superintending work at Zantgraf Extension mine, near Loomis, says work is progressing and ore is being opened up. They will build a mill.

It is said the Eagle Bar Placer M. Co., Ltd., which bought the Channel Bend and adjoining claims on the American river near Josephine, will put on more men. Work is being done on the claims,

the road from Josephine to the river is being repaired and other improvements made. At the Nongrasser mine, on Texas Hill, near Georgetown, the mill has been started up.

### Mariposa County.

(Special Correspondence).—Difficulty has been experienced in reopening the shaft of the Princeton mine. The timbers used are 12x12-inch and have been on the move from the collar of the shaft. A depth of 175 feet had been sunk, but on the morning shift of the 5th inst. a run of surface ground occurred, breaking and twisting fifteen sets from the bottom up. Fortunately, the miners had time to reach the top. They are now bracing and retimbering the wrecked sets. They were nearly through the original cave due to the fire, and the weight of the loose surface ground broke through; as there is practically none of this last cave in the bottom, consequently it either went into the old workings or into the shaft below the burned ground. Considerable charcoal was sent to the top, being used in the forge, the foreman remarking: "It ought to be good coal, it cost enough." Air pipe is being placed in the old air shaft, the intention being to strike the working shaft at the 800 level and suck out the foul air, etc., so that the extent of the cave can be determined. In the event of being in too bad a condition, a new shaft may be sunk.

Mt. Bullion, Sept. 12.

### Nevada County.

At the Brunswick mine at Grass Valley the electrical pumping plant is operating satisfactorily and additional ore shoots are being opened up in the lower levels. Increase of the milling capacity to fifty stamps is proposed. Free gold is showing in the quartz in one of the drifts in 1250 level, the ledge being 15 feet in width between walls. Two ledges are being worked on, while a third is being run for. Fifteen of the twenty stamps are in operation, says Manager C. H. Mallen. The Brunswick has forty men working, but is increasing the number.

L. Williams, superintendent of the Niagara mine, near Nevada City, says extension of the Snyder tunnel will be started. It is on the Snyder claims included in the Niagara lease and bond and will open up the Niagara ledge west from the shaft workings.

Stamps are again dropping in the mill at the Idaho-Maryland mine at Grass Valley. The shaft is retimbered down 90 feet. The mill is being overhauled and ten stamps are dropping on the refuse matter being cleaned up from underneath the floor, and the first day's run resulted in 10 ounces of amalgam being cleaned up, says Superintendent C. B. Laksenan.

### Placer County.

A. J. Tubbs of Lewistown, Mont., has opened up the Lundquist mine, on Auburn ravine, near Auburn. He intends to begin work on the tunnel. G. K. Orr is superintendent.

### Plumas County.

Superintendent Myers, for W. P. Hammon of Oroville, is prospecting the Langhorst ranch at Cromberg, near Quincy, to ascertain value of underlying deposits, with a view of putting in a dredger. Several shafts have been put down.

### San Diego County.

Unwatering the Stonewall mine at Cuyamaca is under way. The shaft is 640 feet deep. As the water is pumped out the shaft will be retimbered, and mining will be begun at the 300-foot level, although it is intended to pump out all the water and retimber the entire shaft. Manager Clark says he will start the stamps to work the tailings of the dump until the 300-foot level has been reached.

### Shasta County.

The Washington mine, west of French Gulch, is producing ore. C. Webb is operating the mine under lease. He has the 5-stamp mill in operation. There are a few sub-leasers working under Webb's lease. The Black Oak M. Co. is owner of the property. The ore chute is being worked 60-feet below the tunnel level.

### Sierra County.

J. M. Harper has men working at the Diadem mine, and reports having struck a ledge 8 feet wide that will mill \$20 a ton. The Diadem is in Forest, said to be between slate and serpentine formation, and on same contact as the Tightner mine. A mill will be built. The Keystone mill is nearing completion. Poles have been put in place for the power line, and pipes are on the ground to furnish power for the generators.

At Pike City the Alaska mine is being reopened. Superintendent St. John has started work of extending the drain tunnel. This will tap the main shaft at a depth of 90 feet, and as soon as completed retimbering the shaft will begin.

### Siskiyou County

(Special Correspondence).—The Salmon River Quartz M. Co., with headquarters at Portland, Ore., owns in Hicky gulch, tributary to Salmon river, a group of four

claims, the vein matter 18 inches to 4 feet in width of quartz, and no sulphurets in the surface development. Development is by driving a crosscut tunnel to reach the main ledge. A tunnel in 200 feet will give backs of 700 feet.

Cleavers and Swain, at head of White gulch, 7 miles from Sawyers Bar, and 4800 feet altitude, continue developing a group of eight claims. The formation in that section is black slate, white quartz streaks intermingling. A large proportion of the values has been obtained by quarrying, the ledges being 7 to 8 feet in width, with \$7 gold value to the ton. Recently a flume 3000 feet in length has been completed to take the place of the old one, and this runs water across three gulches to a mill of four stamps and two Frue vanners, the stamps having been in use ten years and the Frue vanners only two years. Tunnel development will proceed during the coming winter and the mill will be in use excepting two months of the severest weather.

E. Hickey, owning a group of claims on White gulch, has had his small stamp mill idle since last November. He has ore ready for milling, but lack of water prevents running the mill. He is opening up a 4-foot quartz vein in slate and porphyry, which is free milling at the surface. H. Finley and J. Johnson own on one of the gulches tributary to White gulch two claims, the ledge matter averaging 12 inches quartz, with iron and galena sulphurets carrying gold, values ranging \$30 a ton. The property is under working bond till July 1, 1905, to W. E. Baldwin on a 50% royalty.

The Czarina G. M. Co. of Chicago, Ill., is developing a group of six claims in Liberty mining district, on the mountain dividing North Fork of Salmon river and North Fork of Russian creek, with C. Wolf superintendent. In this section the general formation is diabase, the ledge or vein matter, 8 to 12 feet in width, being enclosed in "birdseye" porphyry and the ore quartz free milling, with a percentage of high-grade sulphurets. Developments are by tunnels amounting to 1000 feet. A crosscut tunnel is being driven to cut ledge 200 feet below apex.

The Taylor Lake M. Co. is composed of J. W. Harris & Sons, E. S. Harris and B. F. Bassford. They own at the head of Taylor creek, on the divide separating Taylor creek and Right Fork of Salmon river, a group of six claims and millsite, with a water right covering two parallel ledges 900 feet in width. The ledge next to the granite rock is 4 to 6 feet in width, sugary quartz with percentage of high-grade sulphurets and free gold. A 40-foot tunnel gives 50-foot depth below surface. The other ledge is 8 feet in width, nearly vertical, with blue slate on the east and quartzite on the west. Mill tests give returns of \$5 gold to the ton. From present workings to the milling plant being built is 1500 feet. The ore will be sent down 700 feet by a chute, thence by track round point of divide 100 feet and by second chute to the mill. This mill is of the Krogh pattern, two stamps, triple discharge, the tailings flooding over pieces of carpet. The water right on Taylor creek owned by the company is sufficient to run a twenty-stamp mill twelve months of the year. The mill will be finished by October 1 and run by a tangential water wheel. About a mile from the Taylor Lake M. Co.'s property are two claims showing by surface development a ledge 9 feet in width between walls of slate and porphyry, and the ore free-milling quartz. The owners are T. G. Boyer of Altamont, Ill., W. E. Boyer of Etna, and J. Lewis and J. Arnold of Fort Jones. They are also owners of two claims on the same divide below the Taylor Lake Co.'s group.

Stephens Bros. of Etna are owners of four claims adjoining the Yreka M. & M. Co.'s property (the Ball mine) on the north and northeast. Stephens Bros. are driving a tunnel, already in 550 feet, to strike the north and south ledges coursing through their Illinois and Wisconsin claims, at a depth of 400 feet ledge is in slate, is free-milling ore with high-grade sulphurets. On the Liberty claim there are three short prospecting tunnels.

Development is going on at the Black Bear. John Daggett, manager, is doing work in the 200-foot level of the north and south ledges, about 365 feet south of the 600-foot shaft of the old workings. At 200 feet in the new double compartment shaft a drift will be driven 200 feet farther north to connect with the old workings. Daggett expects to increase work by November 1. The completion of the drift to the old workings will drain the Yellow Jacket claim of water, enabling bodies of ore there to be mined and milled.

On crest of mountain separating China and South Russian gulches the general formation is slate with porphyry dikes running through. Ledges are numerous, outcropping from 2 to 10 feet in width. The ore is free-milling quartz. The Blue



Jeans group of six claims, covering both sides of the divide for quite a distance, are being developed by the owners, B. G. Phillips, J. M. Hadley and W. Werst of Etna. Values in the ore average \$15 per ton. For some time a one-stamp mill and Frue vanner have been in operation. Another stamp is being added. Power is had from a Pelton wheel with 100 feet fall.

D. Malloy of Sawyers Bar has bonded to Overton Bros. his group of five claims at head of Rattlesnake creek, on Tarnes mountain. The three ledges through the claims are 3 feet in width in diorite and porphyry.

W. T. Dawson and J. E. Davis are developing a group of claims on Six-Mile creek, 12 miles from Cecilville. The property is worked by a tunnel and ore run through an arrastra, with good values returned. A road has been completed to the mine.

Sawyers Bar, Sept. 13.

C. W. Geddes, superintendent of the Blue Ledge copper mines south of Jacksonville, Or., says he is working on two tunnels and is employing twenty-five men. The ledges are showing up satisfactorily, and the Blue Ledge company will install power to operate a compressor and a power drill, and more men will be put on. The mines are at the head of Joe creek, 4 miles south of the Oregon line. B. C. Kingsbury of Spokane, Wash., is manager.

L. S. Barnes of Redding says he will build a 30-ton milling plant for the Gold Dike mine in the Salmon River district.

—The Mt. Vernon mine, at head of the divide between Greenhorn and Cherry creek, near Yreka, has forty men at work putting up the new mill, taking out ore and operating the sawmill.

#### Sonoma County.

On the 10th inst. a forest fire, which started on Big Sulphur creek, in northern Sonoma county, swept over Black mountain and destroyed the buildings of the Sonoma Con. Quicksilver Co., near Pine Flat. The Sonoma Con. is composed principally of Santa Rosa men. Last year they built a smelter, which cost \$15,000.

#### Stanislaus County.

Preparations are being made to dredge for gold in the Stanislaus river, near Knights Ferry. J. Hewell has bonded 120 acres on the river, covering a strip of land 5 miles in length below Knights Ferry.

#### Trinity County.

The dredger on the river above Trinity Center has worked steadily during the summer, being the third season it has been in operation by Payne, Clary & Keenan, owners. The gravel is said to pay 40 cents a cubic yard. W. P. Hammon of Oroville is having more ground prospected along Trinity river for dredging. He has a bond on ground at Trinity Center, which he has prospected.

#### Tuolumne County.

The Hard Times mine, north of Carters, has been bonded to the Blue Bell M. Co. of San Francisco, of which W. R. Hall is the local representative. —More men are being added at the Providence mine, near Carters. The stamps are dropping steadily on high-grade ore.

Men have been put to work at the Dreisam mine, at Arrastraville, near Carters. Drifting will be continued on the Good Luck vein which is a contact ledge. Work is under direction of Superintendent Tritenbach of the Dutch mine at Quartz.

—Development work is in progress on the Consuela mine, adjoining the Providence.

At the Black Oak mine, near Soulsbyville, the owners have put in a sawmill, capacity 3000 feet daily. —At the Rawhide mine, near Jamestown, 100 men are working and the mill running steadily, being operated by electric power.

At the Columbia mine (formerly the Holmes) on Experimental gulch, near Columbia, grading for the mill and other surface work are under way. Superintendent Phipps intends putting in a Huntington mill.

At the Ranch mine, near Columbia, a hoist has been put in, with ore bins and chute and a 3-stamp gravel mill. A 100-light dynamo and engine for running the same are being set up. Drifting is under way, though no breasting as yet is being done. There are twenty-five men at work.

The pumps at the Soulsby mine have been repaired and work resumed after a three weeks' shut down. About 300 feet of water accumulated in the shaft during the time the pump was idle. They are putting in an 80 H. P. boiler in addition to the present one. Another compressor has been added.

### COLORADO.

(Special Correspondence).—Little credence is placed in the confession of a convict at Topeka, Kan., in which he claims

to have assisted in blowing up the Independence, Colo., depot last June. He incriminates several prominent union men of the Cripple Creek district in his confession.

If the report is true, Leadville is on the verge of an industrial strife. It is stated that the operators of the district are well organized, and that they have decided not to employ any one affiliated with the Western Federation of Miners. The Federation, it is claimed, has a large following in the Cloud City, but it is believed they are not anxious for a strike, scarcely having recovered from the struggle of 1896, which, so far as can be learned, has never been declared off by the union, and in face of defeat of the strike at Cripple Creek and Telluride the past year. Leadville is one of the most prosperous camps in the State to-day.

The machinery houses of Denver report a fairly good business, and a majority of them are of the opinion that it is improving and will continue to improve. With all the mines working in the different districts, it means the installation of machinery and the employment of many men. Denver, Sept. 12.

#### Boulder County.

(Special Correspondence).—The 20-mile branch line of the Colorado & Northwestern Railroad, now building between Sunset and Eldora, will be finished December 15. This company is already operating between Ward and Boulder. This additional 20 miles of track will give Boulder county mining an impetus. Four hundred men are at work on the grade under Orman & Crook, contractors. L. R. Ford, for a number of years with the Midland Terminal and Florence & Cripple Creek Railroads, has charge of the traffic department, with headquarters in Boulder.

Sunset, Sept. 11.

(Special Correspondence).—The past few months there has been considerable interest in this county over tungsten ore. E. C. Pohle, president of the Progressive Concentrating & Milling Co., Mrs. E. C. Pohle and W. A. Brockway have secured control of the Eureka Tungsten Mining Co. and are operating on the Mabel W. Amanda L. Rex and Tiptop claims, near Boulder falls, 11 miles from Boulder. They are opening up this property by three tunnels on the vein. The vein is 22 feet wide between walls with a streak 3 feet wide of tungsten, the rest good concentrating ore. On the other side of the 22-foot vein is another streak of quartz and tungsten 1 foot wide. A surface tramway 500 feet long has been put in from the mine to the wagon road. They are producing about fifty tons of ore per day, but as soon as the milling capacity can be enlarged the output will be much greater. The tungsten obtained in this county is of superior quality, as it is free from antimony, copper, lead or bismuth. From 112 tons of ore they obtained over 10½ tons of tungsten, the total product of which yielded 68.96% tungstic acid. The product from the jigs assayed 71% tungstic acid. This product was shipped to Europe. If the price of tungsten ore continues at the present rate it will be the means of opening some large bodies of tungsten ore in Boulder county.

The Progressive C. & M. Co., E. C. Pohle, president, is operating its mill two shifts on tungsten ore from their own mine as well as custom work. They will install more tables and jigs and double the capacity of the mill.

Boulder, Sept. 11.

(Special Correspondence).—On the line of the Colorado & Northwestern Railway is located the Wood Mountain mine and mill. A few years ago experts examined this property and reported that the ore had been exhausted and that it would require large sums of money to open up other ore bodies. Since J. B. Annear, superintendent of the property, took hold the mill has been able to pay for all development work and they are now opening up some good ore bodies. Ores will concentrate and amalgamate. The main tunnel is over 900 feet long and cuts the vein 700 feet below the surface. For some time past they have been running the 10-stamp mill twenty-four hours; best results have been obtained by crushing through a 30-mesh screen; are handling about forty tons per day; working one shift in the mine.

A new ore shoot in the Tambourine G. M. Co. property will be developed. The shaft is down 400 feet. Some of the ore is being shipped to the smelter, but a large percentage is milling ore, and it is the intention of F. B. Tiffany, Colorado Springs, manager of the company, to put up a mill on the property. The mill dirt will average \$10 per ton.

Wallstreet, Sept. 11.

(Special Correspondence).—The Cold Spring M. Co. is lining its shaft from 500 level to 650-foot level with mine rail for the purpose of dropping ore from the 500

to the 650 level, where it is transported to the mill below on Left Hand creek, near Rowena. The mill has been overhauled and new Tetrault tables and jigs installed. As soon as the shaft is completed they will break about fifty tons of ore per day in the mine; main shaft is 900 feet deep. The mill has a capacity of thirty tons per day over four tables and two jigs; water wheel will be installed for operating the plant with water power. T. H. Page is manager.

On Gold Hill the old Slide mine has fifteen men working on ore and shipping five carloads per month. The concentrating ore is being piled up, as the mill which they have operated heretofore is not being run at present. J. A. Owenby of Denver is manager. The company will install new hoisting engine and air drills and development work will be pushed. —The Cash mine is treating its milling ore through the Black Swan mill at Salina. Gold Hill, Sept. 11.

(Special Correspondence).—Near the Slide mine the Maxon G. M. Co. is operating in the old Corning tunnel which is in over 2660 feet. They are running drifts each way from the tunnel and stopping out ore. This tunnel was run to cut the Slide vein and other well-known veins on the line of the tunnel; have some shipping ore, but mostly mill dirt. They are also sinking a shaft 150 feet. The shaft is about 150 feet south of the Slide. R. C. Lamb is superintendent.

The Prussian mill is making a test run on ores using cyanide and roasters. The ore is refractory. If the test run shows up well the plant will be operated steadily.

On Left Hand creek, 2 miles below Rowena and near Glendale, is the 25-stamp mill of the Nugget G. M. & M. Co. About 75% of the values is caught on the plates. All the work of the mine is done through tunnels. At present they are working from the 400-foot level to the surface. One tunnel is 800 feet long. This mine was supposed to have been worked out years ago, but the new management have opened up large bodies of ore and increased the capacity of the mill from ten to twenty-five stamps. They claim to have veins of mill dirt 43 feet wide, mostly low grade free milling; are operating the mill by water power during the summer months, when the water supply is sufficient, and by steam during the winter. It is the intention of the company to install a power plant, water wheels, etc., at the junction of Jim and Left Hand creeks, about 2 miles below the mill. A. Scogland, manager; R. G. Hemingway, mill foreman.

Rowena, Sept. 11.

(Special Correspondence).—At Summer-ville, between Salina and Gold Hill, is the Victoria mine, operated by G. A. Blaisdell, manager for the company. A portion of the property is under lease. The leasers are taking out some good ore. —The Gold Lode is operated by the same party and have just finished sinking to the 400-foot level and are opening up the ore bodies. —In the Crown, under the same management as the above, a contract has been let to upraise from the 200-foot level to the surface. A hoisting engine will be put on as soon as this work is completed.

Near Summerville is the Corona M. Co., L. A. Newell, manager. This company owns seventy acres and are developing the mine by crosscut tunnel which taps the vein 200 feet from the surface. They have 1 mile of underground workings; are getting ready to put in tramway and mill. The mill will be located near the depot at Salina; the tramway will be 1½ mile in length. The vein in this mine is unlike the rest of the veins in the district, being mixed sulphide iron, lead and zinc. From tests made the ore will concentrate readily. During the past ten months the smelting ore which they have been able to sort out has more than paid for the development work in the mine. They are shipping a carload every six weeks. The low-grade ore is stacked up at the mine awaiting the mill. About 20,000 tons of ore is blocked out in the mine that will average \$10.

W. C. Johnson, manager of the Belle M. & M. Co., has sunk an incline shaft 300 feet on the vein. The main tunnel is 1500 feet in length; 250 feet from the entrance of the tunnel is located the hoisting engine; are drifting every 100 feet from the shaft opening up ore. Ore from the lower level is smelting grade that runs from \$150 to \$200 per ton; the ore is tellurium and free gold. They have eight claims and 4500 feet on the lead. The mine is equipped with blacksmith shop, assay office, boiler and hoisting engine. They will erect a mill for handling the ore. On the upper level in the mine they have 15 feet of ore that will run \$12 to \$15. All through the 15 feet there are seams that carry free gold.

Frank Vane, one of the owners of the Little Johnny and Sweet Home group, is taking out high-grade ore. He has a

crosscut tunnel 450 feet in length and about 1800 feet of drift work.

The tunnel on the Elkhorn is in 635 feet; it has already cut several veins, but not the ones they are driving for. The mine is equipped with air compressor and drills. W. B. Smith, manager, states that they are making about 3 feet per day in the tunnel.

Across the creek from the Elkhorn is the Quo Vadis property, operated by I. Moore, manager. The upper tunnel is now 255 feet on the vein. They expect to cut the vein in the lower tunnel in the next 75 to 100 feet. The lower tunnel is in 700 feet; the ore is free gold. The lower tunnel is so situated as to dump the ore direct to the cars on the Colorado & Northwestern Railroad.

Salina, Sept. 11.

#### Chaffee County.

The Roller-Le Fevre mines at Monarch, 20 miles northwest of Salida, have been sold to the Two Republics Co. of Pittsburgh, Pa., for \$200,000. The Roller-Le Fevre mines are on the Monarch branch of the Denver & Rio Grande Railroad, on the middle fork of the South Arkansas river, at the base of Mount Etna and the Iron King mountain. The Roller-Le Fevre mines comprise five groups, or a total of thirty-two claims, and have been developed by 9000 feet of tunnels.

Buena Vista reports say the Tickler tunnel, a lead and zinc mine at St. Elmo, has been sold to H. Rhorer, manager of the Alpha M. & C. Co. of St. Louis, Mo., for \$10,000. D. C. Tobin of White Pine, Colo., is associated with him. They will put men to work and will ship ores of smelting quality. The ore shoot is 5 feet wide. The mine adjoins the Mary Murphy mine, in the Chalk Creek district.

The Mary Murphy mine at Romley, near Buena Vista, has been closed down indefinitely. The mine has 15 miles of workings and a mill has been in operation, says Superintendent Hinkson. The smelter operated by the same company has been closed since a year ago.

#### Clear Creek County.

Idaho Springs reports say the ore shipments for month of August were 203 cars, as against 118 cars for same month last year. Nearly every available mill in the district is running full time, with all the ore capacity engaged ahead. Several properties are closed down for want of milling facilities.

At Empire work has resumed on the Empire Tunnel Co.'s tunnel into Covode mountain after addition of power and enlargement of dam capacity. Of the intended 10,000 feet 3000 have been driven. The tunnel course as surveyed will practically crosscut the entire south end of the mountain in its passage from the creek level below the Neath mine on Covode to the holdings of the company on Silver mountain, comprising, among others, the Gold Dirt and Tenth Legion mines.

The hoisting plant of the Con. Alpine M. Co., 2 miles south of Lamartine, was destroyed by fire last week. The loss was \$5000, insurance \$3000.

The Waldorf M. Co., operating in East and West Argentine districts, near Georgetown, reports Manager Wilcox will install electric power throughout its entire workings.

Ericson & Gilean, leasing in the East Griffith mine, near Georgetown, are shipping ore to the Georgetown sampler, returns averaging \$30 per ton. A cable for electric power has been put in and they will break rock with power drills. They are working at the 2000-foot station of the tunnel level.

H. Haggart, superintendent of the Nickel Plate mine, on Alpine mountain, near Georgetown, is increasing development work. He will start a level farther down the mountain to cut the Dempsey lode. It is said a company will be organized for the development and further equipment of the group.

#### Eagle County.

Red Cliff reports say a strike of sylvanite has been made in the Doddridge lease on the Ground Hog mine, on Battle mountain. The ore, which occurs in a fissure vein in a pyrite-bearing quartz, was found at the 1600-foot level.

#### Fremont County.

The Union mill of the United States R. & R. Co. at Florence will begin running the sampling department on Sept. 20, and on Oct. 1 will resume operation at full capacity. This mill treats only Cripple Creek ores.

#### Gilpin County.

During month of August the shipments of smelting and other ores, concentrates and mill tailings from the Black Hawk depot totaled 253 cars, or 5060 tons. This was in excess of the previous month by 43 cars, or 860 tons.

The air compressor is set up at the mill of the Gregory and Bob Tail M. Co. at Black Hawk and connections made. The compressor weighs thirty-five tons and is to run twenty drills, says Manager O. B.



Thompson and Superintendent W. H. Davis. The Cook shaft has been sunk 500 feet to depth of 1500 feet. About seventy-five men are at work on company, contract and leasing account and this number will be added to.

The Gold Dirt M. Co., operating the Gold Dirt group between Perigo and Gilpin, is shipping smelting ore via Rollinsville to Denver, says Manager W. H. Knowles. The company has leased the Petersen mill, at Gilpin, and are making repairs. This mill is equipped with fifteen slow-drop stamps. It is intended to cyanide the tailings.

The Ingalls G. M. & L. Co. has suspended operations pending installation of a heavier hoisting plant, together with topbuildings and better facilities for handling ore. The shaft is 500 feet deep, and when the larger plant is running the company expects to sink to 1000-foot point. The Ingalls mine is on Gunnell hill, near Central City.

Stroehle & Sons of Black Hawk are putting in a hoist and two boilers at the Roderick Dhu shaft on Quartz hill, and topbuildings are going up. Daily shipments of sixty tons are maintained from the Protection shaft, being milling ore.

The Benzie Investment Co. of Denver has bought the Conqueror group at North Empire, containing 110 acres of patented ground, and W. Ballantyne of Central City is in charge. It is intended to sink a three-compartment vertical shaft. There is a 40-ton concentrating plant which has been remodeled and will be started up.

An air compressor is being put in at the Boston mill of the Gregory & Bottall M. Co. at Black Hawk. The company has sunk 500 feet into Cook shaft, making 1400 feet.

#### Gunnison County.

At White Pine the May-Mazepa and North Star mines report developments progressing. The Akron M. & M. Co., owner, is equipping to economically mine, drain and develop its ore bodies. Near the 4000-foot point of the company's drainage and transportation tunnel payable ore is showing. Silver, gold, lead and zinc are carried. President Dick says a mill will be built at the mouth of the tunnel, equipped to concentrate and separate the zinc-lead values. The mill will be run by water power generated 1 mile below the tunnel's mouth.

#### Lake County.

Leadville reports show the tonnage of the camp for month of August reached 70,000 tons of all classes of ore. Of that amount 8000 tons of zinc, including the crude material and concentrates, were shipped to zinc plants in the United States and to Belgium. The Arkansas valley smelter handled 50,000 tons of the output. Between 300 and 500 more men are at work in the mines than were at the beginning of the year and the number is still increasing.

#### Ouray County.

The Security G. M. Co., owning twenty-seven lode claims and three millsites 4 miles from Ridgway at mouth of Cow creek, reports the experimental work of the small stamp mill has proven the cement deposits to carry values of \$5 per ton in gold. A 100-stamp mill and a cyanide plant to extract gold from tailings will be built. The site for the mill has been chosen and work will be started this week on a road to the mill.

#### Park County.

G. W. Shelton of Alma reports opening the ore shoot in the lower workings of the Kentucky Belle mine. The lower tunnel is 280 feet below the upper workings and at 500 feet in has struck the ore shoot, which shows average values of \$14 per ton. It is a sulphide ore and a concentrating mill will be built. There is ample water supply.

The plant of the South Park Oil, Gas & Coal Co. is drilling for oil in South Park basin on Trout creek, near Hay Ranch station, on the Colorado & Southern Railroad, near Alma.

#### Pitkin County.

Aspen reports say the Newman mine, which has been closed down for the past month to put in a new pipe flume and to repair the old one where no change was to be made, has resumed work. A double-decker skip has also been put in the mine, besides other repairs.

#### Routt County.

A tract of bituminous coal land consisting of 2000 acres has been sold to Morgan & Bivens of Steamboat Springs, with Cedar Rapids, Iowa, men. The tract is 4 miles south of Craig. Development work will be started.

#### San Juan County.

(Special Correspondence).—The pipe line at the Natalie-Occidental group has been completed and a Loeffel water wheel will be placed this week, when two electric drills will be put in and work pushed

until the property is put on a paying basis.

T. Jay Hurley, manager of the Ruby Basin M. Co., is working a large number of men completing the 50-ton mill being erected on the property of the company. Manager Bloodgood of the Big Colorado Co. is building a power and compressor house below the mines where machinery will be installed before winter sets in.

The Venetian M. Co. property is in the hands of the sheriff.—The thirty-nine Willey slimes tables placed in the Gold King mill are ready for the power. A good body of ore has been cut in the Gold Prince, an extension of the Gold King, and a 2-mile tramway will be erected for transporting ore from mine to mill. More prospecting is going on in this section this season than during any previous year and some good ore is being brought in from the outlying districts. O. Hansen is stopping ore from the Idaho mine, owned by Schiffer Bros. The Galta Boy owners are piling up ore preparatory to making a shipment of high grade.

Gladstone, Sept. 11.

Concentrates made by the electro-magnetic process at the Silver Ledge mill, near Silverton, are being shipped at the rate of forty tons a day—zinc as one product and lead as another.

#### San Miguel County.

The contemplated lease of the Smuggler-Union mining and milling property of Telluride to S. D. Nicholson et al. having fallen through, B. Wells, manager of the Smuggler-Union company, has taken a lease on the property and has put on 150 men. This number will be increased until the mines and mills are again working at full capacity.

F. J. Hobbs of Colorado Springs, treasurer of the Butterly-Terrill M. Co., operating at Ophir, says approximately \$10,500 worth of metal was taken from the mine and mill during August. Development shows increasing bodies of concentrating and other ores.

#### Saguache County.

P. R. Harpell, president of the Steel Canyon M. & M. Co., says the concentrator under construction has been delayed owing to the explosion of a boiler. The company has ore blocked out in the mine. Men will be put to work taking out ore. The company has 15,000 tons of ore on the dump, ready for concentrating, and will also build a smelter for the treatment of concentrates.

#### Summit County.

The old Union M. & M. Co., on Mineral hill, near Breckenridge, has cut a station in the Smith shaft at 235 feet, and Superintendent G. C. Smith has a crosscut driven to the vein. The vein is 5 feet. A drift has been started on the vein towards the Montgomery workings. Hoisting at the Montgomery shaft is being done with a horse-power whim. The gallows frame and shaft house have been completed and a hoisting plant similar to that on the Smith shaft will be put in. Manager A. E. Keables has let a contract for driving a double track 1000-foot tunnel from west end of Mineral hill in on the Union vein. He expects to have a concentration mill built.

The Griffith lease on the Jessie group and 40-stamp and concentrating mill, near Breckenridge, will start up the mill this week. It was found necessary to add three more Willey tables to the plant, making twelve in all. To place these tables, an addition to the mill structure was made. A 15-ton air compressor and an extra boiler were also added to the plant. Manager Griffith says air hammer rock drills are being used.

The bedrock of the placer pit of the Gold Pan Placer M. Co. at Breckenridge shows there is a body of partly oxidized iron sulphide ore. It is thought to be one of the upper strata of the ore-bearing blanket veins which underlie the course of the Blue River valley for several miles south and north from Breckenridge. The bedrock of the pit is uncovered 70 feet below the present surface of the Blue River, and as soon as the suction of the hydraulic elevators and of the two centrifugal pumps cease, the pit fills with water to within a few feet of the main floor of the elevated flume.

Twenty additional stamps and four Willey tables are going into the Cashier mill, in Brown's gulch, near Breckenridge. The work will be completed by Oct 1st, and then forty stamps will be dropped.

The Reliance Gold Dredging Co. has started work. The dredger will be built in French gulch, near Breckenridge, east of the Makka mine. To ascertain the depth of washable ground, they will put down a series of drill holes to bedrock, says Manager Smith.

Dewey Bros. have a bond and lease on the Brown-Miller-Langdon group, consisting of three patented claims on Mineral hill, near Breckenridge. Values of the ore are in lead, silver, gold and zinc.

#### Teller County.

At Cripple Creek the Golden Cycle mine, having resumed operations after being closed down for eight months on account of litigation, has 100 men at work. The company is mining seventy-five tons of ore per day of \$40 value in gold per ton. It is expected that the tonnage will be doubled. The ore is being taken from the seven levels of the property.

The Henry Adney mine, on Beacon hill, Cripple Creek, has been sold for \$500,000 to W. Lennox and H. Giddings of Colorado Springs, owners of the Gold King and Strong mines, in the same section. S. McDonald is superintendent.

The flow from the El Paso drainage tunnel at Cripple Creek is 4970 gallons per minute. The El Paso, C. K. & N., Mary McKinney and Elkton mines have had their lower levels unwatered. Nevertheless the tunnel continues to do good work, and especially in the mines higher up than those mentioned. It gives the Bull, Ironclad, Carbonate and Raven hills mines the opportunity to go to greater depths. The primary intent of the tunnel was to drain Beacon and portions of Guyot and Raven hills at a given depth. This has been accomplished and good results to other portions obtained also.

Cripple Creek reports show that production for August reached \$1,790,620, with a tonnage amounting to 61,940. Since the strike was started, August 10th, 1903, the output of the camp has been steadily rising, until now it is practically at the former normal level. The production of August shows an increase over July both in tonnage and valuation. In July 51,700 tons were shipped, having a value of \$1,716,500. With August's figures, the total of the first eight months of 1904 amounts to \$14,028,420. The individual treatments made by mills and smelters for the month were:

Mills	Tons.	Total Value.
Smelters.....	10,000	\$ 600,000
United States R. & R. Co.....	20,000	480,000
Portland mill.....	8,000	256,000
Telluride mill.....	6,000	210,000
Dorcas mill.....	2,800	98,000
Economic mill.....	2,600	88,400
Homestake (cyanide).....	6,510	26,040
Florence (cyanide).....	2,170	13,020
Wild Horse.....	1,850	11,160
Sioux Falls.....	2,000	8,000
Totals.....	61,940	\$1,790,620

For the month of August the Vindicator mine sent out 1500 tons, with values of from two to five ounces; Dillon produced 500 tons, \$30 per ton; the Lonaconing mine, on Beacon hill, 500 tons of \$40 ore; C. K. & N., 1500 tons of \$65 ore; Old Gold, 900 tons of \$40 ore; El Paso, 1200 tons of \$70 ore; W. P. H., 850 tons of \$40 ore; Harrison & Seaver, operating under lease the W. P. E., owned by the United G. M. Co., shipped a total of twenty-eight carloads of ore, returning values of from two to five ounces gold per ton. But little waste is picked out of the ore, and the lessees are breaking ore of 25 feet in width above the 300-foot level. Harrison says they will increase the output this month to double the tonnage made for August.

J. J. Cone, owning the Ophir mine, near Cripple Creek, will build ore bins, five in number, each having capacity of 150 tons. This will permit hoisting ore for two weeks without interruption at any time the weather is bad. The railroad company will extend a spur to the ore bins, so that expense on hauling will be saved.

After being closed down on account of water, H. M. Gilbert has resumed operations on the Longfellow mine on Bull hill, at Victor, and is mining at a depth of 250 feet.—The Gilpin lease on the Jerry Johnson mine on Ironclad hill shipped 350 tons during August, average value \$40. Gilbert has twenty men at work on the lease. Operations at present are confined to the fourth level.

The Elkton Con. at Cripple Creek has 100 men at work. Its new washer and sampling outfit are in operation. The management is confining operations on the bottom or eighth level.

The Kimball Investment Co., operating a lease on the Saturday claim, on Beacon hill, Cripple Creek, has been handicapped on account of surface water, and will put in a 40 H. P. boiler and hoist. The shaft has been sunk 200 feet. It is intended to sink to 700 feet.—The Tunnel M. & L. Co., operating the Abe Lincoln mine of the Stratton estate at Poverty gulch, has started washing the dump and 100 tons of rock are being put through the washer daily, and a regular production of a carload per day is sent out from that source. Besides this, the company is sending out a carload of \$50 ore daily, which is being broken in the 600-foot level, where the vein is 25 feet in width, says Manager Swanson. As soon as the surface water decreases the company will resume sinking the shaft. Another washing machine will be put in.

A lease on the Oro claim, north of the W. P. H. mine, on Ironclad hill, Cripple Creek, has been let to Spencer & Co. of Joplin, Mo., who will install machinery

and sink the shaft 300 feet deeper. On the north end A. Knecht, owner, and H. Hart are sinking a shaft. Work has been done with a windlass. They also will put in machinery.

The samplers of the Cripple Creek district report handling more ore than at any time previous, and the output for the month of October shows farther increase. The Black sampler will handle 6000 tons, while the Eagle will double that amount and the Rio Grande is expected to put through 10,000 tons during the month.

The Gold Coin mine at Cripple Creek, operating leasing system, during August shipped 1500 tons of ore, averaging \$50 per ton. Of the amount the company received \$22,500 net, besides getting a sum for hoisting and sharpening tools. There are thirty-three sets of lessees, employing over 100 men. At one time there were over fifty sets of lessees operating on Gold Coin property, but under the contracts a man must have 2-ounce ore or better to make it pay.

#### IDAHO.

##### Boise County.

At the Mammoth mine on Summit Flat, near Idaho City, forty men are on the pay roll. Buildings are going up and work will start in the incline, to be extended from the 300 to the 400-foot level.

E. E. Rogers of Chicago, Ill., says he will equip the Black Pearl mine at Pearl with a mill and other machinery, including a 1500-foot capacity hoist. The machinery is expected to be ready for operation Dec. 1. Rogers says they are drifting on the Afterthought lead, which is 37 feet wide and runs \$11 per ton. The shaft is down 350 feet and the Afterthought lead will be cut at 390 feet. Two electric motors, of 50 and 75 H. P. each, will be put in. To obviate cessation of work by mishap to the electric power, an 80 H. P. plant, which will run the hoist by compressed air, will be put in. The mill will have 40-mesh screens, and a capacity of 150 tons of ore per day. It will also have four hydraulic classifiers, eight concentrators and four Sperry slimmers. A building will also be put up for an assaying laboratory.

##### Custer County.

G. Z. Edwards of Salt Lake City, Utah, has an option on the Phi Kappa group of six claims in Alto district, 40 miles north of Mackay. Ore carrying silver, lead and copper values has been opened. Development will be started next week and the mine equipped.

Manager Fearn of the White Knob C. Co. at Mackay reports the output of copper bullion from the smelter aggregates 300,000 pounds monthly. The ores treated carry 3% copper in addition to gold and silver values of \$1 to \$2 per ton. The company is treating 450 tons of its own ores daily and 100 tons of custom ores.

##### Idaho County.

The Lucky Lad mine, north of the Big Buffalo mine at Hump, has its shaft down 100 feet, and a test run showed payable values. The company has a 2-stamp mill, a hoist, electric plant and other equipment, and is preparing to put in a 10-stamp mill. The company will also increase development work during the winter.

M. Gilbert of the Buffalo Chief M. Co., operating at Hump, says the Big Buffalo, Crackerjack, Atlas, Jumbo, Mother Lode No. 2 and Buffalo Chief have increased their ore showings during the summer. The Mother Lode No. 2 has shipping ore. The Dice claim has made a strike of free-gold ore. Gilbert says he will place machinery on the Buffalo Chief. The company is also developing placer property in Marshal lake district and has men cutting timber and building a ditch for spring work. Pipe and two giants will be put in.

C. W. Stallings of Grangeville reports 500 men are at work in Thunder mountain mines around Roosevelt. The road from Van Wyck to Roosevelt will be completed this week. The Sunnyside M. Co. has completed the wagon road from the Sunnyside millsite on Marble creek to Roosevelt. The company has completed foundations and buildings for the 40-stamp mill. The Sunnyside Co. is working 250 men. The Dewey Co. is working sixty men. The mill was started up two weeks ago, after being shut down for several months. The H. Y. Co. has its saw-mill completed and the mill is getting out timbers for 20-stamp mill.

##### Shoshone County.

The Stanley M. & M. Co. has been incorporated at Wallace by A. Sutherland as president, F. M. Rose, A. J. Dunn, J. C. McDiarmid and J. L. Dunn. The property consists of four claims near Mullan.

Wallace reports say a consolidation of the Frisco, Bernier and Flynn groups has been made.

Twenty-five hundred men are mining in the Cœur d'Alene district, says the Capital News. About 2200 men are in the larger mines making a monthly payroll of



about \$225,000. In the canyon mines all the underground men receive \$3.50 a day, while at Wardner the wages are \$3.50 to miners and \$3 a day to muckers. The Bunker Hill & Sullivan employs 425 men. The Standard mine and mill of the Federal M. & S. Co. employs 325 men. The Morning mine at Mullan works 265 men in mine and mill, while the Mammoth, the Tiger-Poorman and the Last Chance of the Federal M. & S. Co., employ 200 men each. The Hercules and the Hecla mines at Burke work 136 men each. The following are other properties: Gold Hunter at Mullan 70, Snowstorm at Mullan 40, Sixteen to One at Nine Mile 20, California Con. at Nine Mile 30, Granite at Nine Mile 12, Monarch at Murray 22, Bear Top at Murray 10, Paragon at Murray 10, Golden Chest at Murray 10, Silver King at Government Gulch 10, Black Hawk and Wyoming 10. Several hundred men are working on prospects from one to six men each.

Near Murray, the Monarch Co. is putting in a hoist in the upper works, to sink on the ledge. Manager Spalding has twenty-five men working.

#### Owyhee County.

Cleveland, Ohio, men, with V. Nussbaum as president, have organized a company to take over and develop a group of mines on War Eagle mountain, near Silver City, under charge of N. C. Titus, the group comprising the California, North Extension, Helen and Clara mines. A hoisting plant and other machinery will be put in and a shaft will be sunk. Titus says work will be begun this month.

A. I. Eagle and G. A. Bergh of Nampa are putting in a 5-stamp mill and other equipment for their group of three claims on Sucker creek, 13 miles north of Silver City. A 7-foot vein of free-milling ore has been opened, showing value of \$8. It is intended to save the tailings from the mill with view of putting in a cyanide plant later.

#### Washington County.

The smelting plant built by the Ladd Metals Co. at Lenore, in the Seven Devils copper district, will be blown in this week, says C. E. Ladd, president. C. M. McDowell is manager. The plant is of seventy-five tons capacity.

### MICHIGAN.

#### Houghton County.

As a result of discoveries made in the past few weeks both the Isle Royale and the Atlantic mines, near Houghton, are said to be improved. With the Isle Royale the advantage is derived from sinking a new shaft on Section 11, at southern end of the company's lands, where a showing of copper has been opened, says the Daily Record. The Superior C. Co., recently organized to develop a mine on Section 11, between the Isle Royale and Baltic mines, has struck what is thought to be the northern extension of the Baltic lode, sought, unsuccessfully, by the Atlantic Co., on Section 16, for several years. Both of these developments benefit the Atlantic mine.

### MISSOURI.

#### Jasper County.

At Webb City, an electrically operated mill has been completed on the McCorkle Hill lease.—The Fullerton M. Co., L. M. Janes, superintendent, has built a mill at the Hand Shaft on the American-Cornfield lease.—The mill of the Chicago L. & Z. Co., L. E. Sanford superintendent, is having a larger air compressor put in.—The Wise M. Co., R. Jarred superintendent, has opened a 10-foot face of ore on the South Missouri Zinc Fields ground, and will put in hand jigs and begin cleaning ore.

The Cushing-Webb City O. & M. Co., of Oklahoma, will make improvements on its mining leases in Webb City district. J. M. Kerr has management of the company's mine on the Acme lease. They will build a mill on the lease.

The Majestic M. Co., which owns fifteen mines in the Webb City-Cartersville district, has leases on 120 of the Baker land and eighty acres of the Carter land and will erect buildings and put in pumps.

#### Lawrence County.

More men have been put into the Julia West mine, at Stotts City, and the mill started, says Superintendent Stephens.—The Illini mine and mill are in operation. Superintendent Hamilton is shipping ore.

### MONTANA.

#### Fergus County.

Work is being carried on with diamond drills on the Waldorf-Draper group, near the Kendall mine at Kendall. The Draper is owned by the South Moccasin M. Co.

#### Flathead County.

T. A. Noble, of Pittsburgh, Pa., president of the Rustler M. Co. operating the Snowshoe mine, at Libby, says the new machinery put in the mill is working satisfactorily. It is intended to sink to

the 1000-foot level, for which heavier machinery will be put in. Noble says during the time in which the shaft is being sunk the mill will be kept running.

#### Lewis and Clarke County.

The Montana M. Co. reports at the Drumlunnon mine at Marysville, during July thirty-five stamps dropped twenty-eight days, crushing 1750 tons of ore, producing bullion bars and concentrates valued at \$11,100; the tailings plant was employed for thirty-one days, treating 12,975 tons of tailings and fines, producing cyanide precipitates of \$26,000 value; total (represented by 1440 ounces of gold and 15,970 ounces of silver), \$37,100. Expenditures: General maintenance and milling, \$7500; payments to leasers, \$3400; extraneous expenses (insurance, etc.), \$1500; legal expenses, \$800—\$13,200. Treatment of 12,975 tons of tailings and fines, \$14,700; insurance, \$500—\$15,200. Total, \$28,400. Estimated profit, \$8700. The expenditure of \$3000 incurred in developing properties under option is not included in the figures.

#### Silver Bow County.

The Pennsylvania mine, owned by the Boston & Montana Co. at Butte, is again in full operation. With exception of the timbering force, the men had been idle five weeks on account of repairs in the shaft. During suspension 400 feet of the shaft between the surface and the 500-foot stations were retimbered.

### NEVADA.

#### Elko County.

E. L. Godbe says he will build a furnace at Bullionville (Panaca P. O.), 16 miles from Caliente, and will smelt ore from the Jackrabbit mine and the tailings at Bullionville.

E. R. Abadie of San Francisco, Cal., has bought the Kewanee Nos. 1 and 2 mines, near Columbia, near Elko, for \$25,000 and first payment is made. Development will be resumed.

#### Esmeralda County.

E. L. Mims & Co. have an option on the J. Butler interests at Goldfield, including his interests in the Sandstorm Co. and Columbia Mountain Co., Rabbit Springs water right and Columbia Townsite Co.

#### Lincoln County.

The mill of the Newport-Nevada M. Co. at Fay is closed down temporarily for repairs.

F. Campbell, with G. W. Way, has an option on the April Fool group of gold-silver claims, north of Los Vegas, near Caliente, and have put men to work. They have also a lease and bond on the Bob Lee gold-copper group, 12 miles east of the April Fool, on which group is a supply of water from the Cool springs.

The Salt Lake Route Ex. Co. has been incorporated by H. Joseph et al. of Salt Lake City, Utah, to develop mineral-bearing territory in the section being tapped by the San Pedro Railroad. The ledges include copper and gold, silver and lead and cinnabar, the latter having been acquired in a bond on the properties of A. E. Thomas at Goode Springs. Most of the company's holdings are in Lincoln county, with Goode Springs the base of operations.

#### Nye County.

The Nevada M. Co. mines at Berlin are again in full operation and the mill is running. More men are being put to work.

B. Kadish and F. S. Lack of Baker City, Or., propose to build sampling works at Tonopah and have bought a site for the plant.

The compressor plant at the Tonopah Extension mine at Tonopah is in operation. The plant comprises two boilers, one of 125 H. P., which has been connected with the old 50 H. P. boiler for hoisting from the shaft and driving the compressor, the latter having capacity of 1225 cubic feet per minute, and will operate six 3-inch drills at that altitude. More drills will be put into the mine. The entire plant, including freight and installation, has cost \$10,000. The Tonopah Extension is under the management of J. McKane, and has 1800 feet of underground workings. The main shaft has been sunk to 500 feet, and sinking will be resumed.

#### White Pine County.

The experimental concentration plant at the Ruth mine is in operation by the White Pine C. Co., preliminary to building reduction works for development of its copper mines. The plant consists of one Huntington mill, one Wilfley concentrating table, two Frue vanners and two Johnson concentrators. The water supply for the mill is pumped from the Copper Flat mines, a distance of 1½ miles.

### NEW MEXICO.

#### Lincoln County.

The mill on the Puritan mine in the White mountains, near Lincoln, owned by the Jerry Simpson M. Co., is completed. A steam pump is being put in to handle the water in the mine.

#### Otero County.

The Amarillo M. Co. will resume development work at Jarilla (Brice). Three whims are being worked at Jarilla.

#### Socorro County.

There being sufficient water again, work has been resumed by the Cooney mill at Cooney. The Last Chance mine is in ore. B. Graham reports making a strike on the Peterson & Lambert group on the Whitewater creek.

### OREGON.

#### Baker County.

Manager E. S. Tice of the Single Standard Co., at Baker City, says he will reopen the mine and start development. A 10-stamp mill, concentrators, water power machinery and an electric plant are included in the plant to be put in.

W. M. Kippen of Spokane, Wash., and N. P. Kaylor of Sumpter have bonded the Buckeye group in Cracker creek section. They are taking out ore for shipment to the smelter. Development will be increased.

With twelve men, development is progressing at the Platts group near Sumpter. The drift on the Jim Blaine vein is opening up ore 30 feet wide, of which 8 feet is milling value. Manager Hendryx says a compressor is being put in.

#### Grant County.

Manager J. P. McGuigan of the Alamo mine at Granite says he will put men on development and start up the mill. In addition he will build a 30-ton cyanide plant.

Two feet of ore, running \$20 per ton, is being treated at the Royal White stamp mill and development is in progress on the drift on the cross-vein. The group comprises three claims near Alamo, on which surface work has proved two parallel veins. The shaft will be continued down. It is intended to go farther down the mountain and drive a crosscut tunnel, which will give backs of 400 feet. J. P. McGuigan is manager.

The 10-stamp mill at the May Queen mine, near Granite, is again in operation, after idleness of four years. Superintendent W. T. Young has been developing the lower level of the property and has blocked out milling ore. The May Queen is north of the Red Boy.—The Big Producer Co., whose mine is in Alamo district near the Van Anda and Oro Fino properties, has resumed development work.

#### Jackson County.

F. Perry of New York and J. F. Reddy of Spokane, Wash., have bought an interest in the Opp mines, west of Jacksonville, and they will install a 10-stamp mill.

#### Josephine County.

The Lucky Queen M. Co., near Merlin, has bought half a section of timber land on Jack's creek, near the mine, and is putting up a sawmill. The company will build a 10-stamp quartz mill on Jump-Off-Joe creek, ½ mile below the mine. The ore will be hauled to the mill by a gravity railroad.—The Oro Fino mine, in the same section, is putting in a 50-ton cyanide plant.

Men are driving development work on the Alameda mine at Galice, says Manager J. F. Wickham. Work is under way on two adits and in a crosscut. Work will be started on an opening between the two levels. The company will build roads that will give shorter mileage to the railroad, and which will make Leland its shipping point. It will also afford a direct route for hauling in mill machinery.

The dredger of A. Champlain, on Fooths creek, near Grant's Pass, has resumed work after two weeks, overhauling and repairing for the winter.

The Albright & Co. quartz mines near Kerby have been bonded to T. F. Hopkins & Co. for \$20,000, who will develop and equip them. The ore is low grade. Hopkins & Co. will begin work this week and will later put in a stamp mill.

#### Lane County.

At Blue River the Cuba M. Co. has a group of eight claims near the Lucky Boy mine. Several veins have been opened. The company controls a supply of water for milling purposes, and a mill-site, above which a tunnel can be driven to cut the veins at depth. The company will increase development work.—At the Lucky Boy mine work is suspended during the installation of a cyanide plant.—At the Uncle Sam mine the mill being built is expected to be ready to crush ore this week.—At the Badger mine a tunnel is being driven to cut the veins at depth. A mill-site has been selected below the mouth of the tunnel.

A 5-stamp mill will be built on the Mayflower quartz mining property near Bohemia by the Mayflower M. Co., consisting of W. P. Ely of Castle Rock, Wash., E. Carlson of Kalama, Wash., and M. Reed and J. A. Beck of Portland. The company has been doing development work on its group for several years past and has run 2000 feet of tunnel.

### SOUTH DAKOTA.

#### Custer County.

Buildings have been put up on the mine of the Addie M. Co. on Crow creek, 8 miles west of Custer, and a working shaft has been started. It will sink on the vein and drifts will be driven. The ore is 18 inches thick.

#### Lawrence County.

The management of the Deadwood-Standard M. Co., operating west of Lead, reports the mill will be in operation again by October 1. A churn drill will be used to determine extent of the ore bodies. Holes will be put down to depth of 500 to 600 feet.

The run at the cyanide mill of the Spearfish G. M. & R. Co., near Spearfish, during month of August handled 8000 tons, being an increase of 2000 tons over the previous month.

It is reported the Amicus mill (Highland) of the Homestake M. Co. at Lead will be increased by sixty additional stamps, making 300 in that mill. T. J. Grier is superintendent.

#### Pennington County.

The Golden West M. Co., operating southwest of Rochford, has bought the Nancy Hanks group of claims which adjoins the Golden West on the east. A 15-foot vein of free-milling ore has been opened. The Golden West Co. is installing a plant with Huntington mills.

### UTAH.

#### Beaver County.

W. B. Mucklow of Hartford, Conn., president of the Majestic C. Co., reports work is progressing on the O. K., Old Hickory and Harrington & Hickory mines of the company at Milford under Superintendent Freudenenthal. The result of work at the mines makes it certain, says Mucklow, that the furnaces of the company's smelter near Milford will be blown in again before Jan. 1. Construction of a concentrating mill for treatment of the silver-lead ores of the Harrington and Hickory mines, of which there are large bodies exposed, is also proposed. For transportation it is proposed to build an aerial tramway, the distance from mine to plant near the smelter being 4 miles. The elevation of the main Harrington and Hickory works is 450 feet above the smelter.

#### Box Elder County.

The Bonneville Oil & Asphaltum Co., of which S. Bamberger of Salt Lake City is president, with J. S. Gordon, E. B. Critchlow, E. A. Vail, G. Frary, G. Payne, H. M. McCartney, M. J. West, T. E. Black, U. V. Withee, J. and J. J. Simpson and T. Hull directors, has been incorporated to develop placer mining claims and to extract oil, asphaltum and other hydrocarbons. The company owns the Eva, New Century, Industrial, Big Muddy and Old Original Con. placer claims in Box Elder county. It is sinking a well on its ground, with prospects of striking oil.

The Santa Maria G. & C. M. & R. Co. of Ogden has been incorporated by D. Maguire, president, C. A. Maguire, et al. The company owns a group of claims in Sierra Madre district.

#### Grand County.

W. R. Wheat, manager of the Grouse Mountain M. Co., is increasing work on the Grouse Mountain tunnel at Basin, in the La Sal mountains. Next month he will start work on the erection of a 100-ton cyanide mill.

#### Iron County.

Modena reports say the Newport & Nevada mill, pending blocking out of ore and repairs, is closed.

#### Utah County.

W. J. Stauffenberg and J. P. Pederson are resuming development work on the New Utah group of mining claims in Ericson district, near Eureka. The property has been developed by an incline shaft, but it is intended to put up a hoist, blacksmith shop and other buildings, and sink a vertical shaft to tap the vein at a depth of 200 feet.

After a run on Gemini mine ore a clean-up has been made at the Eureka Hill mill at Eureka, and the plant will be closed down indefinitely, says the Eureka Reporter. There are eight carloads of concentrates at the mill awaiting shipment and 80,000 ounces of bullion.

W. F. Babcock of Salt Lake City, manager of the New York Giant Co.'s Deep creek mines, near Fish Springs, is starting development of a group of claims adjoining the Lucy L. company's property on the south.

The mines of Tintic district shipped 404 carloads of ore and concentrates during August: The Centennial-Eureka, 172 carloads, Gemini 64, Mammoth 41, Uncle Sam Con. 14 of concentrates and 9 of ore, Bullion-Beck, Grand Central and Yankee Con. 22 carloads each, Carisa 12, Eagle & Blue Bell 8, Ajax 8, Tero 6, South Swansea 6, Victor Con. 5, Eureka Hill Mill (concentrates) 4, Star Con. 3, Salvador 2,



Lower Mammoth I, Laclede I, Monterey I and Anderson (lease) I.

Salt Lake County.

With four furnaces in operation the Bingham Con. smelter at Bingham is handling a daily average of 750 tons of ore, from which 35,000 pounds of gold and silver-bearing copper bullion are derived. Another furnace will be blown in this month, increasing capacity of the plant to 900 tons per day.

The Old Evergreen M. Co., operating near Alta, in Big Cottonwood canyon, has made application to the State for use of certain sources of water to supply power with which to operate a concentrator, also drills underground. The management of the Evergreen reports having developed a tonnage of milling ore.

The Little Cottonwood M. Co. has been organized in Salt Lake City. The properties of the company are near Alta, in the Little Cottonwood mining district. The officers are: R. Knudsen, P. Blinn, E. P. Phelps and C. F. Loofbourou.

Summit County.

The Ontario mill at Park City will be put in operation again. The water has been bailed out of the mine down to the 1700-foot level and the pumps are working. By means of two tanks, from 1200 to 1300 gallons of water per minute were taken from the mine. The hoisting works replacing those burned down are under roof, with the exception of the gallowes frame and shaft, which are to be left uncovered. The compressor at the mine is being overhauled. An ore bin will be built, from which the cars will be loaded for shipment.

At the Daly-West mine at Park City the 80-foot gallowes-frame is completed. Contractor Graham built and set the frame in a month's time. The first three sets of timber in the shaft have been replaced with heavier timbers, made necessary by the new head frame requiring firmer foundation. Skips will replace the cages in the shaft and will hold five tons each. An ore bin will be built at mouth of shaft. The ore house built to replace the one which collapsed is completed and full of ore.

Tooele County.

The Climax M. & M. Co. has been organized in Salt Lake City. The properties of the company are in Erickson mining district. The officers are: T. Rownd, president; J. J. Mason, manager, and W. D. Mathis.

The mill of the Northern Light M. Co. on Lion hill, near Mercur, has been sold to J. M. Swem.

Since putting in the Chilean regrounding mill, the Honerine mill at Stockton is making average of 100 tons of concentrates and high-grade ore daily. During month of August thirty-five cars of concentrates were shipped from the Honerine mill. The water having decreased, work has been resumed in the Honerine drainage tunnel. The flow of water is giving 7000 gallons a minute, says Superintendent Kaddatz.

It is understood Manager J. J. Trenam of the Stockton G. M. & M. Co. at Stockton will build a mill to handle the mine's second-grade ore.—The Galena King, Black Diamond and others are being developed.

Uinta County.

H. Sanger, manager of the Uinta C. Co. at Vernal, says he will blow in the smelter again.

Utah County.

M. P. Braffet of Scofield and Salt Lake City men are doing development work on a vein of ozocerite or mineral wax, at Colton. A 12-foot vein, running 5% to 7% parafine, with two veins of ozocerite 5 and 7 inches, respectively, in thickness, comprise the find. A plant for extracting the wax from the vein matter will be built at a cost of \$30,000, says Braffet. It is said a product worth \$200 per ton at the mine can be produced by a simple process of reduction. Fuel, both wood and coal, for boiling the product out of the crushed rock, is convenient and cheap.

WASHINGTON.

Ferry County.

J. L. Harper of Republic, S. Aughey et al., who have bought the Manila mine, near Keller, will increase development. It is said a railroad will be built into that section and a smelter installed at West Fork, on the San Poil river, 15 miles south of Republic. The mine is at an elevation of 1000 feet above the valley of the San Poil, along which the railroad will run. This will enable the product of the mine to be handled by an aerial tramway. Water power can be obtained from the river.

Okanogan County.

C. C. May of Davenport, treasurer of the Palmer Mountain G. M. & T. Co. of Loomis, says work will be increased. The Palmer Mountain Co. owns fifty claims, also water power of sufficient volume to operate the works of the company

and furnish a surplus for use of neighboring mines. The property is equipped with machinery for development, including air drills and a compressed air and electrical plant. A double-track tunnel has been driven for 4000 feet, cutting thirty gold-bearing ledges. Depth attained by the tunnel is 1000 feet vertical. Grading for a reduction plant is in progress. The mill will have a capacity of 300 tons daily. A power plant will also be built on Toat's Coulee creek, which is owned by the company. The principal owners are C. C. May and F. H. Luce of Davenport, N. F. Essig and D. Drumbeller of Spokane and Eastern men. Palmer mountain is in northern Okanogan county, near the Canadian border. The Copper World M. Co. owns claims across the mountain from the tunnel company. Cutting through the mountain at that place is a copper-bearing dyke. The company proposes to extend the Palmer mountain tunnel through the mountain to its ground.

Stevens County.

In Deer Trail camp, at the head of Cedar canyon, A. W. Turner and H. J. Davis of Davenport have machinery for a 100-ton smelter on the ground and have forty men putting up buildings. They expect to have it running Oct. 15th. By blowing out a furnace they can treat galena when a sufficient quantity is available to run thirty days, says Assistant Manager C. E. Davis. The principal ore treated will be copper, carrying gold and silver. The smelter is built primarily to treat ores from the two leads in the Turk group. The group is in the main Cedar canyon, 1½ mile from the smelter. There are thirty-five men at work at the mine. Twenty teams will be put to work hauling ore. Coal will be brought from Davenport, 35 miles distant, by a traction engine capable of drawing four trucks loaded with twenty-five tons. The haul will be ten hours. The road has been prepared.

WYOMING.

Carbon County.

Encampment reports say a gold strike has been made in the Solo mine of the Jack Pot group of claims near Copperton, near Encampment. The vein fills the shaft, and a mill run of ore from all parts of the vein at the point where Battle creek crosses it gives \$50 a ton in gold. The ore is free milling.

Converse County.

The Copper King T. & M. Co. has let a contract for driving a tunnel on the Copper King claim, War Bonnet district, for \$12 per foot. It is expected the crosscut will tap the vein at a depth of 225 feet from the surface. This mine is 1½ mile from the Oriole mine, near Douglas.

FOREIGN.

AFRICA.

Transvaal.

The Transvaal Chamber of Mines at Johannesburg reports the gold output for month of July at 298,825 ounces for the Witwatersrand (a decrease of 1088 ounces compared with June), and 9015 ounces for the outside districts (an increase of 709 ounces compared with June).

AUSTRALIA.

Queensland.

Brisbane reports say the Queensland gold returns for July were:

District.	Tons Crushed.	Yield in Ounces.
Charters Towers.....	21,700	21,700
Croydon.....	6,000	3,300
Gympie.....	15,800	8,700
Mount Morgan.....	21,200	9,100
Ravenswood.....	3,100	4,600
Other Fields.....	3,800	2,900
A luvial.....	.....	1,400
Total.....	71,800	51,700

Victoria.

The gold yield of Victoria for the first seven months of 1904 is given at 460,168 ounces, being an increase over last year's production of 19,597 ounces.

Western Australia.

The gold production of Western Australia for 1904 to August 1st is reported at:

Month.	Total Ounces.
January.....	211,373
February.....	194,321
March.....	163,729
April.....	206,574
May.....	191,732
June.....	200,357
July.....	192,306
The total for twelve months of 1903 was	2,436,311 ounces.

BRITISH COLUMBIA.

The Byron N. White Co., owner of the Slocan Star group at Sandon, reports having paid to date \$375,000 in dividends. Pay ore has been opened to vertical depth of 800 feet, carrying ruby silver and grey copper. The zinc ledges also carry them. The Star has been working steadily with sixty men. It is sending out weekly 165 tons. The concentrator was overhauled

last winter. A feature of the remodeling was the change of vanners with Willey for saving of slimes. The concentrator is turning out twelve tons of silver-lead and twenty tons of zinc concentrates daily. The former is shipped to Trail and the latter is piling up outside the mill. Over 2000 tons of zinc are on hand waiting magnetic separation, when the zinc-enriching plants are erected.

Boundary District.

J. C. Welch, manager of the Montreal & Boston C. Co. smelter, at Boundary Falls, says the smelter will blow in its two furnaces about October 1. The ore will be largely drawn from the Brooklyn, Stemwinder, Rawhide and other properties at Phoenix. The third furnace will be set up as soon as smelting commences, and a fourth furnace will be bought in the spring.

East Kootenay District.

At Kimberley operations will be resumed at the Sullivan mine as soon as the roasters at the company's smelter, under construction at Marysville, are completed. Contracts have been let for cutting a tramway from the Sullivan mine to the railway at Kimberley.

The survey of the coal areas of the Imperial C. & C. Co., at Fording River, near Fernie, are being completed. Manager J. Brown is increasing prospecting work, and reports working on several veins. Coal of quality for coking or steaming is being mined in course of development work.

Nelson District.

The Shiloh mine, ½ mile from Ymir, on the Dundee road, will resume operations next month.

The Hunter V. mine has increased shipments to 100 tons a day. During August operations were changed from the glory hole on the Hunter V. claim to that on the Double Standard. The mine can put out 400 tons per day, which is the maximum which can be handled by the tramway.

A. W. Boyd of Spokane, Wash., is resuming operations on the placer property owned by the Erie Placer M. Co., 3 miles north of Erie, on the north fork of Salmon river. It is intended to put in a hydraulic plant.

Rossland District.

M. R. Galusha, manager of the Jumbo mine at Rossland, says the mine is shipping fifty tons of ore a day to the smelter, and next month he expects to increase the shipments to 100 tons a day. The company is working twenty men.

Slocan District.

B. White and J. G. Davlin, of Nelson, interested in the Slocan Star and Molly Gibson mines, near Sandon, report a company has been formed to operate the Molly Gibson, and men are being sent into the mine, which is 12 miles from Kootenay lake on Kokanee creek. The government will rebuild the wagon road to the Molly Gibson.

Vancouver Island.

(Special Correspondence).—The Tye Copper Co., Ltd., at Duncan Station, reports smelter returns for August were: Smelter ran twenty-three days; 4587 tons of Tye ore smelted, giving a return after deduction of freight and refining charges of \$59,224.

Duncans Station, Sept. 10.

West Kootenay District.

On the Bad Shot mine a lease and bond have been given to Vipond, McLean, Mills & McLellan. Development work will be resumed. The mine is in the Lardeau section, near Camborne.—Four hundred tons of salt are at the warehouses along the lake front for use in the concentration plant at Five Mile.—J. A. Darragh has applied for 300 inches of water to be taken from Mohawk creek, to be used for mining and milling purposes at the Silver Dollar group.

IND'IA.

The total output of the gold mines of India for month of July was 51,283 ounces as compared with 51,606 ounces for June, and 50,571 ounces for July, 1903.

JAPAN.

K. Takenouchi, manager of the Kasaka M. & S. Co., says they are operating properties at Rikichu. The ores mined are principally copper bearing, but carry values in silver and gold. Improvements will be made in mining and smelting methods.

MEXICO.

Chihuahua.

The Guggenheim Exploration Co. has started work on the San Pedro copper properties in Tepezala camp.

A placer gold field is reported found in Guaynopa canyon, near Casas Grandes. A large number of prospectors, many of them Americans, have staked out claims. One prospector from Casas Grandes is said to have taken out \$17,000 worth of gold from his claim in five days.

Coahuila.

The Sierra Mojada camp is reported producing 8500 tons of ore per month, divided among the mines as follows: American S. & R. Co., 1050 tons; Compania Metallurgica Mexicana, 1200 tons; Constancia M. Co., 1350 tons; Esperanza M. Co., 800 tons; Fronteriza M. Co., 50 tons; other shippers, 500 tons.

H. G. Collins of Las Esperanzas, with E. Gonzales, is prospecting for coal with diamond drills in the Sabinas valley, State of Coahuila.

Jalisco.

La Fortuna M. Co.'s 10-ton amalgamating plant is in full operation under management of F. E. Lloyd. The plant is at Ahualulco, and consists of stamp mill, copper plates, etc.

Sonora.

Ore has been opened up at the San Bernardino mine, 14 miles southeast of Cananea, assays showing 125 ounces silver, 12% copper and a trace of gold. McDonald & O'Brien of Cananea are the owners, and they expect to put more men to work.

J. B. Tomlinson of Prescott, Ariz., with Boston, Mass., men, put in \$125,000 worth of machinery at the Swansea mine, 65 miles southeast of Cananea. A 200-ton concentrating mill will be the principal part of the equipment.

Near Sahuaripa the Cieneguita C. Co. is putting in a 200-ton reverberatory furnace, says T. S. Lewis of Denver, Colo., treasurer of the company.

Tamaulipas.

It is reported the gusher of the Mexican Petroleum Co. at Ebano continues flowing about 1600 barrels of oil a day. Work is being rushed on five 35,000-barrel steel storage tanks, and when these are completed the other wells will be sunk to the oil-bearing strata.

NEW ZEALAND.

The New Zealand gold output for month of July is reported at 48,013 ounces, valued at £180,027, as compared with 55,902 ounces, valued at £216,578 for July, 1903.

Commercial Paragraphs.

THE Risdon Iron Works of San Francisco, Cal., is shipping this month to the Philippine M. Co., via Manila, a standard Risdon dredge, with 34-foot buckets, having a capacity of 200 cubic yards daily.

THE Pelton Water Wheel Co. report five orders last month from Java, to be used in developing power for quarries, coffee, tea and other industries. The company states that over 11,000 wheels are now in operation, with an aggregate maximum capacity of 1,125,000 H. P. They will send free on request their illustrated book, containing valuable hydraulic data, by addressing the Pelton Water Wheel Co., 124 Main St., San Francisco; 147 Liberty St., New York.

A COMPANY has been organized and incorporated under the laws of California, and known as the Vencedora Mine Equipment Co., to experimentally investigate and test newly devised and patented mining and metallurgical machinery and processes, with a view to placing plants on mining properties for interests in the same, and otherwise putting on the market their machines or processes, on which the company has already acquired several patents. The organizers of the company are W. C. Ralston, A. G. Fisk, Charles Hirschfeld, H. T. Creswell and Jos. Spiers of San Francisco, Cal.

Trade Treatises.

"Wire Rope Tramways" in an excellent description of the several styles of aerial wire rope tramways made by A. Leschen & Sons Rope Co., 920 North First street, St. Louis, Mo. The company's branch offices are 163 Washington street, New York; 137 East Lake street, Chicago; 1717 Arapahoe street, Denver, and Rialto Building, San Francisco. A request to any of these offices will secure a copy.

"Electrically Driven Machinery," being Bulletin 101 from Harron, Rickard & McCone, 21-23 Fremont street, San Francisco, Cal., is a treatise of standard size (6x9 inches), which commends and describes modes of electrical power application, air compressors, mine hoists, pumping machinery, blowers, ventilators, etc., with finely illustrated description of each device, with prices. This booklet is worthy of a place on any mining engineer's desk.



## Personal.

G. K. ORR is superintendent of the Lundquist mine, near Auburn, Cal.

C. W. PURINGTON is at Nome, Alaska, and will return to Denver, Colo., October 15.

W. L. WATTS, E. M., of Los Angeles, Cal., is in Oaxaca, Mex., on professional business.

F. SUSTERSIC is manager of the Amparo M. Co., operating at Etzatlán, Jalisco, Mex.

S. McDONALD is superintendent of the Henry Adney mine, on Beacon Hill, Cripple Creek, Colo.

A. W. BOYD of Spokane, Wash., is in charge of the placer mines of the Erie P. M. Co. at Erie, B. C.

F. D. JOHNSON has resigned as manager of the Ivanhoe Junction mine at Kalgoorlie, Western Australia.

G. D. BLOOD is chief engineer for the United States & Nicaragua M. Co. at Yauli, Segovia, Nicaragua.

A. S. MILLS is superintendent of the Oriental group of copper mines at Cave Creek, Maricopa county, Ariz.

E. H. LIVEING is resident consulting engineer for the Associated M. Co. at Kalgoorlie, Western Australia.

J. WAGNER has resigned as superintendent of the Bonnie Bee M. Co., at Dutch Flat, Placer county, Cal.

W. H. BUNCE is chief engineer of the American M. Co., operating near Port Delrick, Cape Gracias, Nicaragua.

E. McCORMICK of Calumet, Mich., has returned there from an examination of placer mines in Colombia, South America.

O. H. FAIRCHILD of Denver, Colo., is remodeling the Marion-Geyser mill at Mercur, Utah, for New York capitalists.

J. J. MACDONALD is consulting engineer for the Seal of Gold M. Co., operating mines at Dale, San Bernardino county, Cal.

H. H. NICHOLSON at Sumpter, Or., is consulting engineer for the Morning G. M. Co., operating in the Greenhorn mountains.

W. W. GARRETT has been appointed professor of chemistry and metallurgy in the Missouri School of Mines at Columbia, Missouri.

A. F. RISING, recently of Madoc, Ontario, has accepted a position with the San Carlos C. M. Co. at Linares, Nuevo Leon, Mex.

G. J. LYON, C. E., has been appointed on the faculty of the civil engineering department of the University of Colorado at Boulder, Colo.

A. W. CONNER has accepted appointment as assistant professor of civil engineering in the Missouri School of Mines at Columbia, Mo.

W. BALLANTYNE of Central City, Colo., is manager of the Conqueror group of mines at North Empire, Gilpin county, near Central City.

H. SANGER, formerly in charge of the Uinta C. Co., is again manager of the company's mines and smelter at Vernal, Uinta county, Utah.

E. WALSER, formerly cyanide operator for the Dorcas mill, Florence, Colo., is metallurgist for the Montana Zinc Co. at Walkerville, Mont.

J. W. HOWARD, consulting, civil and mining engineer, has been appointed on the international jury of awards at the St. Louis Exposition.

H. COLVIN has resigned as superintendent of the Bamberger-De Lamar mill at De Lamar, Nev., to accept a place with the Utah C. Co. at Bingham, Utah.

H. M. DAVEY has severed his connection with LeRoi C. Co. Northport, Wash., smelter and has gone to Marysville, B. C., to build furnaces for a smelter there.

W. G. RAYMOND of Rennselaer Polytechnic Institute has been appointed head of the engineering department of the Iowa State University at Ames, Iowa.

V. B. SHERROD has resigned as manager of the Nuevo Australia & Nuevo Porvenir mines at Guanacavi, Durango, Mex., and will go to Guanajuato, Mex.

J. C. BARBER, recently with the Homestake M. Co. at Lead, South Dakota, has accepted position as superintendent of a mining company, operating at Ketchikan, Alaska.

G. D. DOVETON, after an absence of sixteen months, being engaged profes-

sionally by Creston Colorado Co. of Torres, Sonora, Mexico, has returned to Denver, Colo.

G. C. MASON, for twelve years past on the engineering faculty of New York University, New York City, has opened an office as consulting engineer at Portland, Oregon.

C. G. HYDE, C. E., engaged in engineering work at Pittsburgh, Pa., has been appointed assistant professor of sanitary engineering in the University of California at Berkeley, Cal.

G. M. FORD of Auburn, Cal., has gone to Korea to accept the position of superintendent of construction for the Oriental Con. M. Co., operating near Puk Chin, in Wunsan province.

T. P. RIGNEY of Salt Lake City, Utah, has retired from management of the Summit mineral wax mines at Soldier Summit, Utah, and will give his attention to personal interests.

SUPERINTENDENT T. H. SIMMONDS of the Bunker Hill & Sullivan mine at Wardner, Idaho, has gone to California, to be absent several months, and Foreman W. McDougal will act as superintendent.

G. G. LINDSEY of Toronto, Canada, third vice-president of the Crow's Nest Pass Coal Co., operating at Fernie, Michel and Morrissey, B. C., has been appointed general manager of the company's mines.

K. TAKENOUCHI, manager of the Kasaka M. & S. Co., operating copper mines at Rikichu, Japan, is examining smelting methods as practiced in Utah and Montana. He will visit Australian plants before returning to Japan.

MANAGING DIRECTOR A. J. McMILLAN has been appointed manager and J. W. Astley general superintendent of the Le Roi C. Co. at Roseland, B. C. A. I. Goodell is manager of the company's smelter at Northport, Wash.

R. BRONDEL, recently superintendent of the San Pedro copper mines at Tepetzala, Chihuahua, Mex., has been transferred by the Guggenheim Exploration Co. to the Descubridora mine at Durango, Mex.

H. W. REYNOLDS, for the past four years with the mechanical engineering department of the Michigan Agricultural College, has been appointed assistant professor of mechanical engineering in the University of California at Berkeley, Cal.

## Obituary.

WESLEY HUNTER, a pioneer mining man of Colorado, died at Idaho Springs, Colo., on the 8th inst., at the age of 68 years.

J. MITCHELL, a mining man of Idaho Springs, Colo., died on the 6th inst. Deceased was born in England forty-nine years ago.

H. N. MARTIN, superintendent of the San Marcial coal mines in Sonora, Mex., was killed in a raid by Yaqui Indians on a La Barranca stage last week.

FRITZ MILLER, a British Columbia mining man known as the discoverer of the Atlin, B. C., mining camp, died at Atlin on the 2nd inst. Deceased was a native of Germany about thirty years of age. He was one of the earliest of the Northern prospectors, going into the Yukon when fifteen years of age. Later he staked the first claim on Pine creek at Atlin.

P. MCCANN, a mining man of Colorado, died at Central City, Colo., on the 10th inst. Deceased was 59 years of age. He went to Colorado in 1886 and had been identified with mining and milling in Gilpin and Clear Creek counties most of the time since then. In the '80s he was milling in California gulch near Leadville. He was superintendent of the mines operated by the Kansas Burrows Con. M. Co. of Gilpin county.

## Books Received.

"Oil Engines" is the title of a profusely illustrated and practical treatise on the design and construction of oil engines by A. H. Goldingham, M. E. (second edition enlarged). The work treats on a large number of oil engines and their application to various uses, such as running dynamos, compressors, pumps and many other kinds of machinery. It contains instructions for running and repairing oil engines, and also numerous tables useful in making comparisons and computations. Price, cloth, \$2. Spon & Chamberlain, 123 Liberty street, New York.

## Latest Market Reports.

SAN FRANCISCO, September 16, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 26 $\frac{1}{2}$ d (standard ounce, 925 fine); New York, bar silver, 56 $\frac{1}{2}$ c, refined (1000 fine); San Francisco, 56 $\frac{1}{2}$ c; Mexican dollars, 47c San Francisco, 45 $\frac{1}{2}$ c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$12.75; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: \$57 5s spot per ton.

Copper remains almost unchanged, the small fractional changes being the result of a steady market and production. From present indications no material change need be anticipated during the next three months.

Following are the figures of the German consumption of foreign copper for the months January-July, 1904, as compared with the same period of time in 1903-1902:

	1904.	1903.	1902.
Import, tons.....	64,334	49,263	47,765
Export, tons.....	4,514	6,283	5,517

Consumption, tons. 59,520 42,980 42,248

LEAD.—New York, \$4.30; Salt Lake City, \$3.50; St. Louis, \$4.12 $\frac{1}{2}$ ; San Francisco, \$4.50, carload lots; 4 $\frac{1}{2}$ c 1000 to 4000 lbs.; pipe 6 $\frac{1}{2}$ , sheet 7, bar 5 $\frac{1}{2}$ c; pig, \$4.85. London: £11 16s 3d long ton.

SPELTER.—New York, \$5.20; St. Louis, \$5.00; London, £22 10s  $\frac{1}{2}$  ton; San Francisco, ton lots, 6 $\frac{1}{2}$ c; 100-lb. lots, 7c.

TIN.—New York, pig, \$27.42 $\frac{1}{2}$ @27.62 $\frac{1}{2}$ ; San Francisco, ton lots, 28c; 500 lbs., 28 $\frac{1}{2}$ c; 200 lbs., 29c; less, 29 $\frac{1}{2}$ c; bar tin,  $\frac{1}{2}$  lb., 30@32 $\frac{1}{2}$ c. London, £126 2s 6d spot.

PLATINUM.—San Francisco, crude, \$18.50  $\frac{1}{2}$  oz.; New York, ingot, \$19.00  $\frac{1}{2}$  Troy oz. Platinum ware, 75 @ 82c  $\frac{1}{2}$  gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, coil, \$41.50@42.50  $\frac{1}{2}$  flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6 $\frac{1}{2}$ c; extra, 17 $\frac{1}{2}$ c; genuine, 31 $\frac{1}{2}$ c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 17.75c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure,  $\frac{1}{2}$  lb., 50c; dust,  $\frac{1}{2}$  lb., 10c; sulphate,  $\frac{1}{2}$  lb., .04c.

NICKEL.—New York, 40@47c  $\frac{1}{2}$  lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.85 @13.20; gray forge, \$12.00; San Francisco, bar, 3c  $\frac{1}{2}$  lb., 3 $\frac{1}{2}$ c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c  $\frac{1}{2}$  lb.

### CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$14 75@15 00
Foundry Northern 1.....	13 75@14 00
Northern 2.....	13 25@13 50
Northern 3.....	12 75@13 00
Southern 1.....	13 65@13 90
Southern 2.....	13 15@13 65
Southern 3.....	12 65@12 90
Forge.....	11 90@12 15
Charcoal.....	14 50@15 00
Billets, Bessemer.....	23 00@23 00
Bars, iron.....	1 35@1 40
Bars, steel.....	1 51@1 51
Bars, standard.....	28 00@28 00
Rails, light.....	23 00@25 00
Plates, boiler.....	1 71@—
Tank.....	1 56@—
Sheets, 27store.....	2 17@2 22
Angles.....	1 46@—
Beams.....	1 46@—
Tees.....	1 51@—
Zees.....	1 51@—
Channels.....	1 46@—
No. 1 railroad wrought.....	11 50@12 00
No. 1 cast, net ton.....	10 00@10 50
Iron rails.....	16 00@16 50
Car wheels.....	11 00@11 50
Cast borings.....	4 00@4 50
Turnings.....	7 00@7 50

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6 $\frac{1}{2}$ c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails,  $\frac{1}{2}$  lb. above kegs price; in 1 and 5-lb. tin cans, 100 lbs. per case,  $\frac{1}{2}$  lb. above kegs price. Dry Lead.—In bbls., 1 ton and over, 6 $\frac{1}{2}$ c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35;

Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city  $\frac{1}{2}$  bbl.

CEMENT.—Imported, \$2.15@2.65  $\frac{1}{2}$  bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40  $\frac{1}{2}$  bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7 $\frac{1}{2}$ c; Hallett's, 6 $\frac{1}{2}$ c; San Francisco, 1000-lb. lots, 8c; 300/500-lbs., 8 $\frac{1}{2}$ c; 100-lb. lots, 10 $\frac{1}{2}$ c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15 $\frac{1}{2}$ c; less than one ton, 17 $\frac{1}{2}$ c. No. 1\*, 60%, carload lots, 13 $\frac{1}{2}$ c; less than one ton, 15 $\frac{1}{2}$ c. No. 1\*\* 50%, carload lots, 11 $\frac{1}{2}$ c; less than one ton, 13 $\frac{1}{2}$ c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9 $\frac{1}{2}$ c; less than one ton, 11 $\frac{1}{2}$ c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11 $\frac{1}{2}$ c  $\frac{1}{2}$  set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c  $\frac{1}{2}$  lb.; carloads, 23@23 $\frac{1}{2}$ c; in tins, 30c; soda ash, \$2.00  $\frac{1}{2}$  100 lbs.; hyposulphite of soda, 3@3 $\frac{1}{2}$ c per lb.; caustic soda, in drums, 3@3 $\frac{1}{2}$ c  $\frac{1}{2}$  lb.; Cal. s. soda, bbls., \$1.20@1.40  $\frac{1}{2}$  100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2 $\frac{1}{2}$ @2 $\frac{1}{2}$ c; powdered sulphur, 2@3c; flour sulphur, French, 3 $\frac{1}{2}$ @3 $\frac{1}{2}$ c; alum, \$2.00@2.25; California refined, 1 $\frac{1}{2}$ @2c; sulphide of iron, 8c  $\frac{1}{2}$  lb.; copper sulphate, 5 $\frac{1}{2}$ @5 $\frac{1}{2}$ c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66 $\frac{1}{2}$  B, 1 $\frac{1}{2}$ @2c  $\frac{1}{2}$  lb.; nitric acid, carboys, 8c  $\frac{1}{2}$  lb.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19 $\frac{1}{2}$ c; Astral, 19 $\frac{1}{2}$ c; Star, 19 $\frac{1}{2}$ c; Extra Star, 24c; Ecocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20 $\frac{1}{2}$ c; cs., 24c; Mineral Spermin, cs., 26 $\frac{1}{2}$ c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22 $\frac{1}{2}$ c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19 $\frac{1}{2}$ c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Spermin, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c  $\frac{1}{2}$  lb., 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c; Pittsburg, No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c  $\frac{1}{2}$  lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c  $\frac{1}{2}$  lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase,  $\frac{1}{2}$  lb., 7c; less than 500 lbs., 7 $\frac{1}{2}$ c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c  $\frac{1}{2}$  lb.

MOLYBDENUM.—Best, \$2.00  $\frac{1}{2}$  lb.

CHROMIUM.—90% and over,  $\frac{1}{2}$  lb., 80c.

PHOSPHORUS.—American,  $\frac{1}{2}$  lb., 70c.

SILVER.—Chloride,  $\frac{1}{2}$  oz., 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride,  $\frac{1}{2}$  lb., 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—Metal,  $\frac{1}{2}$  lb., \$2.75.

SODIUM.—Metal,  $\frac{1}{2}$  lb., 50c.

BISMUTH.—Subnitrate,  $\frac{1}{2}$  lb., \$2.10.

URANIUM.—Oxide,  $\frac{1}{2}$  lb., \$3.50.

FIRE BRICK.—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

ROCK DRILL.—No. 769, 465. Sept. 6, 1904. W.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

COMPOSING STICK TILTER.—No. 769,443. Sept. 6, 1904. S. Lack, Berkeley, Cal. This invention relates to improvements in typesetters' tools and particularly in means for supporting a composing stick in inclined position. The object of the invention is to provide a simple device to be carried by the stick capable of being folded out of the way when not in use, but being instantly at hand and easily applicable when needed.



# MINING AND SCIENTIFIC PRESS.

Whole No. 2305. — VOLUME LXXXIX.  
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SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 24, 1904.

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## The Difficulties of Concentration.

The object of concentration of ores is to collect the values occurring in a large mass of rock into a smaller mass, thus enriching it in proportion to the amount of concentration. By concentrating 6 into 1, or 20 into 1, is meant the collecting of all—or as much as possible—of the values in six tons of ore into one ton, or that in twenty tons into one ton. The subject of concentration is one which has engaged the attention of a large number of practical and scientific men, who have worked along lines often widely different, but with greater or less success. There are a great many concentrating devices and an almost equally great variety of the several types. There are bumping tables, shaking tables, buddies and inclined planes, stationary and moving; there are a dozen or more makes of belt concentrators having particular kinds and variable degrees of motion. There are jigs, of several kinds, with their accessory machinery. Spitzkasten and spitzluten are concentrating devices, and beside these there is a great variety of hydraulic classifiers, all depending for their operation upon the same principles. A smelter is necessarily a concentrator, for it reduces the valuable metallic contents of an ore to a lesser bulk and sometimes weight, often only a small percentage of the original volume of ore, while containing practically all of the values.

There is a large and very important difference in the facility with which various minerals concentrate, and to this difference is due most of the difficulties of concentration and probably the large number of different kinds of concentrating devices. Probably the least troublesome material to concentrate is pyrite from a clean quartz gangue. Chalcopyrite is less easy of concentration, owing to its inferior hardness and consequent tendency to slime. Galena, although softer than chalcopyrite, does not slime so readily, owing to its higher specific gravity and largely to the cubic habit of its crystallization, which may be detected in the finest particles of the mineral when examined under the microscope. All other soft sulphide and telluride ores slime more or less upon crushing, and as it is not uncommon to find several different kinds of sulphide minerals in a single ore, and the gangue may consist of several varieties of earthy mineral, such as quartz, calcite, heavy spar, etc. These complex ores render the separation of the valuable sulphides from the gangue often a difficult matter. The relative size of the particles of the several sulphides present, as well as of the gangue,



El Rico Mill, Mother Lode, California. (See Page 210.)



Hauling Timbers to the Mines. (See Page 210.)



Assay Office of El Rico Mine, Mother Lode, California. (See Page 210.)

is an important factor in concentration, and, in view of this, the method of crushing any particular ore should be carefully studied before a plant is installed. It may be said that, with a few rare exceptions, complete or satisfactory concentration of an ore can not be effected by a single operation. The ore must be crushed to a fineness which will free the valuable particles of the ore from the matrix, and this may be accomplished in stages—first coarse crushing, with a separation of the coarser fragments of valuable mineral, usually on jigs, followed by screening and recrushing of the lighter portion rejected by the coarse concentrating machines, for the purpose of further freeing the mineral from the gangue. Hydraulic classifying, to effect classification of sized ore particles,

is also an important factor in concentrating, and renders the subsequent operations on tables, belt machines and other devices much easier of accomplishment. There is too often a tendency to perform the entire concentration at a single operation on one machine. This in many cases is an impossibility; still the practice continues. One of the secrets of successful concentration is in avoiding the sliming of the material as far as possible, and when slimes result from mechanical crushing to remove them by classifiers from the remainder of the pulp, that each class may be treated separately, in a proper manner and each on a concentrating device suited to the character of material.

It is generally understood that all ores are adaptable to concentration by the smelting method, when mixed with suitable fluxes, but often this method is impracticable for various mechanical, physical, or economical reasons, and concentration by hydraulic method on the various devices above referred to is the natural consequence. For many years the art of ore dressing has been carefully studied and practiced in Europe, but for a long time, for commercial reasons, some of the methods employed there were deemed unapplicable to conditions in America. Now, however, adaptations and variations of the European methods have been adopted and in some instances American ingenuity has resulted in the devising of means to affect separations which were scarcely attempted in Europe. The electro-magnetic separator is a device which is of recent date, but is a pronounced success. It has rendered the separation of zincblende from its associated ores and gangue minerals possible when other mechanical means failed. Contemporaneously with this the "salt cake" process, for separating zinc from other sulphides was successfully introduced in New South Wales.



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## Broken Hill Report.

The half yearly report of the Broken Hill Proprietary Co. of New South Wales for the half year ending May 30, 1904, has been received and presents some interesting figures, and also indicates the wisdom of the policy which directs the operations of that large concern. As an instance may be mentioned the statement that the cost of development for the half year was \$115,000; equivalent to 36 cents per ton of ore raised. Included in this item was the cost of sinking the Delprat shaft to 1020 feet. This indicates a policy of carrying on development contemporaneously with ore extraction—one of the most important details of mining practice. The Broken Hill is now in its twentieth year, but this half yearly report shows that the tonnage produced exceeded by 5000 tons that of any similar period in its history, which again indicates the wisdom of a policy of carrying development so far in advance of extraction as to make this increasingly greater output possible. The tonnage produced was 305,512, of which all but 7194 tons consisted of concentrating ore.

A plant has been erected to manufacture sulphuric acid as a by-product from ore-roasting furnaces. Among other improvements, a plant has been installed for the purpose of separating zincblende from the complex ore of this mine by what is known as the Delprat "salt-cake" process, an invention of the manager. Each pan employed in the process treats 100 tons in twenty-four hours, the total capacity of the Broken Hill plant being 2000 tons weekly. This process is said to effect, in a wet way, results similar to those of the electro-magnetic separator. The history of Broken Hill has been a very interesting one. Originally the oxidized ores were high-grade lead ores, high in silver, with a large percentage of manganese oxide—typical smelting ores. The ores now mined are low grade, complex and difficult to treat. Concentration of sulphides, roasting of slimes and

separation of zinc are some of the manipulations through which these ores pass before smelting. The mine has paid over \$40,000,000 in dividends and it is still largely profitable.

## The Mining Law.

There appears to be a disposition to make radical changes in the existing Federal mining laws. That this may be done to advantage is believed by many, but in the contemplation of any changes in the laws such proposed alterations should be carefully considered, for ill-advised changes can only result in greater confusion and increased, instead of lessened, litigation. It must also be remembered that all mining claims located prior to any change will continue to exist under the laws obtaining at the time of location of such claims. The extralateral right is the most prominent cause of disturbance, and in this the relation of the end lines of a claim to the dip of the vein is an important factor. As long, however, as locators are permitted to lay out their claims in haphazard fashion, with the end lines at other than right angles with the side lines, and with no particular reference to the strike or dip of the vein, there may be expected the legal complications which have constantly arisen during the past years.

If the extralateral right is abolished in favor of square locations, or of those of any other definite form or size, then the first requirement of the mining law—the discovery of mineral in place—must also be abolished in order that the locator may acquire by location sufficient territory adjacent to his outcrop in the direction of the dip to justify him in erecting the large and expensive plant often essential to the economical development and operation of the property on a scale commensurate with its magnitude. This condition has been appreciated in Mexico, where not even a discovery is required, but the would-be locator who wishes to avail himself of the opportunity presented by the Government of acquiring undeveloped mining property simply makes his selection, which is viewed by a Government official. He may then take as many claims (pertenencias) as he wishes and pays an annual tax on the concession. He may or may not do development work, as he elects, but his title remains good as long as he keeps up his taxes. In Mexico, as elsewhere, the locator should be sure that the officially written description of his claim coincides with the boundaries of the claim on the ground—in other words, make sure he is getting the ground he selects; but this is a matter of detail. In the United States it is rarely the case that a recorder of a mining district visits a claim he is requested to record, before entering the same on his official books. The writer knows of but one recorder who made this his invariable rule, and he positively refused to make such entry until he had made a personal inspection and satisfied himself that the claim presented for record did not conflict with any other. There is no mining litigation of record in his district. In the contemplation of a change in the existing mining laws it would be well, perhaps, to give the above instance more than a passing thought. In a district where the recorder prevents encroachment of claims upon each other much litigation is avoided.

THE Congo Free State, in Equatorial Africa, has passed a law which forbids the use of any mining product, as prepared at the place of extraction, for payments, gifts, exchange, or any commercial transaction. Any person not being a concessionaire of a mine, or authorized by a concessionaire, found in possession of precious metals produced from mines in the Congo Free State, or engaged in conveying such metals, renders himself liable to imprisonment. This statute is aimed at those who systematically steal gold specimens, diamonds and other valuable mineral products, and those who buy them from the purloiners. The law was doubtless suggested by similar laws in South Africa. In the United States there are abundant laws making theft of any kind punishable, but it would be inexpedient, if not impossible, to pass and enforce a law making it a misdemeanor to have valuable minerals of any kind in one's possession, unless such person were the owner or operator of a mine. Yet there are some districts where the strictest vigilance is necessary to prevent misappropriation of specimens.

## The Drainage Tunnel in Mining.

There is no factor in the economics of mining more important than the inexpensive handling of underground water. In some mines it is an expense exceeding all others, and in still other mines the volume of water is so great as to render profitable mining impossible. Wherever there are great quantities of water to handle, and the cost of drainage is excessive, it is good business to run a tunnel for the purpose of handling the water by gravity instead of mechanically. The tunnel, once driven and properly timbered, is no longer a source of expense, but a means of economy in the operation of the mine. In addition to this, it affords a means of ventilation superior to any other, and also a comparatively inexpensive means of transportation of ores and materials from and into the mine. There are many districts where tunnels are either inexpedient or impossible, owing to the topography of the country, and still other places where drainage by tunnel will solve the water problem, but its advantages are either unappreciated or the mine owners cannot agree upon a concerted plan of action and equitable division of expense.

The driving of long tunnels by private enterprise, for drainage and transportation purposes, on a basis of contracts previously secured, has met with some unfortunate experiences, and capitalists are slow to appreciate the rather uncertain advantages to themselves in undertaking enterprises of this character. The greatest drainage tunnel in the United States is the Sutro tunnel draining the Comstock lode at Virginia City to a depth of about 1750 feet. Only those who have stood on the bank of the Carson river east of the mouth of the Sutro tunnel, and looked up at the great mountains of trachyte which lay between him and the outcrop of the lode at Virginia City, can understand what a gigantic undertaking the financing of such an enterprise at such a time was. The work was undertaken and continued to a successful issue, but it was a constant hard fought battle—an unequal war between the determination and courage of a few men and physical, financial and legal obstacles. The main tunnel is a little over 20,000 feet in length, and the lateral branches along the lode about as much more. Without doubt were it not for the Sutro tunnel the Comstock would have been deserted years ago. This is, as has been said, the most noted mine drain tunnel in America, if not in the world, but there are other great tunnels, the advantages of which are fully appreciated by those who have benefited by their existence. In the early history of the Ontario mine, at Park City, Utah, a drainage tunnel was run which relieved that mine to the 600 level of a large and constantly increasing volume of water. Later a second tunnel was started, to drain the mine to the 1500 level. This tunnel is now in 17,000 feet, has cost over \$600,000 and is to be driven 3000 feet more into and through the Daly-West ground, which will give this tunnel a total length almost equalling the main Sutro tunnel, and all done by private enterprise. In the Cœur d'Alene district of Idaho, the Bunker Hill & Sullivan Co. have driven a drainage and transportation tunnel 12,000 feet in length, and it has resulted in greatly cheapening the cost of mining at that property. The Yak tunnel at Leadville, Colo., is in about 12,000 feet, and is one of the most important features in that district, both from an engineering and economic point of view. At Cripple Creek, Colo., the drainage adit, known as the El Paso tunnel, has proven of inestimable value to the development of mining in that district, and a lower and longer tunnel is now being seriously considered to render accessible the deeper ore bodies of that district. In the Bingham district of Utah the Dalton & Lark tunnel, known as the Mascot, is in over 6000 feet, and the Honerine tunnel at Stockton, Utah, is in 6000 feet and being driven to 7000 feet. In Colorado there are numerous instances of the great benefit derived from drainage tunnels, among them that at Creede, which drained the mines on Bachelor mountain. Beside the above there are numerous other drainage adits in mines elsewhere, and in one instance, at least, that of the mines at Clausthal, Germany, a drainage tunnel is provided with gates and boats are floated into and from the mine and used for transporting ore and materials.



## CONCENTRATES.

WATER PIPE is usually tested to 300 pounds pressure per square inch before delivery.

THERE is more friction on the face of a wooden pulley than on that of a cast iron pulley.

GENERALLY speaking, about 7.5 gallons of water per horse power per hour are required for steam making in boilers.

THE water-jacketed melting furnace is not a "new" institution. It is mentioned in Overman's Metallurgy as being in use over fifty years ago.

WHERE slipping occurs on the brakes of hoisting engines, oil or grease is not recommended. Chalk aids the brakes to hold and is not injurious.

THE metric gram weighs 15.432+ grains. The legal value of the gram in the United States is 15.432 grains. A new 5-cent nickel weighs 5 grams.

ANY heavy piece of iron that affords a secure rest for the end of a drill will do for swaging machine drills, but no substitute is as convenient as the notched sole plate made for this purpose.

THE volume of a cone-shaped tank may be ascertained by the following formula, from Trautwine: Volume =  $\frac{1}{3} \times \text{perpendicular height} \times (\text{area of top} + \text{area of base} + \sqrt{\text{area of top} \times \text{area of base}})$ .

WHERE A locates a placer claim, whether he may know of the existence of a quartz lode therein or not, B may not enter A's claim to prospect for a vein or to locate one should he know of such, as he would be a trespasser on A's claim.

BLOW HOLES in iron castings may be filled with a mixture one part gum arabic, one part plaster of Paris and one part iron filings mixed with a little water. This, when dry, becomes hard and the hole will be scarcely noticed if properly filled.

AS URANIUM and other radio-active minerals become better known to prospectors, it may be anticipated that they will be found in many places where not at present suspected. Uranium ores occur in several localities in the Black Hills of South Dakota.

A SINGLE diamond drill hole is likely to give misleading information. Prospecting with the diamond drill may be carried on to great advantage if it be done systematically, but holes sunk at random, with no care as to the record of results, is of little value.

WHEN the ventilation becomes poor in the mine and no connection can be made with other workings which will afford natural ventilation, it is time to increase the size of the ventilating fan if it is running to its capacity. It may be necessary to provide more power also, but this should not stand in the way.

WHEN the drills can no longer be tempered the steel has probably been overheated and the carbon burned out. The ends should be cut off 3 or 4 inches from each drill and new bits forged on them, then in the future avoid too high heat in the forge. The overheating was probably done in heating to forge, and not to temper.

KUNZITE is a transparent lilac-colored spodumene, a lithia-bearing aluminous silicate. Its discovery is of comparatively recent date. It occurs in pegmatite together with other lithia-bearing minerals, notably lepidolite and amblygonite. It is used as a gem stone, and its value is determined, as in other gems, by its purity, freedom from flaw and its size.

A QUICK and convenient method of ascertaining the tonnage of solution in a tank is to calculate the tonnage of the tank when full. Divide this into feet and inches in height. A measuring pole should be made by painting a foot and inch scale on it, marking the tonnage. Then by immersing the measuring pole in the solution the depth in feet and inches will at once tell the amount of solution in tons in the tank.

CONCENTRATES said to contain \$150 to \$200 per ton, the greater part of the values being in silver sulphide (argentite), are treated at the Woodstock mine in New Zealand by the cyanide process, by the agitation method. The concentrates are agitated for thirty-six hours with a 4% cyanide solution. Two pounds of lime are added for every ton of concentrates. The charge treated is usually  $1\frac{1}{2}$  ton. The actual recovery is stated to be 90% to 94%, at a cost of about \$4.50 per ton for materials and labor.

THE ton according to the United States Statutes is 2240 pounds or twenty hundredweight of 112 pounds each. This is called the long or gross ton. The ton of 2000 pounds is called the short or net ton. The bloom ton contains 2464 pounds + two hundredweight of 112 pounds each; and the pig iron ton had 2268 pounds or

2240 pounds + twenty-eight pounds "sandage" to each "quarter," allowing for the sand adhering to the pigs of iron. In electric traction and hoisting the ton contemplated 2000 pounds.

BUT two sections in the United States produced lithium materials in 1903—Pala, San Diego county, Cal., and the Etta and Bob Ingersoll mines, in the Black Hills, S. D. The minerals mined were lepidolite and spodumene (both silicates) and amblygonite (lithium phosphate). The Pala lepidolite carries about 5% lithium oxide and amblygonite from Pala 8.3%. Spodumene is obtained principally from the Etta mine, in the Black Hills. The production of lithium minerals for 1903 was 1155 tons, valued at \$23,425 at the railroad. The uses of lithium are limited, being mostly for medicines.

WHERE several persons hold a mining location in common and the annual assessment work is left undone, one of these co-owners cannot re-locate the claim as against his former partners. One of them may perform the assessment work to the extent required by law, thus saving the claim for all, and he may then demand from the several co-owners their share of the expense. Then, if refused, he may proceed to "advertise out" his partners in the manner prescribed by law, but he may not re-locate in his own name, as against the others, any more than he can profit by his own negligence by a re-location alone and fail to perform the necessary work.

WHEN sinking was discontinued at the Combination shaft of the Savage, Hale & Norcross mines on the Comstock lode of Nevada, it had reached a vertical depth of 3250 feet. This was March 28, 1882. It was at that time the deepest shaft in the world with the single exception of that on the Adelbert mine, Bohemia, which was down 3280 feet. Since that time a number of shafts have been sunk to greater depth, notably in the Lake Superior region. The Combination shaft above mentioned is one of the few deep vertical shafts still open on the Comstock. The Yellow Jacket and Foreman shafts, both deep vertical openings sunk at the cost of several millions each, are caved and probably will never be reopened.

COMMERCIAL ASBESTOS is mainly of two varieties, chrysotile and amphibole, the applications of the latter being limited to where a very short fiber or a ground product is used. The uses of asbestos are numerous and constantly increasing, a few being fire screens, partitions, ceilings, stove linings, pipe coverings, electrical insulation, cloth, theater curtains, gloves for furnace-men, glass workers' shovels and baking screens, fire-proof paints, and packing for fireproof safes. When asbestos is used for electrical insulation, in case of short-circuiting the "burnout" is confined to one channel and one wire. Canada is the largest producer of asbestos, most of the output going to the United States. In 1903 Canada produced 42,328 tons, value \$904,852. The United States in 1903 produced 887 tons, value \$16,760.

THE usual method of computing the capacity of an air compressor is to multiply the sectional area of the intake cylinder in feet by twice the length of stroke of the piston, in feet, and this product by the number of revolutions per minute at which the machine may be run. This will give a rough approximation of the capacity of the compressor, and is based on the assumption that the piston is double acting, and gives the result of the number of cubic feet of free air per minute—deduction being made for the volume of the piston rod. To obtain the actual capacity of the compressor, however, requires a careful test, which may be best made with the use of indicator cards. The number of atmospheres for a final pressure is determined approximately by adding fifteen pounds to the gauge pressure and dividing by fifteen.

THE business of a company organized under the laws of the State of Colorado, or Territory of Arizona, or other foreign State or Territory, and doing business in the State of California, is conducted in accordance with the laws of the State in which it is incorporated. If the stock is non-assessable, as in Arizona, it is non-assessable in California; but no stock is non-assessable of corporations organized under the laws of California, no matter what directors or others may promise. However, the stockholders of all corporations operating in California, and organized under the laws of a foreign State, are subject to the personal liability of stockholders provided for in the corporation laws of California, it being the evident intention of the law not to give the stockholders of foreign corporations an unfair advantage over corporations organized in California.

TO give amalgamated mill plates a final cleaning at the end of a run, the amalgam may be softened by covering the plates with gunny sacks and then pouring over them scalding hot water for several minutes. Or a quantity of sand may be heated and piled on the plates. The heat softens the amalgam and greatly facilitates its removal from the plates with steel scrapers. Good scrapers may be made from old flat mill files. In using them care should be taken that the silver plating is not removed as well as the amalgam. This "sweating" of plates, as it is called, should be only done when it is intended to hang up the mill for an indefinite period. The weekly or monthly practice of sweating is not to be recommended, as it not only takes time and hard labor, but it removes what is most desirable in a plate for sub-

sequent amalgamation, that is a film of gold amalgam on the plate. No surface is superior or equal to that of gold amalgam for catching more gold. Most mill men in their eagerness to make a good cleanup overlook this important point and scrape the plates too close.

THERE is no limit to the number of mining claims a locator may take for himself or for others. Placer claims cannot exceed twenty acres in area, but an individual may take as many twenty-acre claims as he can find unappropriated, and an association of eight or more persons can take not to exceed 160 acres in a single claim. They may take as many claims of 160 acres each as they desire. On each tract of twenty acres the individual locator must perform \$100 worth of work annually, but the association of persons need perform only \$100 worth of work on each claim of 160 acres. Where there is a group of quartz locations, these several locations cannot be considered a single claim, on which \$100 worth of work will suffice, as is the case with the 160-acre placer claim, but \$100 worth of work must be annually performed on or for each claim 1500x600 feet or less.

A STEEL CORE in a hoisting rope adds from 7% to 10% to its strength, but it is customary to insert a hempen core in ropes used for hoisting, as this greatly lessens the wear, due to bending of the rope over sheaves and drums. Where high speeds are employed it is advisable to have sheaves and drums of large size. The standard rope is made of six strands, each formed by twisting nineteen wires together about the hemp or steel wire center. Inferior steel ropes are not as serviceable as those of good iron. When the wires composing a strand and the several strands are twisted in the same direction it is known as a "lang" rope. Where great flexibility in a rope is desired it is customary to make the several strands of wire ropes which are made of twisted wires, as in the case of tiller ropes. No great flexibility is required in standing ropes like those on which buckets are drawn by a hauling wire on aerial trams.

IT is known that dilute cyanide solutions have a direct effect on many sulphides. Experiments have shown that chalcocite, when finely crushed and treated with a 0.03% solution, will within an hour yield a portion of the copper to the solution. Copper glance acts in much the same manner, copper being present in the solution in the form of cyanide. Covellite, a sub-sulphide of copper, is attacked even more readily than the sulphides, a sulphocyanide of copper. The carbonates and oxides of copper are attacked freely. Stibnite (antimony sulphide) is affected by cyanide and is one of the most objectionable of minerals in cyanide treatment. Some chemists assert that, if first treated with a solution of sodium sulphide, the antimony will be dissolved and carried away in the wash water. A part of the sulphur of stibnite has a tendency to combine with the potassium of the potassium cyanide, forming sulphide of potassium, the remainder of the sulphur forming, with the cyanogen, sulphocyanogen. Galena (lead sulphide) is attacked slowly by cyanide solutions, but its sulphur forms sulphocyanogen; zinc blende is not materially affected, but the experiment of placing a strip of bright silver among the ore showed that decomposition takes place, as the silver was blackened. Pyrite is scarcely, if at all, affected by cyanide solutions.

IN a few mills, mostly in Australia, gold is precipitated from cyanide solutions in filters of charcoal. In some plants the charcoal—finely granulated—is packed in barrels and in others it is placed in hopper-shaped boxes. James' "Cyanide Practice" says: "One hundred and forty-four tubs are required to precipitate 400 gallons of solution per hour, so that at a plant of 800 or 1000 tons a day capacity, 2000 regulation tubs and no less than forty regulation furnaces for burning the charcoal would be required, and the ash remaining at each cleanup would weigh ten tons, containing, say, 1% gold. The fusion of a large quantity of light ash would not only require large amounts of flux, but would probably be attended with considerable loss of gold." It is probably due to the above mentioned difficulties that charcoal precipitation is not in more extended use. At Mount Morgan, Queensland, Australia, where the ores are treated by chlorination, precipitation of gold from the solutions is successfully effected by means of charcoal filters of pyramidal shape, made of wood and lined with sheet lead. These hoppers, sixty-four in number, each contain a layer of charcoal 2 feet 6 inches deep, placed on a perforated board covered with cheese cloth, and kept from floating by a perforated sheet of lead. Before being placed in the filters the charcoal is crushed to pieces about one-sixteenth of an inch in diameter, and the fine dust rejected. The solution introduced at the top percolates through the charcoal, depositing the gold in a finely divided condition, on the surface and in the pores of the charcoal. Occasionally some gold escapes in the solution and this is delivered to a filter of sawdust where the further precipitation of gold is completed. At these works numerous methods of precipitation were tried and each rejected in favor of the charcoal. Among other things experimented with were sulphate of iron which was discontinued because the spent liquor was not available for reuse, and because of the large area of precipitating tanks required; sulphurous acid and sulphureted hydrogen also were rejected, as a slight excess remaining in the spent liquor would precipitate gold in the leaching vats; and sulphide of iron was rejected because of the formation of ferrous sulphate.



## The Desert Dry Lakes of California.

NUMBER V.

Written for the MINING AND SCIENTIFIC PRESS by  
G. E. BAILEY, E. M.

The importance of the California deposits is only emphasized and increased when compared to the world's production of borax, which is shown by the following table taken from Bulletin No. 24:

GENERAL PRODUCTION OF BORAX.  
(Metric tons).

Year.	United States	Chili	India	Germany	Italy	Peru	Turkey.
	Calcium Borate.	Calcium Borate.	Borax.	Boracite.	Boric Acid.	Calcium Borate.	Pandermite.
1894..	5,950	6,700	367	176	2,746	800	9,100
1895..	6,126	4,532	400	150	2,633	4,000	9,081
1896..	12,310	7,486	340	184	2,616	1,179	12,626
1897..	17,600	3,168	280	198	2,704	11,850	11,375
1898..	13,911	7,034	184	230	2,650	7,178	.....
1899..	21,834	11,951	.....	183	2,674	7,638	.....

Reduced to percentage and rank this table shows as follows: In 1894 Turkey ranked No. 1 and produced about 32% of the whole amount; No. 2, Chili, producing about 26%; No. 3, the United States, producing only about one-quarter of the world's supply; No. 4, Italy, about 11%; No. 5, Peru, about 4%; No. 6, India, with about 2%, and last of all Germany, with only about one-half of one per cent.

In six year's time this condition of affairs had wholly changed. The United States has leaped from the third to the first place, producing over 50% of the total amount of the world, followed by Chili which produced about 30%. Peru produced about 11% and Italy about one-third as much as Peru. Germany stood still at one-half of one per cent, while Turkey, the former leader, dropped out of the race in 1897, followed by Italy which ceased operations in 1899. It will be seen from these facts that California produces over one-half of the world's supply of borax. If this rate of increase of production is maintained for a few decades, the next generation will have to import their supplies instead of depending on home resources; unless steps are taken to conserve the contents of the dry lakes or saline lakes of this country.

In this connection it will be well to consider briefly the nature of the foreign sources of supply. In speaking of the foreign sources in general the Mineral Industries says:

The foreign sources of borax are the following: The Tuscan Hot Springs; the ulexite bed at Suzurlu, in Asia Minor; the alkaline beds in South Tibet; the small deposits in northern Chili, in the region ceded by Bolivia after the late war; and the salt mines in Stassfurt, in Germany.

Considerable quantities of stassfurtite are annually afforded by the salt mines at Stassfurt, Germany. The mineral occurs in small masses, from the size of a barley corn to that of a bean, imbedded in the salt.

This source is too limited to enable this country to become a producer of note. There is very little information accessible in regard to the source of India's supply.

It is obtained from the alkaline basins or deserts of that region and is brought to northern India. While it is the oldest source of supply of this material, very little is known definitely about the occurrence or extent of the deposits.

They seem to be dry lakes similar in origin and character to these of California. Italy produces no borax, but has a limited supply of boric acid from which borate of soda (borax) can be made. The third annual report of the State Mineralogist of California, 1883, contains an account of the occurrence of the acid from which the following notes are quoted:

The boric acid of Italy comes from the districts of Volterra and Pumarance, in the province of Pisa. Near the town of Marbo there are about forty hot springs whose waters contain boric acid, the acid being obtained by conducting the steam into vats where the acid is crystallized from the vapor. These springs are called "Lagioni," which has held to the idea that the source of the Italian borax was lagoons or lakes, which is not the case.

The only other locality mentioned is as follows:

Boric acid is also found in the waters of the small lake of Monte Rotondo in Italy, from which it is recovered by evaporation. As this lake has only an area of about eighteen acres, it is not of special importance.

The only mention in the Mineral Industries is as follows:

Italy—The product is sassolite or crystallized boric acid, from which borax is made with soda.

The deposits of Peru and Chili are found in "dry lakes" similar to those in California. Mineral Industries says:

Peru and Chili—Both of these contain the borate or dried-lake bottoms, in association with various alkaline salts, and practically described for California.

In a report published three years later is the following:

One of the most important of the earliest sources of borax are the deposits of Ascotan and Maricunga, north of Copiapo in Atacama, Chili, where ulexite, known locally as "tiza," occurs in old lake beds in layers alternating with layers of salt and salty earth. A recent British consular report contains the following interesting particulars about the Maricunga borax district. The lake where the borax is found measures 32½ kilometers from north to south and 20 from east to west, giving an area of 650 square kilometers. Uppermost is a layer of salt 20 centimeters thick, mixed with clay and mud, and below this a layer 24 centimeters thick, averaging 27% boric acid. Below the layer of borax is another of a mixture of borate of lime, soda and clay, impregnated with iron. Below this again is another layer of borax 9 centimeters in thickness. The quantity of borax in the unexplored part is calculated at 69,000,000 tons. A railway line passing through this district was recently surveyed, and its construction is now under consideration.

It is evident from the above that Chili and Peru are the only rivals of importance that California and Nevada have; and that the world's supply must be obtained from these two regions in North and South America.

VALUE OF THE SODAS.—So far attention has been called more especially to the borax because it is a

heard of the "alkali deserts" of the West, and the sight of plains covered with a sandy-like mantle of salts is familiar to every transcontinental traveler. These salts are mainly sodium carbonate, sulphate and chloride, sulphate predominating on the eastern side of the basin, carbonate on the west side, chloride, as in the Great Salt Lake, occupying the central position. Of course this division is only approximate, and the salts are generally mixtures of all three.

It is not necessary to go into voluminous details. Two or three quotations are sufficient to show that the value of the natural sodas of California is recognized in the commercial world, and that this industry is already well established. Quoting from the Mineral Industries nine years later than the date of Prof. Chatard's report, as quoted above, we read:

There was a considerable production of sodium carbonate in 1900. The production, reduced to a basis of 58% ash of natural soda in the United States, came from California and Nevada, and amounted to 14,000 short tons (\$195,300), as against 10,500 short tons (\$147,000) in 1899. The producers were the Inyo Development Co. of California and Nevada, Griswold & Epperson of Wadsworth, Nev., and Occidental Alkali Co. of Hawthorne, Nev. \* \* \* And for the following year (1901) we find the production of sodium bicarbonate, reduced to the basis of 58% ash, was about 15,000 short tons (\$197,000), as against 14,000 short tons (\$195,300) in 1900. The production continues to come from California and Nevada.



Evaporation of Salt in San Mateo County, Cal



Salt Making Near Redondo Beach, Los Angeles County, Cal This Small Lake Was Formed by the Building of a Sand Spit Between the Mainland and the Ocean.

rare and unique mineral that cannot be produced in chemical manufactories except from natural borates. Boric acid, borate of lime, or crude borate of soda, must first be taken from some one of nature's storehouses as the basis of the manufacture, and, as already shown, such storehouses are rare.

Carbonate and bicarbonate of soda, and sulphate of soda, have been made for many years from salt, soda, ash, etc.; but this artificial method is more or less expensive. The discovery of "natural soda" a couple of decades ago has not only helped the manufacture by lowering the cost of production, but also the consumer by lowering the price. The principal sources of supply of the United States are the lakes in the California and Nevada portion of the "Great Basin." Prof. Thomas M. Chatard, the chemist of the United States Geological Survey at Washington, D. C., spent some months at these deposits in California and Nevada and has made a special study of them, and is considered the leading authority on "natural sodas" in America. He says:

Natural soda is the residue obtained by the evaporation of natural alkaline waters without the aid of artificial heat. It is composed of sodium carbonate and bicarbonate in varying proportions, mixed with impurities, mainly sodium chloride and sulphate. It is found to some extent in all dry regions, such as Hungary, Egypt and the deserts of Africa and Asia; but nature has been especially bountiful to the United States in giving us a most valuable source of national wealth in the despised and detested "alkali dust" and "alkali water" of the Great Basin. \* \* \* Everyone has seen or

The production of soda in the United States for the year 1901 was 480,000 metric tons, as compared with 390,000 tons for the year 1900, and the imports for 1901 were 24,859 tons. A total of 15,000 tons from the natural soda deposits of the Pacific coast is not large when compared with the total production by artificial processes in the East; but it shows that the industry is well started; that the demand is enormous, and that the soda industry of the West may soon rival that of the rest of the world, just as borax has. The enormous consumption of artificially produced soda carbonates plus the importations show a demand that makes the deposits of natural sodas in the West most valuable. As the population of the country increases, the consumption of such an article as soda, used daily by every family, must rapidly increase, and all natural soda deposits must become more valuable as the consumption increases. Dr. Chatard, looking into the future, says:

It is not improbable that the natural soda fields and springs of the western United States will be in time an important factor in regulating and probably depressing the market.

OTHER SALINES.—Before leaving the question of the value of these deposits of borax and natural sodas, we wish to call attention to the fact that borax and carbonates of soda are not the only valuable salines that they contain. The numerous analysis scattered through the reports on these "dry lakes" of the California State Mining Bureau and the United States Geological Surveys show that these saline deposits



also contain large quantities of compounds of magnesia and potash, sulphate of soda and more or less of the rare iodine and bromine. All of these will be utilized in the near future, as chemical manufactures increase on the Pacific coast and attention is paid to the by-products of these saline lakes.

(TO BE CONTINUED.)

## Milling of Auriferous Ores in New Zealand.\*

NUMBER II.

Written by H. A. GORDON.

There are different opinions as to the weight of stamps that should be used. Until within the last four years the weight of each stamp in any of the batteries did not exceed 800 pounds, but it is generally held now that it is more economical to have stamps of 1100 pounds, as they do better work, the height of drop depending on the hardness or friability of the ore to be crushed. As a rule, a low drop and quick action give the best result in forcing the pulverized ore through the screens. The stem, 15 feet long, 3½ inches in diameter, weighs 482 pounds; the head, 20 inches long, 9 inches in diameter, 350 pounds; the shoes, 9 inches long, 9 inches in diameter, 159 pounds; the tappet, about 130 pounds. This makes a total weight of 1121 pounds.

Whatever height of drop is determined, the stamps should be driven as fast as possible, so long as the tappet does not fall on the cam. This speed can be ascertained mathematically from a formula which gives the following speed:

Drop of	Drops per Minute.
4 inches	118.3
5 inches	110.5
6 inches	104.8
7 inches	99.8
8 inches	95.3
9 inches	91.5
10 inches	88.2
11 inches	85.3
12 inches	82.0

The coefficient is from experiments made in actual working, which showed that 0.21 of a second was the period that the stamp required to be at rest in order to obviate the tappet striking the cam. That is, the stamps can be run at the speed mentioned with perfect safety.

In some mills where the batteries are placed on level ground a hydraulic hoist is used to lift the ore to the bins, or, if it has gone through the rock breaker, it is lifted and dumped on to a grizzly; but where the ground will admit the mine trucks are run on the top of the grizzly platforms.

In the older mills the stems are screwed at a place where the tappets are fixed, with a key-way cut in the stem, so that a vertical key can be driven in where the tappet is placed to the required height; but in all the modern mills the stems are without the thread from end to end, and the tappets are held to the stem with three cross-keys. The most modern mills in the colony have been supplied by the Allis Chalmers Co. of Chicago and London.

A jack shaft about 3 inches in diameter rests on brackets bolted to the frame, having finger bars.

The mortars for heavy stamps are generally of the Homestake pattern, weighing about three tons. The mortar bed is from 7 inches to 9 inches thick, and the sides at the bottom of this 4½ inches; the inside dimensions being—width at the bottom, 10½ inches; length, 4 feet 3 inches, with a total height of 4 feet 8 inches. Arrangements are made for having a chuck-block covered with silver plate inside the mortar box for collecting amalgam; but in many cases this is not used. All the dies and shoes are made of steel, which is found to be more economical than those made of chilled white iron, as they last longer and wear more evenly.

The screens generally used are made of iron wire gauze of from 20-mesh to 60-mesh, according to the quality of the ore under treatment. In the majority of mills in the north island a 30-mesh to 40-mesh screen is used, but in some cases where the gold is very fine in the matrix the ore goes through a 60-mesh screen. In the south island the gold is generally in much coarser particles, and therefore a coarser mesh screen is used. In most of the old mills the screens used are made of punched charcoal sheet iron.

The amalgamating tables are generally about 5 feet wide, constructed on a gradient of from 1½ inch to 1¼ inch to the foot, and vary in length from 9 feet to 12 feet. There is a grooved ripple near the head of the tables, below which they are covered with copper plates, or in some instances plates of muntz metal coated with quicksilver. In modern mills the copper plates are about ¼-inch in thickness, in some instances electroplated with one ounce of silver per square foot; but some millmen prefer to scour the plate and coat with quicksilver themselves. In any case, the plates require to have an even and smooth surface, and to be laid down on the table perfectly level transversely. In the early days of gold milling the amalgamating tables were covered with plates of very thin copper, which were liable to buckle and form an uneven sur-

face, which is a very objectionable feature in securing good amalgamation. In removing the amalgam the plates are slightly scraped, and when once they have a thin, hard coating of gold amalgam they are in a far better condition to save gold.

In regard to the quantity of water required millmen have different opinions. This, however, has to be regulated in proportion to the gradient of the tables and the character and quantity of the crushed ore. The crushed material requires to pass over the plates in an even and thin film, with as little water as will keep them clear.

In some mills the pulp from the tables passes into spitzkasten and spitzluten, as in the case of the Kauri Freehold Co.'s mill at Gpitonui; the overflow is lifted by 2-wheel elevators and deposited in the percolating vats to be treated with cyanide solution, while the coarse sands are reground in a mill before they are subjected to cyanide treatment. In the south island the pulp from the tables of the Progress mines of New Zealand mill, at Reefton, passes through an amalgam trap on to vanners, where the ore is concentrated, two vanners being used to every five head of stamps, while the sand and slimes from the vanners are carried away in a chute and distributed over a large plant of canvas-covered tables, where a further concentration takes place. These tables are constructed in 3-foot divisions and 12 feet long, on a gradient of about 2 inches to 1 foot. There is a small sluiceway in the main chute, which can be regulated to let out the necessary quantity of sand and water on a distributor at the head of each table. The pulp is allowed to run over the tables in as thin a film as possible. These are covered with fine duck. Each four divisions are constructed level transversely, and the next four divisions are at a slightly lower level, so as to correspond with the gradient of the chute carrying the sands and slimes from the mill. This chute is carried down along the head of the tables, so that each set on the downward grade has to be at a lower level to allow the pulp to be run over them. The fine sand and slimes flowing over these tables are carried away into the river by the tail water from the turbines which drive the machinery of the mill.

After allowing the water to pass over the tables for about two hours the headgates in the main chute for one set of tables are closed, and the fine concentrates lying on the canvas are washed down with water from a pressure hose into a small chute, which conveys the concentrates into a tank at the lower end of the tailing plant, where a small centrifugal sand pump is placed. This forces the water and concentrates into a trough or tank at a higher level near the roasting furnace. The concentrates are removed from this trough and stacked ready to put through the roasting furnace previous to chlorination.

In the north island the tailings or pulp passing over amalgamation tables is run into percolating vats, where it is treated with cyanide solutions.

In regard to the pulp after it leaves the amalgamating tables, it depends on the class of ore as to what treatment it is subjected to. If it contains much sulphurets it has to be concentrated, the concentrates roasted, and the roasted ore treated by chlorination or by cyanide solution. In the north island the large percentage of silver alloyed with the gold in the ores cannot be extracted unless the ore is roasted and thoroughly chloridized, and the ores are in general of too low a grade to pay for roasting. The only place where a roasting furnace is attached to a large mill is at the Progress mines of New Zealand mill at Reefton. The general system in the north island is to treat the pulp by cyanide solutions.

The size of a cyanide plant depends on the quantity and character of the ore, the general practice being to have a dissolving tank, standard solution vat, percolating or leaching vats, sumps, agitation vats, zinc precipitation boxes, solution pump, vacuum chamber and air pump, melting and roasting furnace, and laboratory.

A dissolving tank only requires to be a small one, sufficient to dissolve the KCy; it may be made 3 feet, 4 feet, or 5 feet in diameter, and from 2 feet to 3 feet in depth. The salts are, in some plants, placed on a perforated tray after being broken up in small pieces. The tray is suspended in the tank by having a wire rope attached to the tray and on a pulley overhead; the shaking of the tray in the tank greatly facilitates the solution of the salts. When the salts are dissolved the liquor is run into a standard solution tank, where the strength is made up to from 10% to 15% of KCy, or whatever strength is decided on. One pound of pure salts dissolved in ten pounds of water will give 10% KCy solution.

The leaching or precipitation vats are in general constructed of steel plates and coated with a mixture of tar, pitch, and kauri gum. The dimensions of the vats vary considerably—from 20 feet to 50 feet in diameter, and from 4 feet to 7 feet in depth. Some of the vats belonging to the Waihi Co. at its Waihi mill are made of concrete, 50 feet by 50 feet, and about 4 feet in depth; but the more recent vats constructed by this company are all circular and made of steel plates. At the bottom of each vat there is a filter frame constructed of wooden slats 1 inch wide, notched together so that all the divisions are 1 inch square. These frames are made in sections so as to be easily handled; in large vats there

may be eight sections in one filter frame. This frame is kept up about 3 inches above the bottom, and when laid down has to be about 2 inches less diameter than the bottom of the vat. A filter of cocoanut matting and hessian cloth is laid on the top of the filter frame, and held tight against the vat by having a rope tightly packed into the space between it and the edge of the filter frame. Two pipes 2 inches in diameter are generally placed in each vat, with brass cocks to draw off the filtered solution to the zinc precipitation boxes. In the early cyanide plants a filter bed made of gravel was laid on top of the filter frames; but these beds very soon became so impervious that no solution could get through, and, also, in removing the sand after treatment the beds were liable to be damaged. The filter cloth has taken the place of the bedding and is found to answer far better.

Most vats have distributors attached to distribute the pulp evenly over their surface: this is done by a set of revolving arms made of gaspipes, bent at the ends, and all of different lengths—the water and pulp from the battery flowing through the pipes with bent ends cause them to revolve on the same principle as a turbine wheel. The vats are filled to within about 6 inches of the top, and are allowed to settle; the water is then siphoned off and the solution of KCy put on. The solutions from the sumps are now pumped up into the top of the ore, and the required strength made up by adding a certain quantity of the standard solution. To ascertain this quantity the strength of the sump solution is tested by standard nitrate of silver solution in the usual manner, and when the strength is ascertained, and also the quantity of the solution required, the additional quantity from the standard solution vat is easily arrived at—as, for example, if twenty tons of sump solution were used containing .1% KCy, and a working solution required was .3%, the number of pounds of a 15% standard solution would be as follows:

	15%	0.3
	0.3	0.1
	14.7	0.2
therefore 14.7 : (20 x 2240) :: 0.2		
8960		
— 600 52 pounds of strong solution.		
14.7		

(TO BE CONTINUED.)

## "'Malgamatin'."

TO THE EDITOR:—Here is something which may appeal to some of your readers. As a bit of realism it strikes a sympathetic chord in mill operatives.  
Boulder, W. A., Aug. 2.

'Malgamatin' on the pans  
Down the Golden Mile,  
Mixers belchin' boilin' sands  
Swellin' someone's pile.  
Heat and dust and KCy,  
Hot mud splashin' in your eye,  
Twenty pans rotatin';  
Spin, you whirlin' devils, spin!  
Can't hear nothin' for the din,  
'Malgamatin'!

Now the elevator's stuck,  
Twisted buckets jammed;  
Never saw such purple luck,  
May the job be d—d!  
For this flamin' dust is chokin',  
Might as well in hell be stokin',  
"Bash those edges straight in!"  
"Pass, oh pass the hammer here!"  
'Taint all counter lunch and beer  
'Malgamatin'!

Chippin' mudflake off the edge,  
Hammer-head went plump!  
Close up three-pound weight of sledge,  
Hear the muller bump!  
Snatch the clutches out of gear!  
Blazes! won't the foreman rear!  
Here's a lovely ratin'!  
(Can't he give it to a bloke!\*)  
Bet a quid† there's somethin' broke,  
'Malgamatin'!

Boss says, "Clean up, Number Four!"  
Get the tackle to her;  
Lift the muller from the floor,  
Guess we'll have to shoe her!  
Jam the bars beneath the dies,  
Put some weight on, up they rise,  
Set those cogs gyратin'."  
Pans on either side a-steam'!  
Lord! it ain't no place for dreamin',  
'Malgamatin'!

Lyn' thick between the dies,  
Cloggin' up the pan,  
Don't it tempt a fellow's eyes,  
Man is only—man!  
Half a hundredweight in this,  
Ounce or two they'd never miss—  
Go to blazes, Satan!  
While my girl's in me believin',  
Haven't got no time for thievin',  
'Malgamatin'!

\* Slang for "one of the common herd."  
† Slang for £1.

THE daily press reports the theft of amalgam valued at \$25 from the plates of the California quartz mill at the St. Louis Exposition, which makes the exhibit even more realistic than before.



Crushing in Cyanide Solution as Carried on in the Black Hills, S. D.\*

Written by C. H. FULTON.

The crushing in cyanide solution process was first introduced into the Black Hills at the old Dakota plant at Central City by J. M. Henton. The method originated in New Zealand, being first used by F. R. W. Daw, in 1897, at the Crowns mine. In the Black Hills it has become practically the established method for the denser siliceous ores, there being at present five plants in operation using this method, with several more of the same kind projected. The dry crushing process still holds its own on the more porous and open siliceous ores, and there are also plants in operation which do fine, dry crushing on dense siliceous ores. The mills employing the crushing in cyanide solution process are the Horseshoe, 120 stamps, 60 in operation; the Dakota mill, 30 in operation; the Maitland mill, 40 stamps; the Hidden Fortune mill, 60 stamps, and the Lundborg, Dorr & Wilson mill, a 6-foot roller mill.

GENERAL FEATURES OF THE PROCESS.—The process comprises the following operations:

1. The crushing of the ores, generally by stamps, in a cyanide solution ranging from 1.3 to 2.2 pounds of cyanide per ton, and carrying a protective alkalinity equivalent to 1 to 1.5 pound of sodium hydrate per ton.
2. The separation of the sands from the slimes by means of cone classifiers.
3. The treatment of the sands by percolation.
4. The treatment of the slimes by agitation and decantation.
5. The precipitation of the values by means of zinc thread.

The process is applicable to the dense siliceous ores that require a comparatively fine crushing, and which contain but a small quantity of cyanide consuming compounds. For ores that without previous alkaline treatment destroy much cyanide the process is not applicable. As a matter of fact, it may be stated that the cyanide consumption in this method is higher than in dry crushing. The cyanide consumption in the wet crushing mills of the district varies from 0.75 to 1.50 pound per ton of ore treated. At a typical dry crushing plant, the Imperial mill at Deadwood, milling the same class of ore, the consumption is 0.4 pound per ton. At the other dry crushing plants of the district it ranges from 0.4 to 0.75 pound per ton. The increased consumption of cyanide is a defect inherent in the process for several reasons: 1. Agitation of the ore with cyanide solution in the battery causes extra consumption. 2. Although the battery cyanide solution carries a protective alkalinity (alkalinity above that due to cyanide and cyanogen compounds) of from 1 to 1.5 pound per ton, this does not by any means completely protect the cyanide from destruction by cyanicides. The reaction between cyanicides and cyanide and alkaline earth hydrates and caustic alkalies probably takes place in part at least simultaneously. It has been recognized by metallurgists that with many ores it is essential to apply a comparatively highly alkaline solution low in cyanide to the ores before the stronger cyanide solutions are employed, for the alkalinity carried in the strong cyanide solution would be ineffective in preventing a considerable consumption. 3. There is also an increase in the consumption due to the discharge of considerable cyanide in the moisture going out with the slimes tailings. This might be called a mechanical consumption. This consumption alone amounts to from 0.3 to 0.6 pound per ton of ore treated. The mechanical consumption of dry crushing plants is but an insignificant factor.

At the present time it is difficult to make a comparison as regards the relative merits of the process under discussion and the dry crushing process. There is probably, on the whole, little difference between the two processes as regards cost, although the wet crushing mills probably have a slight advantage in this respect, in spite of the slimes treatment and the higher consumption of chemicals. The wet crushing plants, of course, have an advantage in that they do not suffer from the dust nuisance. However, the hope that the wet crushing plants, on account of the great fineness of crushing that would be carried on, would be able to treat the blue ores in the raw state successfully has not been verified, and it is probable that for this class of ores roasting will finally have to be resorted to. In this case, of course, dry crushing will have all the advantage. Some of the mines of the district furnish but little blue ore, while others have a great deal in their reserves. For the first type the crushing in cyanide solution method is, without doubt, a permanent institution.

THE CRUSHING OF THE ORES.—The ores are rough crushed generally by Gates crushers and in one instance, at the Maitland mill, by a Blake crusher. The crushed ore will pass a 1.5 to 2-inch ring and is fed to the stamps by Challenge feeders. Stamps, with one exception, are used for the fine crushing of

the ore. The Lundborg, Dorr & Wilson mill employs a 6-foot Monadnock roller mill for the fine crushing, a set of rolls being placed between the Gates crusher and the roller mill, in order to get the proper sized feed of ore.

The following table gives the details of the stamps at four of the mills:

NAME OF MILL	DETAILS OF THE STAMP MILLS.			
	Type of Mortar	Capacity per Stamp in Tons per 24 Hours.	Amount of Solution per Ton of Ore	Screen Used
Hidden Fortune	Double issue, rear blocked up.	4	5	24 mesh, 26 wire.
Maitland	Single issue.	4 to 5.5 to 4	4 to 5.5 to 4	26 by 13 mesh, 26 wire.
Dakota	Single issue.	5	5	10 by 4 mesh, 20 wire.
Dakota	Double issue, rear blocked up.	4.4	5	10 by 4 mesh, 20 wire.
Horseshoe	Double issue, rear blocked up.	6.4 to 5	6.4 to 5	14 by 7 mesh, 21 wire.
* Crushing in very dilute cyanide solution and amalgamating with inside plate and over tables.				

Some of the earlier mills installed double issue mortars, with the idea of getting an increased stamp duty, but it was soon found that the amount of solution required in crushing was so great that the mills were unable to handle it economically, and the rear discharges were closed by wooden frames. It will be seen from the table that the depth of issue and the width of the mortar at the discharge level vary considerably at the different mills. The weight of stamp has not so great a variation.

As the stamps are used for crushing purposes only at all of the mills, with the exception of the Hidden Fortune, it would seem that in general a narrow box, a shallow discharge and a heavy stamp, up to 1100 to 1200 pounds, would give the greatest capacity and most economical results. However, the retaining of the ore in the mortar for a certain length of time, in order to agitate thoroughly with cyanide solution, is desirable. At most of the mills from 50% to 53% of the values of the ore is extracted in the batteries and the classifying cones. Stamps for this type of crushing should attain a capacity of five tons and over per stamp, and in the later designs of mills to be built this has been provided for. At some of the mills the ore is very hard, which in part accounts for the rather low capacities.

The screens used also vary considerably at the different mills, ranging from 26 mesh 26 wire to 10 mesh 20 wire. This is necessitated by the requirements of the individual ores, which, while having the same general characteristics, differ somewhat in the fineness of crushing required.

Recently several of the mills have installed wire cloth screens, in which the opening is rectangular instead of square, the long dimensions in these screens being from two to two and one-half times that of the short dimension. Screens of this type give somewhat greater capacity and do not choke so readily as screens with a square mesh.

The denser siliceous ores require a comparatively fine crushing, but if the crushing is carried beyond a certain fineness nothing is gained in extraction, and trouble is encountered in the production of an excessive amount of slimes, which are difficult to handle in the mill. It has been demonstrated that if the ore is crushed so that the great bulk of it is not coarser than 30 mesh (0.0195 inch), and not finer than 60 mesh (0.0075 inch), the most economic extraction is obtained. Material finer than 60 mesh yields but very little higher extraction than that between 30 and 60 mesh.

The 5% greater extraction obtained in the mills on the slimes—although the recovery is the same as on the sands—is for the greater part due to the agitation obtained in the treatment. If the size of the ore particles, however, is coarser than 30 mesh, the extraction on most of the ores is materially decreased.

The following table shows the nature of the mill product made at some of the mills:

TABLE II.—MECHANICAL ANALYSES OF MILL PRODUCTS.

NAME OF MILL.	NAME OF MILL.			
	Mesh of Screen	Dakota—Stamps, Screen 10 by 4 Mesh, 20 Wire	Lundborg, Dorr & Wilson Mill, Screen 18 Mesh, 0.046-inch Space	Imperial—Rolls, Screen 16 Mesh, 21 Wire
Percentages Remaining on Screen.	Plus 20	12.7%	1.0%	3.0%
	Plus 30			18.0%
	Plus 40	23.0%	10.0%	17.0%
	Plus 60		10.0%	16.0%
	Plus 80	14.8%		5.0%
	Plus 100	6.0%	10.0%	5.0%
	Minus 100			36.0%
	Plus 150	14.8%		
	Minus 150	29.8%		
	Plus 200		19.0%	
	Minus 200		50.0%	

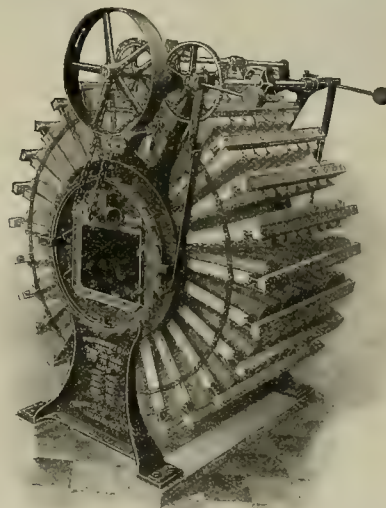
The Dakota mill uses the coarsest screens of any of the mills and gets a product about 20% of which is coarser than 30 mesh, a rather high percentage, but in view of the very low tenor of the ores treated, and their shaly nature, this crushing is the most economical that could be practiced. The other mills use finer screens and their mill product approaches closely to that of the Monadnock mill, quoted in the above table. One mill—the Hidden Fortune—crushes some cement ore which contains considerable coarse free gold. This mill has adopted the crushing in cyanide solution process in conjunction with amalgamation inside and outside of the mortar. A very weak cyanide solution—1.5 pound per ton—is used with success as a battery solution, no difficulty being experienced to get good amalgamation. The plates need somewhat more frequent dressing, owing to the hardening action of the cyanide on the amalgam. This same method is used, in part, at one or two mills employing the Diehl process at Kalgoorlie, Western Australia. It is also very probable that the plates will have to be more frequently renewed, owing to the solvent action of the cyanide.

(TO BE CONTINUED.)

Perfection Dust Collector.

Dust is an ever present problem in stamp mills and ore reduction plants. Wherever ore is treated, whatever the form of reduction, the dust is often a dreadful nuisance and a menace to health and a constant source of expense. In many cases the loss occasioned is considerable. Mining men and others will be pleased to know of a machine that the makers say they guarantee will solve the dust problem wherever it is put in, and in many cases result in a considerable saving in values.

Reference is made to the "Perfection Dust Collector," made and sold by Prinz & Rau, Milwaukee, Wis. The device is illustrated herewith. This dust



Perfection Dust Collector.

collector is made up of a central drum having openings through which the dust-laden air passes into cloth tubes, the dust adhering to the sides thereof. When the drum moves a number of these dust-laden tubes are thus brought directly over the conveyor, which automatically shuts off the air from entering these tubes, the rubber-faced hammers at the same time, in connection with the back draft, effectually cleaning the tubes of all adhering dust. As the drum revolves each row of tubes discharges the dust

\* Bulletin No. 7, South Dakota School of Mines.



into the conveyor, by which it is carried out of the machine.

Any one who has choked and gagged in the dust of a dry mill will appreciate the fact that a machine has been found that will clear the air, enable them to work in comfort, and at the same time save values that now go to waste. One man writes that he has a Perfection Dust Collector that collects 300 pounds of dust every day.

The Prinz & Rau Mfg. Co., Milwaukee, Wis., are the sole makers of this machine. It was invented by Mr. Prinz, who did all the experimenting and made it a practical working machine before offering it for sale. The company have testimonials from managers and superintendents of milling and mining companies throughout Colorado, South Dakota and elsewhere, commending and endorsing their dust collector, and speaking particularly of the good work it does in collecting the dust that before had been such a nuisance and a positive injury to health. The collector further commends itself by not only clearing the air and giving one a chance to breathe, but also by saving values in dust which would otherwise be lost.

The Prinz & Rau Manufacturing Co. claim that their Perfection Dust Collector is "the only machine that has proved a success in the saving of valuable dust in chloride, cyanide and bromide mills, dry concentrating plants, furnaces, roasters and other mills in which dust is created in the reduction or treatment of ores. The collection of this dust is not only a source of revenue, but at the same time a great protection to the workmen who have to inhale the injurious dust. The Perfection Dust Collector is also extensively used in collecting dust arising in cement mills, lead and zinc works and bricqueting plants. By the use of fans connected with pipes having suitable hoods for concentrating the suction, the dust can be blown into the Perfection Dust Collector and automatically separating the air, delivering it to any desired point, and allowing the air to escape perfectly free from dust. The dust when discharged can be automatically blended with the pulp without affecting any subsequent treatment. When the dust to be collected is of a sharp sandy nature, or the air in which the dust is mingled is of a high temperature we strongly recommend the Perfection Dust Collector with perfected sheet steel central drum. The steel drum collector is especially adapted for handling hot air from furnaces. A small amount of cold air blended with heated air from the furnace precipitates the fumes and allows the values to be collected. When the dust to be collected is of soft nature, our regular or standard collector can be used."

## Borax in the United States.

The amount of crude borax produced in the United States in 1903 was 34,430 short tons, valued at \$661,400. The production in 1902 was 17,404 short tons of refined borax, valued at \$2,447,614, and 2600 short tons of crude borax, valued at \$91,000, a total of 20,004 short tons, valued at \$2,538,614. Of the refined borax 862 short tons, valued at \$150,000, were boric acid. Had the valuation in 1903 been taken on the refined instead of the crude product the figures would have been \$2,735,000 instead of \$661,400.

Refineries for borax are located at Bayonne, N. J., Brooklyn, N. Y., New Brighton, Pa., Chicago, Ill., and Alameda, Cal., where various more or less secret processes are employed to convert the crude material into products designed for various uses.

Borax is used for many purposes. When melted at a high temperature it dissolves metallic oxides and forms transparent colored glasses. It is used as a flux in welding metals and in melting gold and silver. It is employed in the manufacture of granite iron ware and of enameled bath tubs and other articles, as well as in making pottery and earthenware. Manufacturers of the hard, tough grades of glass and of encaustic tiles are large users of borax. It is used by painters, tanners, hat makers, and calico makers, as well as by beef packers.

The domestic uses of borax are widely known, and in chemistry and metallurgy the borates are employed in many ways.

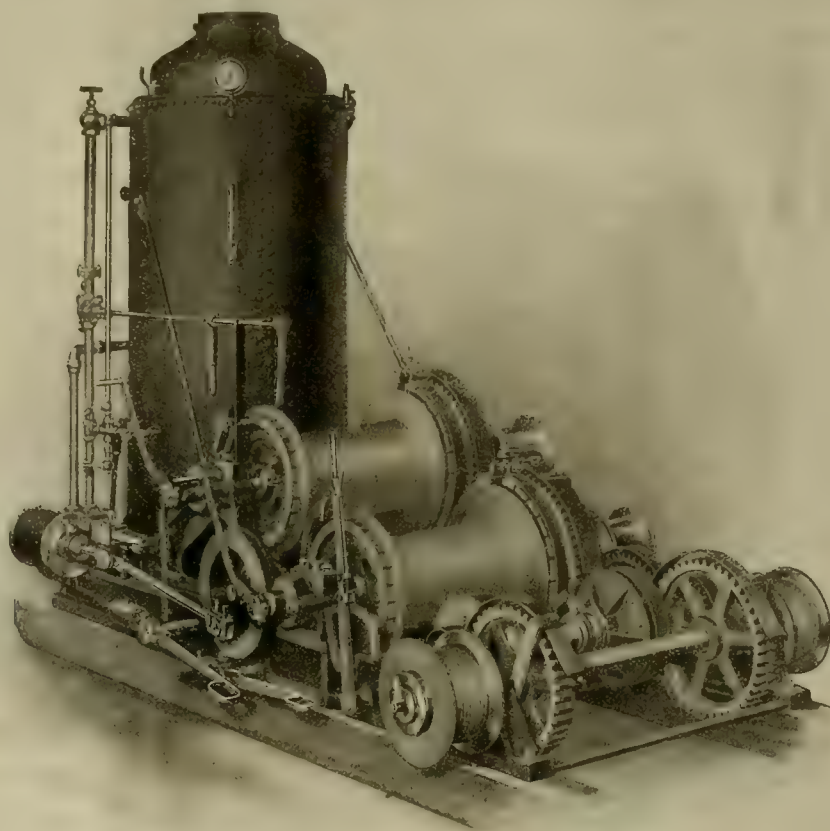
An account of the borax industry in the United States is given in a pamphlet entitled "The Production of Borax in 1903," by C. G. Yale, forming a chapter in "Mineral Resources of the United States, 1903." This pamphlet, which contains detailed statistics covering the production and importation of borax in 1902 and previous years, is printed for gratuitous distribution and may be had by application to the Director of the United States Geological Survey.

A LARGE number of Chinese coolies have recently been taken to the Rand, and a much larger number are expected to be shipped. What the outcome of this experiment will be—for it is considered an experiment even by the most serious supporters of the movement—can not be determined until several months of trial have been given the undertaking. It has been found that, as elsewhere, the expense of mining on the Rand increases with depth, the mechanical difficulties increase, and the value of the ore in great depth, if not decreasing, surely does not increase. Naturally cheap labor is required if the mines are to be operated for profit, for not only is it

necessary to make a profit over running expenses, but also to cover interest on the large capital investment, which in the larger concerns usually exceeds \$3,000,000. Whether a fewer number of well-paid, skilled workmen can be employed to greater profit than can be made by working a large number of unskilled Chinese, remains to be shown by the experiment now being tried.

## Boom Swinging Gear for Hoisting Engines.

The Lidgerwood Mfg. Co., New York, have put upon the market three different types of boom swinging gear for derrick engines. In the No. 4 swinging gear illustrated herewith the company have devised



Lidgerwood Standard Double Friction Drum Engine and Boiler Equipped With No. 4 Boom Swinging Gear.

another apparatus of the kind; it is employed for swinging the boom of an ordinary derrick while simultaneously the boom is being raised and the load hoisted.

This new swinging gear consists of a drum shaft with two gear wheels and two drums and a friction shaft and two frictions and pinions mounted on side stands tied together by two flat steel braces secured to the bottom of the side stands and countersunk in them, making an independent apparatus, which is mounted on an extension of the engine skids and fastened to the front ends of the engine bedplate. If desired, the engine bedplate may be extended and the swinging gear mounted on it. The friction shaft is driven by a pinion, next to the winch head on the forward drum shaft, meshing with an idler gear, which in turn drives a gear wheel keyed fast to the outer end of the friction shaft. There are two cone frictions on the friction shaft, the male part carrying the friction woods, being mounted on the shaft with a feather key, and the female part being cast with a pinion and mounted loosely on the shaft. The pinion of one drives a gear directly on the drum shaft, thus turning the drums in one direction, while the pinion of the other drives an idler pinion, which in turn drives the other gear on the drum shaft, turning the drums in the other direction. The drums are spirally grooved and the ropes wind over on one drum and under on the other.

One of the swinging drums is keyed fast to the shaft; the other is loose thereon, but prevented from turning by means of a collar keyed to the shaft, on which are lugs or projections which fit into corresponding recesses in the drum. When the collar is loosened and moved back, the drum may be revolved far enough to take up the slack, due to the stretching of the rope, and then the collar moved back into place and secured. The drums being outside the bearings, the ropes leading to the bullwheel are not in the way of hoisting and boom lines.

The No. 4 swinging gear is made on the duplicate part system and all parts are easy to get at and can be placed upon any of the Lidgerwood standard double drum hoisting engines, either with or without boiler.

The Lidgerwood Mfg. Co. are showing this new No. 4 swinging gear in their fine exhibit at the St. Louis Exposition in Machinery Hall, where it is attracting considerable attention.

## A Crucible Charge for Gold and Silver in Zinc Ores.\*

Written by E. J. HALL and E. POPPER.

Experiments have been conducted for the past four years by various members of the chemistry department aiming to improve or supplant the present scorification method of assaying zinc ores for the precious metals.

Investigations were made on the scorification assay using oxide of iron in Furman's "Manual of Assaying," a combination method similar to that used for copper mattes, and a scorification charge using soda.

However, all of these methods proved to be just as troublesome as the ordinary scorification method,

which frequently necessitates the use of but small amounts of ore (.1 A. T.), as well as constant attention and manipulation to prevent the formation of zinc crusts. Furthermore, the results were no better.

Therefore, the following investigations were conducted with the hope of eliminating both the troubles inherent in any scorification, as well as the special difficulties met with in the scorification of zinc ores, by the use of a crucible method.

The preliminary work consisted largely in experimenting with nails and with nitre as desulphurizing agents on sphalerite, the most common zinc ore, and in studying the effect of varying the amounts of litharge, soda and borax glass.

Omitting the details of this work, it is sufficient to say that, after making some two hundred fusions, the results indicated that the most satisfactory charge must contain:

1. Only sufficient litharge to give a lead button of proper size to collect the gold and silver, on account of the difficulty in regulating the size of the button, and because lead oxide in the slag seems to interfere with the complete decomposition of the ore and prevent the formation of a slag which is free from lumps and readily poured.

2. Soda ( $\text{Na}_2\text{CO}_3$ ) four or five times as much as ore.

3. Borax glass sufficient to prevent the charge from being entirely basic and assist in fluxing the gangue minerals not acted upon by soda alone.

4. Argol, if necessary, sufficient to reduce all the lead.

It may be necessary to add a couple of nails if the ore is high in pyrite (over 15%) to prevent the formation of a brittle button. The final charge adopted was:

Ore.....	1	A. T.
Soda ( $\text{Na}_2\text{CO}_3$ ).....	1 1/2	A. T.
Litharge.....	1 1/2	A. T.
Borax glass.....	1	A. T.
Argol.....	0 to X	

The reason for using only one-third A. T. of ore is the tendency of the charge to boil excessively, and the danger of overflowing when a larger charge is run in a 20-gram crucible. This boiling is not caused mainly by decomposition of the ore, but apparently

\*School of Mines Quarterly, Columbia University.



by the action of the soda on the silica of the crucible, as it may continue long after the fusion is complete. The charge given is very similar to that of Aaron.

The experiment was made of varying the temperature (measured with a Le Chatelier pyrometer), and it was found that best results were obtained from 750° C. to 775° C. Above this temperature (which is about that of scorification) the results were lower, in some cases considerably below the scorification figures. The time required in the muffle was from thirty to thirty-five minutes.

In view of the fact that an ore containing 15% of copper could not be satisfactorily run with this charge, experiments were made to determine the amount of copper which could be taken care of. Ores were made containing varying percentages of copper sulphide, and it was found that ores containing up to 7½% of copper could be satisfactorily assayed.

There is no doubt in the minds of the investigators that the charge could be used for one-half A. T. of ore, the fluxes being increased proportionately, if the fusions were made in a 30-gram, low-form crucible (Denver Fire Clay Co.). The results compared with scorification follow:

Ore.	Per Cent Zn.	Scorification .1 A. T. Oz. Au and Ag per Ton.	Crucible ½ A. T. Oz. Au and Ag per Ton.
1	2.5	48.00	48.20
2	5.0	10.00	10.41
3	6.0	9.70	9.78
4	8.0	42.50	42.54
5	9.5	165.00	168.48
6	11.5	125.80	129.40
7	11.5	38.00	37.95
8	17.5	17.10	17.16
9	27.5	135.80	139.35
10	29.7	85.00	87.66
11	35.6	105.70	106.56
12	44.0	71.10	73.83
13	47.6	44.80	47.28
14	52.0	40.10	41.34

The gold and silver beads were not parted, as the gold present would not affect the comparison.

A study of the table will show that in every case the results by this crucible charge either checked or exceeded those obtained by scorification.

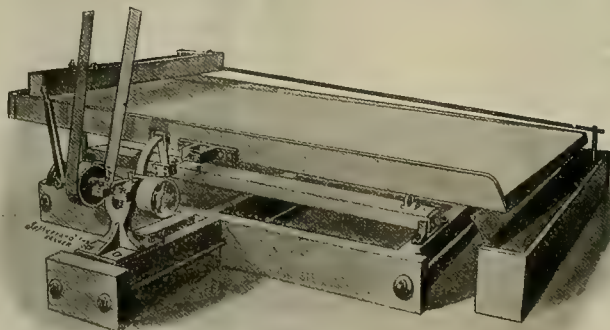
### Isolated Mining Regions.

In the high Sierra of California there are many beautiful valleys through which roads already have been built, or in which they may be constructed at no greater expense than that attaching to road building in the foothill region. The topography of some of these valleys is such that they have been surveyed with a view to making them the sites of reservoirs for mining and other purposes. Some of these valleys are in the vicinity of mines and undeveloped mineral deposits. The accompanying illustration is that of Bloody canyon, as seen from the meadows at

Mono county. The Mono pass is at an altitude of 10,600 feet above the sea. The mining region is more easily approached from the western side, or by the road from Bridgeport, a few miles to the northward. In these several mining districts the ores are mostly sulphide, carrying varying amounts of copper, lead, iron, zinc, etc., beside gold and silver. The processes best suited to their reduction must vary greatly with the changing character of the ore in the various mines. In most of them amalgamation and concentration, with subsequent separation of the several products by means of electro-magnetic separators, is the best suited to the conditions at present existing there. In time, when the development of the mining industry seems to justify it, railroads will undoubtedly penetrate this region, and then smelters will become an important factor in ore reduction. The topography of this section of the Sierra Nevada is not unlike a great portion of that in Colorado, or in British Columbia. In each of the twolatter regions railroads have done much to make accessible the mineral wealth of the county, and in time these same agencies will also aid greatly in opening up the important mineral districts of the high Sierra of California.

### Tetrault Concentrator.

During the past year many changes have been made in the Tetrault concentrating table. This concentrator, illustrated herewith, is 6 feet wide by 10 feet long, covered with linoleum and without riffles, with a smooth surface. The manufacturers claim it



Tetrault Concentrator.

will not churn or mix the pulp after it is delivered onto the body of the table, but merely settles out the heavy mineral from the lighter gangue. "After the mineral takes its place on the table it passes in one continuous smooth band or stream, covered at all

the table. The clear wash water from the compartment also flows longitudinally off the table."

The tables are being manufactured and sold by the Progressive Concentrating & Milling Co., Boulder, Colo.

### Shaft Sinking in Quicksand at Hibbing, Minn.\*

Written by H. B. STURTEVANT.

The satisfactory completion of any engineering or mining feature is of interest to this Institute; and further, the Institute has certain rights to information of the details of such accomplishment. Hence this paper on sinking, partly in quicksand, of the Susquehanna shafts at Hibbing, Minn., during 1903. Our conditions were in brief as follows: A surface of 138 feet, of which 57 feet were in dry sand, 50 feet in quicksand, and 31 feet in hardpan.

Anticipating quicksand, it was decided to sink first a small shaft, to reduce difficulties to a minimum; this shaft would drain the surrounding territory, making it less difficult to sink a large working shaft near by. And further, the small shaft would be used as the permanent drainage and timber shaft. On February 15, 1903, the sod, or rather frost, was broken for the small shaft of size 8x10 feet inside; timbers 12x12 inches, studdles 3 feet and hanging bolts 1½ inch. The shaft bearers were 20 to 24 inches diameter and 32 feet long. At the depth of 45 feet six ¾-inch wire ropes were used to hang the shaft from the bearers, using 8x8-inch wrought washers ½-inch thick.

At a depth of 57 feet water and quicksand were encountered; and as considerable pull on the wire ropes was noticed we built two trusses at the collar of the shaft, using the bearers as lower cord of an ordinary queen post truss. From 57 feet we used the drop shaft method. A shaft set was beveled to an edge flush on outside of shaft and placed in position and forced down; filling in other sets above it and under the jacks successively, bolting timbers to each other, and hoisting the sand, and pumping the water. In this manner we sank 15 feet, but could go no further, and the operation was repeated until a depth of 85 feet was reached.

The experience was valuable, and we modified the method later in sinking the operating shaft, to be mentioned further on.

At 85 feet the pressure of sand being very great, and difficulties increasing, we reduced the size to 6x8 feet, building up inside the shaft a solid box with bottom edge beveled, but flush on outside, and this solid box was forced down 22 feet to 107 feet and bedded in hardpan. At 85 feet the timbers were anchored to the collar trussed bearers by four 1½-inch ropes, thus making ten wire rope hangers, besides the usual iron hangers. At 107 feet the timbers were again anchored by wire ropes. The enormous strain on the shaft timbers due to quicksand was manifested by the washers 8x8 inches pulling into the bearers fully 2 inches.

During the entire process we forced in advance of the timber a sheet steel box, 3x5 feet of ½-inch plates, put together with angle irons, and 10 feet long. This box was forced down in the middle of the shaft and served to partially drain the bottom, and to serve as a sump for the pump suction.

Progress in quicksand was very slow, and 8 to 10 feet per month was all we could do, the rate varying from nothing to 6 inches per day. We found, as others have, that the great danger to success lies in the sand and water bubbling through under the bottom timbers. To prevent this the sand was not removed faster than necessary, and when bubbling was indicated a plank hewn to edge on end, or a shovel was used and water allowed to rise a few feet; further, during the entire work in quicksand we ran eight-hour shifts, work progressing continuously in order to hold what we had made. And to avoid trouble over the idle Sunday the sand was not removed at bottom and water was allowed to rise to the pumps.

In hardpan below 107 feet depth the process used was driving lath, removing ground and placing timbers, bolting them together. Sinking progressed in clay at the rate of 1½ foot per day, until the shaft was bottomed on ledge of ore at 138 feet on September 14, or seven months from date of beginning.

The drainage increased to 300 gallons per minute

\*Abstract Trans. Lake Superior Min. Inst.



A Mountain Meadow in the Sierra Nevada of California.

the head of Walker lake. Both canyon and lake are of glacial origin, and at the head of the canyon in the distance are several small glacial lakes, and also the noted Mono pass through which hundreds of miners wended their way in the early '60s, when placer mining was active in several districts in this Sierra region. This valley is at an altitude of nearly 8000 feet, and is on the east side of the Sierra Nevada, in

times by a thin layer of water, and is not agitated or mixed up again by passing over a series of riffles. The fine particles, or slimes, are held in place by the coarser material and carried along with them into the boxes. The pulp is fed into the hopper compartment and flows down onto the deck of the table. The table is inclined longitudinally downward from this end and directs the flow of the ore longitudinally on



on July 1 at 90 feet depth and 450 gallons at 138 feet. The sinking pumps tried were unsatisfactory, because of jumping in case of air in the suction; and No. 10 Cameron pumps were substituted.

The shaft is only 2 feet out of plumb; and this does not impair its serviceability for pumping and timber. In sinking it was found necessary to use the greatest care to maintain the bottom edge of timbers exactly level in quicksand or the shaft would sink out of plumb. The water would occasionally make cavities which would fill suddenly, producing a great strain on timber and hanging ropes. There was no way of anticipating this, and as the timbering was solid there was no way to inspect behind it. Anticipating these troubles we would, while sinking, ram hay behind the timbers, and the effect was to prevent dirt washing down on outside of shaft.

It is also very necessary in sinking in quicksand to hoist no more sand than possible; that is to say, the sand will try to run into the shaft under the timbers, and if removed too fast the sand outside the shaft will become loosened and run, and cause timbers and irons to break; and the whole work may be ruined irreparably. On one occasion we noticed unusual bubbling and we immediately stopped the pumps and allowed the water to rise 15 feet, and then lowered sand from the surface and filled the shaft several feet in which condition it stood, efforts to resume being without success for six days, when sinking was resumed.

The hoisting shaft was begun July 28, 1903, 4 feet east from the drainage shaft. The size was 6x16 feet, inside, with usual timbering, to the water line. It is shown in plan in Fig. 1. It was found that the

drainage shaft pumps had drained the ground at the hoisting shaft to such an extent that a No. 7 Cameron working slowly handled the water.

The same difficulties were encountered as at the drainage shaft, but in less degree, and we are satisfied that had we not partially drained the ground by the small shaft it would have been impossible to sink the large one, because the troubles are in proportion to the external dimensions. The method in the quicksand in the hoisting shaft was quite different from that used in the drainage shaft; and particular attention is called to the following details, as we consider the method a most successful one, and not, so far as we can learn, one which has before been used.

A drop section of shaft timbers of full size of shaft was framed and placed in position. The details of the drop section are shown in Fig. 2. It is 4 feet in

depth, made of 12x12-inch timbers bolted together and braced; the lower two sets are beveled, flush outside, and a 1/8-inch plate of steel shaped to fit the edge was fastened by spikes, making a shoe or edge 3 inches wide to cut the sand; outside of this drop section was bolted a sheeting of plank, with lower edges hewn thin for less resistance to sand, and the upper end of plank extending 3 feet 6 inches above the timbers, as indicated in sketch, and behind the last permanent shaft timbers.

About 20 or 30 jacks, 2 1/2 x 18 inches, were operated between the drop section and the last permanent timbers, the plank sheeting serving to retain the sand. As the jacks forced down the drop section

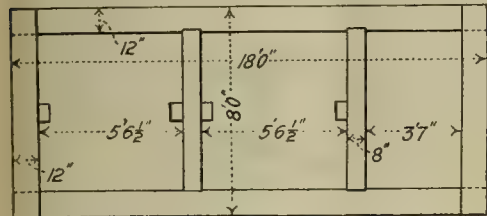


Fig. 1.—Shaft Plan at Mine.

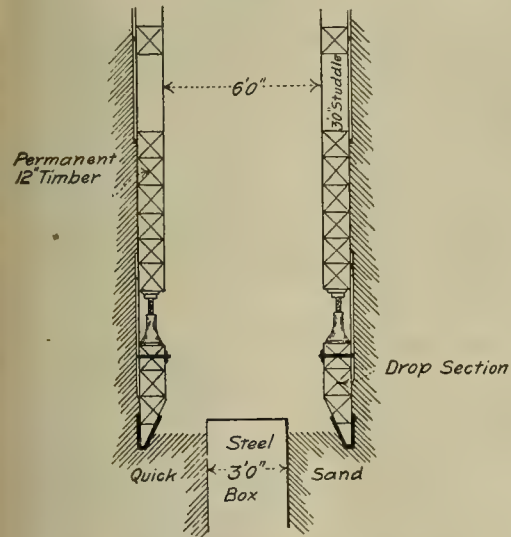


Fig. 2.—Section Showing Method of Sinking.

they were removed temporarily, and timbers placed, and bolted to the last permanent timbers; and to bring the permanent timbers close together pockets were cut out for nuts and washers. In other words, as the jacks forced down the drop section the permanent timbers were placed above the jacks and this process was continued until the iron shoe was imbedded in clay at 107 feet, after which we drove lath and after removing the ground put in timbers.

As this was to be the hoisting shaft it was very necessary that it be vertical and truly in line without serious variation. The greatest possible care in the use of jacks was necessary to success in this particular. The greatest variation from vertical is only 6 inches. As an additional protection against a crooked shaft we placed diagonal braces 8x8 inches at each end from the collar of the shaft down to depth of 85 feet. The necessity for these braces might be questioned, but our experience in the drainage shaft, where the washing away of sand behind the timbers and the caving causing the entire shaft to surge several inches, prompted us to take no chances. The shaft timbers were hung by wire ropes from the bearers at collar of shaft, but it was not necessary to truss the bearers as in the case of the drainage shaft.

As an improvement I might suggest the substitution of steel sheeting for the plank as less liable to break or get loose; and further, the steel would, being thin, allow the drop section to cut the sand easier.

We sank the shaft through the quicksand at the rate of 8 feet 6 inches to 9 feet 6 inches per month, working continuously, excepting Sundays. On reaching hardpan on January 1, 1904, we sank at the rate of 1 1/2 feet per day. As to speed of sinking in quicksand we shall not boast, but we modestly claim success in continual progress and that we did not lose either shaft; neither did we lose headway gained, excepting on the occasion mentioned above, and further, our hoisting shaft has a variation of only 6 inches.

For our conditions and with 50 feet of quicksand I can suggest no improvement over the methods used at our hoisting shaft. However, if the quicksand were 100 feet deep, the difficulties would increase, and it is probable that the freezing process might be more successful and more rapid, although the method described could be used. The essential feature of our success was the solid drop section with steel shoe and with back lath well secured and extending upwards to span the open space occupied by the jacks.

To Thomas Caddy I am pleased to give great credit for success in the sinking of the shafts.

### The Motter Furnace.

Herewith is illustrated the Motter furnace, which is 40 feet long, the roasting tube being 22 inches di-



The Motter Furnace.

ameter, fire space around outside of tubes 4 inches. The tubes ride on large wheels built on stone foundation. The furnace travels five to fifteen revolutions per minute, according to the quantity and character of the ore being treated. It has a combined apparatus for drying and roasting the ore, to leave it in condition for cyaniding, amalgamating and other chemical treatments. This machine is being manufactured by the patentees, W. H. Motter & Son, Denver, Colo.

### THE PROSPECTOR.

Rocks that contain fossils may be metal bearing as well as those of igneous origin, or metamorphic rocks in which all traces of fossils have been obliterated. As examples of ore-bearing fossiliferous rocks, may be mentioned the sandstones and shales of Silver Reef, Utah, and Permian rocks in which the fossil fish and wood have been changed to rich silver-copper ore. In the Black Hills of South Dakota the Cambrian beds and carboniferous limestones are fossiliferous and also ore bearing. This is notably the case with the upper Cambrian quartzite, which, where unaltered, is characterized by the little bore holes of arenicolites, but which in some districts becomes high-grade gold ore, and in some places is rich in lead and in silver chloride. Other fossiliferous strata in the Cambrian are also ore bearing. Fossiliferous limestones in many regions contain lead-silver and copper ores by replacement.

The rock specimens from Vaughn, Kern county, Cal., is largely composed of amphibole (hornblende) and feldspar, the whole covered with iron oxide. It is apparently from a dike of coarse grained granitic rock.

### The Mother Lode in Tuolumne County, California.\*

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

Serpentine is a prominent accompaniment of the lode in this county, and although gold is known to occur in schistose masses of this rock in Amador Co., none have been reported, as far as known to the writer, in Tuolumne county. Occasionally small, rich shoots or pockets are found at contact of the serpentine and other rocks—clay slate and greenstone schist—but these are of comparatively infrequent occurrence. The serpentine lies sometimes on one wall and sometimes on another. It is a curious fact that the occurrence of the mariposite-bearing dolomite and ankerite is almost always found in close association with the serpentine. Mariposite is a mica deriving its color from chromium oxide, and serpentine has long since been recognized as the principal, if not the only habitat of chromic iron, which fact may account for the persistent appearance of the chromium mica mariposite in the dolomitic mineral. In very large masses of this rock (it sometimes appears in dikes over 300 feet wide) that portion of the dolomite most distant from the serpentine usually contains but little, if any, mariposite.

The gold-bearing rocks of the lode are chiefly quartz which contains from 1% to 3%, and sometimes more, iron sulphide, and the accompanying amphibolite schists which are more or less siliceous and also contain auriferous iron sulphide. In some mines rock of the latter description forms the principal ore-bearing material. All of the important mines have a variety of gold-bearing rocks, including the quartz lenses, silicified schist and ankerite, and the mill treatment is essentially the same throughout all the mills of the lode. The ore is passed through rock breakers from which it goes to stamps, where it is crushed to pass a 30 or 40 screen—the height of drop, and of the discharge and other details of stamp mill practice varying but little in the several mines. Amalgamation is practiced both inside and outside the battery, the pulp going to various makes of concentrating machines. The sulphurets are either shipped to smelters or are roasted and treated by the Plattner chlorination process, as at the Rawhide, or by barrel chlorination, as at the Eagle-Shawmut, near Jacksonville. Cyanide is being tried in an experimental way on tailings at several mines. In all cases the saving is high, usually over 90%, by whatever method is employed, and it appears to be a case of relative economy of the several processes.

The Alabama mine, referred to in the last paper, has been idle some time, due to legal and other complications. It is stated that in the north drift of this mine rich ore was found before shutting down, but was not followed as it was going into the neighboring property, the Omega.

South of the Alabama is the Crystalline mine. The geological conditions here are similar to those of the Alabama. This does not always follow, for often within a few feet the geological conditions change to an extent which had not been anticipated.

The Crystalline mine has produced a large amount of gold from pockets as well as from milling ores, but seems as yet to have failed in finding a large and continuous body of pay rock, though the surface indications are favorable to successful deep development. South from the Crystalline mine is a small property (a fractional claim) known as the Gem, which has been worked in a small way and which has produced many thousands of dollars in gold from the greenstone schists forming the hanging wall country of the main vein, which outcrops on the hill back of the Gem workings. These schists are silicified and impregnated with auriferous iron sulphide, and free gold. The mine has been worked mostly by open cuts, which has made mining cheap. The mill has been run by a large overshot water wheel. This was a very common means of power along the Lode in the early history of mining there, some of the wheels built at that time being 50 to 60 feet in diameter, though the greater number were about 30 feet. In more recent years impact wheels, steam and electricity have almost entirely replaced the old-fashioned overshot wheels.

Whiskey Hill is an eminence beginning at Wood's creek, 1 1/2 mile south of Table mountain. This ridge is caused by the greater resistance to erosion of the continuous, unbroken outcrop of the Mother Lode. The serpentine and soft amphibolite schist being more quickly eroded than the quartz and dolomite, which form for most part the summit of this ridge—Whiskey Hill—noted for the large amount of gold

\*See illustration on front page.



taken from its surface and from pockets occurring in the hanging wall schists and slates in the early mining days. It is in this zone of schists that the Gem workings have been mostly made. The Trio mine lies west of the Gem and is located on the main lode. It has considerable development of a superficial character.

Two of the engravings on the front page are of El Rico mine, near Tuttletown, on the Mother Lode, and the third shows the usual method of delivering the heavy timbers at the mines.

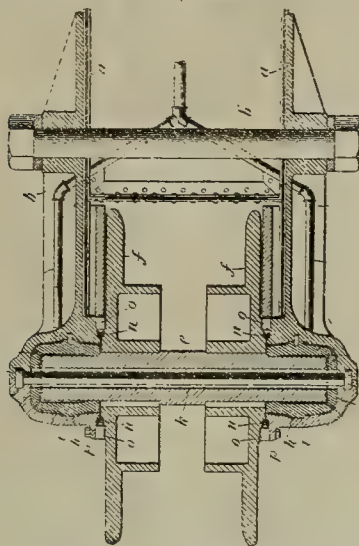
(TO BE CONTINUED.)

## Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 13, 1904.

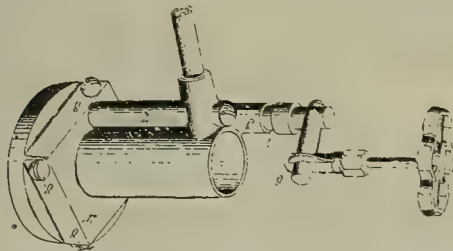
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

LOWER TUMBLER AND LADDER END FOR ELEVATOR DREDGERS.—No. 770,011; S. L. G. Knox, Milwaukee, and W. Ferris, South Milwaukee, Wis.



In lower tumbler mechanism for dredging machines, combination of hollow rotating tumbler shaft, brackets in which shaft is supported, removable caps on brackets, and tie rod passing through shaft and secured at ends between brackets and caps, whereby tie rod is rigidly held in place and brackets are held at fixed distance apart.

HYDROCARBON VAPOR BURNER.—No. 769,981; H. B. Cary, Los Angeles, Cal.



Gasoline vapor generator and injector consisting of enlarged flat head and elongated duct portion extending at right angles from one side thereof, parts being formed integral and head comprising circular face and shouldered rear portion, face forming shield and rear portion being provided with passage formed from limbs, each limb extending respectively from one shoulder to limb from adjacent shoulder, except last one, which terminates at point adjacent to first limb, plug in outer end of each limb, and jet piece, head of burner being of such area and thickness as to receive and retain enough heat from furnace as to produce constant vaporization, and duct portion being provided with three passages, one of which is larger than others and extends longitudinally entirely through portion and transversely through head substantially at center thereof, and other passages extend parallel with larger passage and terminate at inner ends, respectively, one with inner end of last limb of passage in head and other with first limb near its plug, and outer end of one of them communicates with jet piece in alignment with larger tube and other one is adapted to communicate with oil supply.

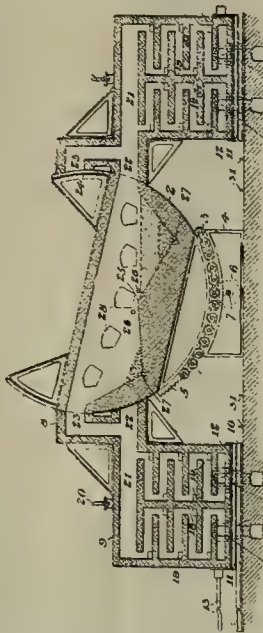
GOLD-SAVING APPARATUS.—No. 769,886; J. S. Bolinger, Cherokee, Cal.



Combination with riffled or like surface of submerged sections of foraminous material flexibly held

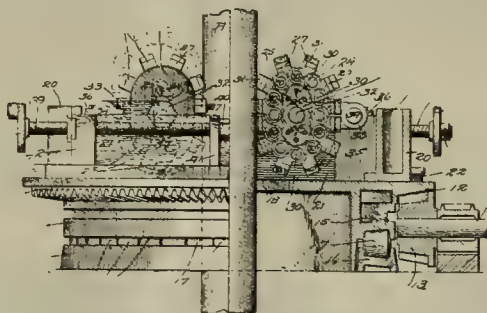
at one end adjacent to surface and arranged as perforate partition between finer sands and values and coarser material above. An arrester for undercurrent of water flowing thereover, comprising series of successively arranged flexible screen sections secured at upper ends to surface and approximately of same width as surface.

TILTING METALLURGICAL FURNACE.—No. 769,712; J. A. Potter, Pittsburg, Pa.



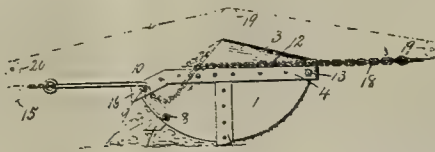
Endwise tilting furnace and regenerators located at opposite ends and registering with end ports, regenerators being movable toward and from port joints.

WELL-SINKING APPARATUS.—No. 769,727; M. T. Chapman, Aurora, Ill.



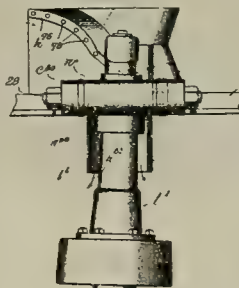
Combination with rotatable platform, of a pair of jaws mounted thereon, each jaw comprising endless chain, and support therefor consisting of block having groove in face, in which groove chain is adapted to move.

EXCAVATING APPARATUS.—No. 769,828; T. F. Moore, Syracuse, N. Y.



Excavator having its sides of greatest depth midway between ends and bottom extending from rear ends forwardly along lower edges of sides and terminating at lowest points.

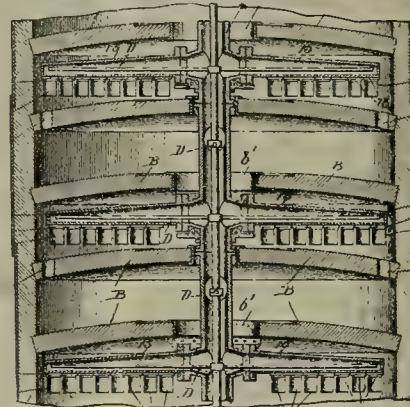
CRUSHING OR PULVERIZING MILL.—No. 769,740; E. C. Griffin, Newton, Mass.



In mill of class described, grinding chamber containing annular die, overhead revoluble carrier, crushing roll, spindle operatively connected therewith, and fulcrumed on carrier, tubular shield surrounding spindle and mounted on carrier, lower end of shield opening into grinding chamber and its upper end opening through carrier, and means mounted on

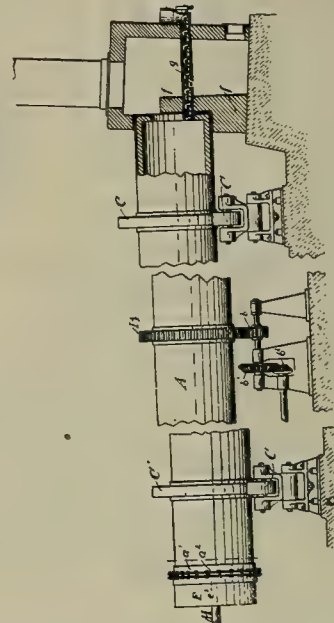
latter and communicating with upper end of shield to collect and force downblast of air through shield.

RABBLE FOR ROASTING FURNACES.—No. 769,689; M. Corcoran, Anaconda, Mont.



In device of character described, arm provided at lower edge with lateral base flanges, carrier plate provided with flanges arranged to engage base flanges of arm whereby carrier plate may be slid upon arm, and blade and carrier plate being provided one with a guide and other with head adapted to engage guide, whereby blade may be slid into position in carrier plate.

CEMENT KILN.—No. 769,742; F. M. Haldeman, Alpena, Mich.



Cement kiln having hood removably attached thereto, hood and kiln being each provided with lining of firebrick or similar material, and gasket of asbestos or similar non-heat-conducting and non-fusible material between linings.

PROCESS OF EXTRACTING PRECIOUS METALS FROM ORES OR SLIMES.—No. 769,938; H. R. Cassel, New York, N. Y.

Process of extracting precious metals from ores by adding bromide and cyanide in solution to ore, and then passing chlorine gas through mixture to convert bromide into bromine and form solvents for precious metals.

THE cyanide process has now been in actual and successful operation for nearly fifteen years. It has been improved in many ways and its application much extended as the knowledge of the process grew. Improvements are constantly being made and intelligent efforts directed toward simplifying and cheapening its application, with a good show of success, so that in a decade from now, or in a quarter of a century from its first use, it will probably have found a much wider field of usefulness and successful operation. The field for improvement is broad, and other processes promise to make cheaply available the values in ores now considered either too low grade or too rebellious for treatment by existing methods.

THE first electric transmission plant for mining purposes in California was installed near Placerville, El Dorado county, for the American River Syndicate, when power generated on the American river was transmitted to the Dalmatia mill, near Kelsey, May 1, 1890. The electric plant was situated 1300 feet lower than the mine, a mile distant. The power was derived from 400 inches of water under a 112.5-foot head. The dynamo was figured at 126 H. P. The motor was situated in the mill and was belted to the main shaft of the mill and ran rock breakers and mills, etc.



# Mining Summary.

SPECIALY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ARIZONA.

### Cochise County.

It is reported the Empire S. Co. at Benson has been reorganized as the Southwestern S. & R. Co., and will add a 200-ton water jacket furnace to its equipment.

J. A. Lewandowski of Douglas, engineer for the Savage G. & C. Co., operating at Paradise, says a smelting furnace will be put in.

### Gila County.

The water rights, rights of way, franchises, etc., of the Clark electric power proposition have been taken over by the Globe Power Co., which will start construction this fall. B. G. Fox of Globe is interested. The capacity of the plant will be 8000 H. P. A 30-foot concrete diversion dam will be built in Salt river below the mouth of Cherry creek. A tunnel 10 feet by 13 feet, 7015 feet long, will carry water through the mountains to opposite Redman flat, from which point a pipe line will cross Salt river, from where the water will be conducted by canal to the power house above Pinal creek. The water will have a head of 285 feet to the river bed. A substitution will be built in Globe, from which lines will be built to all parts of Globe district for distributing power to the mines. Specifications also provide for a dam 100 feet high above the mouth of Cherry creek. Two other reservoirs on side streams will also be built. It is said the Globe Power Co. will provide small electric hoists for rent to the smaller mine owners in order to increase development of the district.

### Graham County.

The output of the Arizona C. Co. at Clifton for August was 2,165,705 pounds of copper.

The Federal M. Co., operating the San Juan mine, near Safford, reports progress in development work. A 100-ton smelting plant will be built. J. F. Weber is manager.—The Michigan-Arizona M. Co., with headquarters at Safford, has been organized to operate mines in the Graham mountains, on which development work has been done. The ore carries gold and silver values. It is intended to sink a shaft to 1000 feet, after which levels will be run.

Work has been resumed by the Coronado C. Co. The company owns a group of claims in the Coronado mountains near Metcalf, adjoining the Coronado mine of the Arizona C. Co.

### Mohave County.

The Gold Roads M. Co., near Acme, last week shipped bullion valued at \$3800, taken out in two weeks' run of the mill.—It is reported that work on the Roosevelt mines, in the Gold Roads section, will be started up next week. The mines are owned by J. M. Day of San Francisco. The properties are said to have bodies of milling, gold ore.

W. Fellows, superintendent of the Hilty group of mines, near Kingman, is hauling in lumber and machinery for a hoisting plant.—F. Stull reports getting out ore in his lease on the Lucky Boy mine, near Chloride, and will make shipments. Storms caused several landslides to fill up the portal of the tunnel at the mine, which has been cleared. Stull is also working men on the Mocking Bird mine, near Stockton Hill, and is getting ore.

At Chloride the Philadelphia & Arizona M. Co. has sold its Minnesota-Connor properties to F. H. Griffith et al. Development work will be increased. The shaft on the Minnesota mine will be sunk 200 feet deeper. The mill will be run on tailings until the dumps are run through, when ore from the mine will be handled. Water will be piped from the Lucky Boy mine, after which a pipe line will be laid from the Merrimac mine to the mill and a pumping plant installed.

### Santa Cruz County.

The Tom Taggart group of mines, near the Wandering Jew mine, in Tyndall district, Santa Rita mountains near Nogales, has been bonded to E. L. Crowell et al. Operations have been started.

### Yavapai County.

It is reported the Silver Flake mine, near Prescott, will be reopened.—J. S. Jones, at Chaparral, is putting in an air compressor at his mines.

J. K. Truman of Phoenix has started development of a group of claims near Wagoner, near the Black Canyon road. He has a hoist set up and is putting in a pump. The ore carries gold and copper.

E. M. Clark of Groom Creek, owner of the Chicago mine, says he will build a mill.—W. W. Elliott is putting men on

the properties of the Mount Union Con. M. Co., near Prescott, to build a mill and other buildings. E. E. Greenwood is superintendent and manager.

### Yuma County.

W. W. Elliott of Prescott of the Amalgamated G. M. Co., operating at Quartzsite, says the company has sixty men at work building roads, grading the millsite and developing water. The mill will have 120 stamps of 1000 pounds each. Power will consist of 350 H. P. boilers and one 350 H. P. compound Corliss engine. The company has five eight-horse teams on the road, and will put on five more, freighting from Congress Junction, says Superintendent Meeks.

## CALIFORNIA.

### Amador County.

At the South Eureka mine, Sutter Creek, B. B. Haven superintendent and W. J. McGee manager, progress is being made on construction of the 20-stamp mill. Excavating is completed. The new mill is being built to the west of the present one and separate from the old building. It will also be operated with independent power.

### Butte County.

Near Oroville, San Francisco and New York men have leased the Sugar Loaf mining claim. Development work will be begun by Superintendent Page.

### Calaveras County.

Work will be started this week on the North Star mine, adjoining the Gold Cliff mine at Angels. This mine, with four others adjoining, has been taken by Eastern men, who will put in machinery capable of handling 200 tons of rock per day; a mill test of eleven tons of rock averaged \$4.20 per ton. J. Jacobs is superintendent.—The Beatrice mine, at Murphys, will be operated again, beginning Oct. 1, with R. E. Ober superintendent.

Work of extending the electric wires to the Marshall mine, near Mokelumne Hill, is about finished. Work in the mine has been delayed owing to the non-arrival of the pump. The company operating the Marshall mine is the California Gold Placer M. Co.

At the Black Wonder mine at West Point rock assaying \$60 per ton is reported opened up. There is a 5-stamp mill on the mine and at present operations are being confined to putting in additional machinery for full operations. The mine is operated by Moffitt & Sallee of San Francisco.—The south extension of the Black Wonder is being operated by A. J. Teeple of Mokelumne Hill.

### El Dorado County.

It is said final payment has been made on the Mameluke Hill mine, near Georgetown, and that the company expects to resume operations by October 1st.—The drainage tunnel at the Nigger Flat mine, Smith's Flat district, has been retimbered and reopened and work of unwatering the mine is progressing.—The Monte M. & M. Co., Gold Hill district, has started putting up a 10-stamp mill. The shaft in the lower tunnel is 60 feet in depth and is said to have developed an ore body.

The Landecker G. M. Co., which has bought the Landecker property, is working thirty men. They have completed top buildings and grading for the mill and retaining walls is completed. The lower drain tunnel of the mine, which is near Placerville, has been driven to the pay channel, showing workable gravel.

The Short Handle mine, in Spanish Dry Diggings, near Placerville, which has not been worked for several years, will resume operations.—It is reported gravel yielding 25 cents a pan has been struck in the South Slope gravel mine, owned by Bosquit et al., of Placerville.

Two boilers and a steam pump are being set up by El Dorado C. M. Co., and work on the triple-compartment shaft at the Eureka gold quartz mine in Georgetown will be resumed. The shaft is down 200 feet.

### Humboldt County.

G. A. Waldner of Eureka, president of the Big Bar M. Co., operating the Big Bar placer mine on the Klamath river, 6 miles from Orleans, reports mining is being increased. The flume is being repaired. F. Road is superintendent.

### Mariposa County.

The Mount Gaines mine, above the Hornitos G. M. Co., is developing and milling ore from the Barfield mine. A 5-foot Huntington mill crushes the ore.—At the Grimshaw, the shaft is down 150 feet. The mine is under bond to Bierce & Rhodes of San Francisco.

On Bear Valley mountain, near Hornitos, on the Homestake mine the tunnel has been driven 100 feet by the Hornitos G. M. Co., and 700 feet more will be run.—At the Exchequer mine, Superintendent M. O'Brien reports development progressing. The mine is at the mouth

of Cotton creek, 7 miles north of Hornitos on the Merced river. There are seven claims in the group, says the Gazette-Mariposan, and the main ledge crosses the river and can be worked by tunnel from either side. A mill run by water power will be built. The mine is owned by the Exchequer G. M. Co.

### Mono County.

The White Mountain M. Co. has been incorporated at Salt Lake City, Utah, by E. W. Clark, president; F. Pierce and W. J. Barrette. The company owns ten silver lode claims in an unorganized mining district in Mono county.

### Placer County.

The Three Star mine, near Auburn, is again in full operation, says Superintendent B. F. Hartley, after repairs to the pipe line.—The Baltimore mine at Forest Hill is running with a few men opening up the ore bodies, says Superintendent Vestal.—About thirty-five men are at work putting in the dam for the Eagle Bar M. Co. at Channel Bend.

There are seventy men working at the Cash Rock mine, near Forest Hill. They are nearly down to bedrock. This is a river mine and they cannot work after high water arrives.—Twenty men are at work driving the tunnel at Peckham Hill. They are also putting the tunnel ahead at the Seller mine and expect to break through next week.

### Plumas County.

E. C. Robinson of Oakland, part owner of the Morning Star group of mines in Granite Basin, near Quincy, says the Trenton M. & M. Co. has been incorporated to work the mines this winter and will sink a shaft on the Morning Star, which is 86 feet below the water line, to 286 feet from surface. From shaft they will drift 500 feet.

### Riverside County.

The United States Tin Co. is operating the "Temescal" tin mines near Corona. Machinery has been put in, and concentrating tables are treating the tailings dumps. The company is working under a twenty-year bond, on a royalty basis.

### Sierra County.

The Mabel Gravel M. Co. has been incorporated to operate in Sierra county, by J. W. Morrell, J. M. Haskins and J. H. Patterson of San Jose, and J. M. Walling of Nevada City.

### Shasta County.

The Mammoth C. M. Co., composed of A. F. Holden of Bingham, Utah, W. H. Coolidge, R. D. Evans, E. A. Clark et al. of Boston, Mass., having bought the Mammoth group of copper mines, near Kennett, has development work under way. The company will build a smelter. J. Filius of Redding is local agent.

W. A. Albertson, superintendent of the Clover Creek Quicksilver M. Co.'s cinnabar property on Clover creek, northeast of Redding, reports another 10-foot body of ore has been opened in the mine. The ore is high grade. The main vein in the mine is 50 feet in width.

In South Fork mining district in western Shasta county, near Redding, a custom smelter will be built on Clear creek by the Redding G. & C. Co.

### Slakiyou County.

(Special Correspondence).—The Medina G. M. Co. of Tacoma, Wash., has fifteen men at work developing a group of six claims near Oro Fino. The ledges average 2½ feet in width in diorite. These ledges were uncovered by hydraulics in working the Scott gravel mine. The main ledge courses through three consecutive claims. The longest tunnel is in 250 feet and the breast 200 feet below surface. The lower tunnel when at this point will have backs of 250 feet. Near mouth of lower tunnel a steam hoist is being put up and a shaft will be sunk. The 10-stamp mill, remodeled, is run by water power. The ore is free milling so far and increases as a base proposition as depth is gained. It yields average milling value of \$10 per ton in gold. Further development will be done to find advisability of a concentrating or a cyaniding plant. The officers of the company are: C. Saunders, Northampton, Mass., president; I. A. Towne, Tacoma, Wash., and G. W. Addison, at the mine, manager.

Near Oro Fino, A. D. Cameron of Seattle, Wash., has a bond and lease on three claims through which run three ledges. He will increase development work and next spring will build a mill.

Oro Fino, Sept. 20.

(Special Correspondence).—The Sheba mine, on Patterson creek, consisting of 200 acres, and lately owned by the Patterson Creek G. M. Co. of San Francisco, has been taken over under lease and bond by C. J. Fry et al. The general formation is granite and porphyry, with ledges 10 to 20 feet in width. The ore is free milling with sulphides and averages \$10 gold per ton.

The main shaft is down 200 feet. Under C. J. Fry's management a new ore body has been opened. The milling plant is of ten stamps and two Frue vanners. Work will continue during the coming winter.

Ore is being opened up in the Boston quartz claims, 4½ miles from Yreka. The claims are owned by W. B. Shearer and R. M. Brown of Yreka and J. W. Berry of Gazelle, with Brown as manager. The ledges are 4 feet in width and the pay ore a free-milling ribbon quartz with assay values of \$40 per ton. Open cuts for 3000 feet along apex of ledge are said to show same grade of ore.

The Mabel group of two claims is on the divide between Mill and McKinley creeks, 6 miles northeast from Scott Bar. The general formation is slate and limestone; the vein matter is 2½ feet in width of white, sugary quartz, iron stained, with free gold showing. Values are also carried in high-grade sulphurets, both iron and galena. Developments are by tunnels driven in from McKinley and Mill creek sides—one in 300 feet, others 150, 75 and 80 feet, respectively. The Columbia is another claim, owned by Fisher of San Francisco, under lease to owners of the Mabel group. A crosscut tunnel on that claim crosses the side line of the Mabel and taps the ledge 300 feet below surface. On the Columbia is a 5-stamp mill, and 100 tons of Mabel ore treated gave return of \$16 per ton in gold. The Mabel group is owned by A. J. Timmons of Yreka and is under management of J. Chase.

J. Ironsides, superintendent of the Cherry Hill mine, says he is doing development on his own property adjoining. In the 700-foot tunnel he has a 40-foot winze in free-milling quartz, with values of \$30 per ton in gold.—On east fork of Deadwood creek is the Opal group of three claims, owned by Sacramento and Nevada City men. The ledges are in slate, being ribbon quartz, mineralized, with 7% sulphurets. The concentrates assay \$350 per ton. The average value of the ledge matter is \$22 per ton in gold. A crosscut tunnel taps ledge 170 feet below surface. Drifts on the ledge amount to 1200 feet. A mill has been built and five stamps with concentrating table are being placed. C. J. Bryant is manager and has twelve men employed.

Yreka, Sept. 21.

At the Drummer Boy mine, near Yreka, formerly worked by a Mexican horse arrastra, F. W. Mahler, owner, says he has developed a vein of ore 25 feet wide, in its lowest tunnel, with a high grade vein of quartz, 2 feet on either wall, of average value of \$18 per ton, and has 175 feet of backs from the tunnel. He also has 1000 feet of drifting and raises, and three levels with ore in sight, and will build a mill and concentrator.

L. C. Monahan of Redding is opening up a quartz ledge at Cecilville, in Salmon river section, and says he will put up machinery.

At the Mount Vernon mine, at the headwaters of Greenhorn and Cherry creeks, which is being opened up by the Mount Vernon M. Co. of Spokane, Wash., Superintendent Lane says he has 385 feet of backs developed and expects to have 685 feet by spring. The vein averages 20 inches wide. An electric plant has been put in to run a sawmill that is cutting lumber for a 10-stamp mill. The buildings and the mine will be lighted by electricity. Superintendent Lane has twenty-five men on the payroll.

### Trinity County.

W. & W. Valentine expect to erect a stamp mill on their mine, near Deadwood. They have two ledges, one being 12 feet wide and carrying payable values. The other is smaller, but higher grade.—G. Simmons has a lease on the Fox & Francks mine and has put up a Huntington mill and will start crushing ore this week.

The Haas mine at Junction City has been sold to J. Elliott. Owing to lack of water, it could be operated profitably only during winter and spring months. Elliott intends putting hydraulic equipment on the Haas.—W. Montgomery, superintendent of the Bobs Farm M. Co., which has bought the Mountain Boomer mine at New River, reports work increasing.

J. G. and G. Lorenz are working their mine on Grizzly creek, near Weaverville. They have put in a sawmill and will further open up the mine.—The Lappin Co. is putting in a 5-stamp mill at its mine. The company is also running a lower tunnel to tap the ledge below the old works, so as to do away with the pumping plant.

W. M. Stover, who has bought the Unity mine at Minersville, reports work progressing. He has men cleaning out the ditch and will dig 1½ mile of new ditch.

### Tuolumne County.

C. Wagner has a five years' lease on the Stanislaus gravel mines Nos. 1, 2 and 3, covering 480 acres, near Columbia.—



Bond has been given to E. Knickerbocker, G. W. Thompson, T. Nagle, T. Harris and B. Jennings of San Jose on the Emma K., O. K., Electric and Thunderbolt claims, near Confidence, for \$10,000, payable within three years. They are to pay 25% of the gross output of the mines, which will apply on purchase price.

The Big Oak No. 1 (the Moody) mine, near Groveland, is being unwatered by Superintendent D. S. Tyer for Tait & Roper of New York, who have a bond on the property.

Work has been suspended at the Altadena mine, near Columbia, the pumps have been pulled out and the property abandoned.

The Jumper and Golden Rule mines at Stent are doing development work preparatory to extending workings when the heavy rains come. The properties are owned by the Jumper Gold Syndicate, with M. B. Kerr manager. The Jumper mill is dropping thirty stamps of its sixty, with R. E. Eampson as mill foreman.—The Santa Ysabel mine is working three shifts, sinking a shaft, with E. C. Loftus as superintendent and manager.

The Rawhide mine, near Jamestown, is reported closed down due to shortage of water.

## COLORADO.

(Special Correspondence).—The Interstate Commerce Commission, at a meeting here the past week, elicited testimony introduced showing that the freight rates made by the various railroads entering the city are much higher than to any other point for the same class of goods. Denver has brought pressure to bear and the Commission has heard the charges. On certain classes of mining machinery the rate from Chicago to Salt Lake City is about the same and in some cases less than from Denver to Salt Lake.

Contracts for the big tunnel to tap the Gunnison river, to irrigate a large section near Montrose, will soon be let. This tunnel work will require several years for completion.

About \$14,000 have been distributed to the families of the miners who were killed and maimed in the Independence depot disaster on June 6th. This amount was subscribed by citizens of Cripple Creek district, illustrating the general disposition of mining men.

Efforts are being made to have the convict Romaine, now serving sentence in the Kansas Penitentiary, pardoned, that he may be brought to this State for trial on the charge of blowing up the Independence depot, near Victor, June 6th. He has confessed to the crime and implicated several others.

Papers have been filed with the Secretary of State of the Red Mountain Railroad M. & S. Co., with a capitalization of \$5,750,000. Headquarters of the company are Phoenix, Ariz., and Philadelphia, Pa. Denver, Sept. 19.

Denver reports say the American S. & R. Co. has made a reduction in its prices for treating ores, which will enable low-grade ores to be treated at the local smelters and will result in treatment of ore that is now thrown on the dump. The Colorado & Southern railway has made a reduction in its freight rates from Georgetown, Central City and intermediate points, and the miners in Gilpin, Clear Creek and Boulder counties will increase output. H. Lyne at Denver, acting manager of the smelter, says the object in making the reduction was so the smelter could secure a large supply of quartz. Quartz is needed in smelting, and because so much concentration work has been done of late years the ores having large quantities of quartz were not sent to the smelters. The output of the mines within a radius of 100 miles of Denver is expected to be doubled because of the low smelting and freight rates. The new rates went into effect Sept. 20, and are: For ores of gross value of \$10, \$4 per ton smelting charges; ores giving from \$10 to \$18, \$5 per ton; ores of gross value of from \$18 to \$25, \$6 per ton smelting charges. Sulphur and silica in the ores will not be taken into consideration. Zinc will cause an extra smelting rate. The Colorado & Southern has made a rate of \$1.25 from Georgetown and other places of equal distance.

### Boulder County.

The F. J. K. group of claims on Woodland mountain, near Eldora, has been sold to Boston, Mass., and Pennsylvania men, who have incorporated under Colorado laws as the Woodland M. Co., with J. R. Campbell of Eldora as president and manager. Work will begin this week on the development of the mines, which are favorably located for working by tunnel.

### Clear Creek County.

Idaho Springs reports say work is progressing on the excavation for the addition to be built on the Bertha mill. The capacity will be doubled. G. W. McClanahan of Booneville, Mo., interested in the

Bertha Co., is superintending operations. Increase in the capacity of the mill will allow treatment of 100 tons of ore daily. They are adding two Kinkead mills, two batteries of rapid drop stamps, two Gilpin county bumping tables and two Wilfleys. Manager J. H. Eaton of the Dives-Pelican and Seven-Thirty properties, near Silver Plume, says a larger air compressor will take the place of the one now in use at the Burleigh tunnel. Additional drills are being put in.

The electric power line to the Stevens mine, near Silver Plume, is completed and the transformers are being set up. The motors and other equipment are ready for operation.

R. C. Vidler, manager of the Transcontinental M., M. & T. Co., operating properties in East Argentine district, near Georgetown, reports negotiations under way for transfer of one-half the company's holdings to an English company for \$1,000,000. The Vidler tunnel has been driven 600 feet and has, so far, cut seven veins carrying payable ore.

### Dolores County.

S. Larson, manager of the Horlick group of mines at Dunton, reports indications in the Horlick group of mines encouraging. He is working twenty-five men on development and is driving several tunnels. At 1400 feet below the mine is a 10-stamp mill, being used at present for sampling the ore. Its capacity will be increased. The mill will be connected with the mine by a wire-rope tramway 1400 feet in length. The company generates its own electricity.

### Gilpin County.

An air compressor has been put in at the King mine on King flats, near Central City, by the Nevada Con. G. M. & M. Co., and developments are being increased. Crosscut is being driven south on third level to cut a known ore body on the Lamberson & Warren property. T. Cornish is manager.

The Fairfield M. Co., operating the Fairfield mine at Russell Gulch, has partially suspended development to put in an air compressor. Several lessees are at work and are taking out ore.

Sinking operations are being carried on by the Newfoundland G. & S. M. & M. Co. at the Newfoundland shaft on Gunnell hill, near Central City. The shaft is down 690 feet, says Manager G. W. Mabbee. The ore bins are being filled for test shipment of 100 tons to the Rocky Mountain concentrator at Black Hawk. An addition has been made to the main shaft building.

The Peterson slow-drop stamp mill at Gilpin is being run on ores from the Gold Dirt mine and an average of twenty tons is being treated daily. The mill has been leased by the Gold Dirt M. Co. and they overhauled it. G. Williams is in charge. The Gold Dirt Co. intends to experiment this fall with cyaniding the tailings. Two four-horse teams are hauling ore from the Gold Dirt mine.—The Proconier mine in Hawkeye district has been leased and bonded to E. H. Jeffries for one year for \$25,000, and the lessee will sink the shaft and drift.

The Cashier G. M. & R. Co., operating the Pittsburg mines, near Russell gulch, is shipping smelting ores which give values of \$170 per ton. The company will put in a hoisting engine of 60 H. P. capacity and will sink the main shaft 200 feet below present depth of 620 feet. B. L. Campbell is superintendent.

Operations have been started by the Protective G. M. Co. on the Saratoga West and Ridge mining claims west of the Saratoga, near Central City. C. Heselbine of Denver is manager. Work of retimbering the Ridge is under way. The company intends to sink the shaft another 100 feet and will put in a steam hoisting plant.

The Pyrenees and Nimrod group of mines on Quartz hill, near Central City, will be operated by the Pyrenees-Nimrod M. Co., which has been incorporated with E. B. Wilson, Minneapolis, Minn., president; F. F. Reed, L. E. Tobias; manager; J. Moynahan of Idaho Springs. They have unwatered, cleaned up and prospected the workings to determine condition of the property, the work being done on the Nimrod where there is a shaft down 600 feet. Shipments will be started and machinery will be installed on the Pyrenees which is 100 feet west of the Nimrod shaft. The Pyrenees shaft is down 850 feet and it is intended to make that the main working shaft of the group.

### Gunnison County.

The Standard M. I. Co., controlling the Augusta Metal M. Co. and the Black Queen G. M. Co., is mining in Crystal in the northern part of Gunnison county, near Camp Pittsburg. The Augusta and Excelsior tunnels are opening up the ground. The Augusta Metal M. Co. has extended its tunnel in on its group of twenty-six lode claims a distance of 3000

feet. The main Augusta vein, for which the tunnel was driven, was cut at 2854 feet at a vertical depth of 1420 feet. The vein is 15 feet across. The company has drifted on it for several hundred feet both ways. But little ore has yet been taken out. The ore is galena and carries gold. The company expects to make heavy output when it completes plans of development under way, and will equip the property with machinery. A larger compressor will take the place of the one which has been in use for three years. Other improvements are to be made in the power plant, says Manager T. O'Brien. A tramway system will connect the mine with the mill. The tram will be 2 miles in length. The milling plant will be of 100 tons capacity.

The Red Jacket mine, at Pitkin, was started up last week by a new company, with J. Grant in charge. A plant of machinery is on the property.

At Whitepine the Erie M. Co. will build a zinc mill this fall.

### Hinsdale County.

The Adelia M. Co. has been incorporated by J. Uglow, W. Mendenhall and G. D. Bardwell, of Lake City, to operate a group near the Isolds mine, in Burrows Park district, south of Lake City.

The Handies Peak G. M. & M. Co. has been incorporated to carry on mining operations in Hinsdale county. Its principal offices will be in Denver. The incorporators are F. H. Sprague, S. T. McDermitt and R. R. Bollinger.

### Lake County.

Leadville reports say the Bohn shaft, on lower Carbonate hill, will start up this week and sink deeper, the Coronado and the Penrose shafts having drained this section, and there will be no difficulty in getting down to the required depth. On Rock hill the Bessie Wilgus mine, near the Dome and Rock claims, has resumed. It is owned by T. B. Wilgus of Morgantown, W. Va. Machinery is being placed. Sinking will be started.

Leadville reports say a strike has been made by J. F. and G. Campion, owners of the Reindeer mine, on Rock hill. A body of lead carbonate that measures 150 feet through has been uncovered for 1100 feet. The ore body is thought to be a continuation of the old Dome shoot. Ore is being shipped to smelters without sorting and nets \$20 a ton.—The New Monarch M. Co., on Little Ellen hill, is operating three shafts and blocking out ground. Two more boilers, 200 H. P. each, are in place at the New Monarch and sinking will resume. The present depth of the shaft is 800 feet, and at bottom bodies of oxidized ore have been opened. The shaft will go under that and get to the sulphide zone. At the Cleveland the shaft is being sunk and is opening up lead sulphides. The gold-bearing quartz ore is being kept separate as it comes from the shaft. A railway spur is being built to the shaft.

Work on the reduction plant at the Yak mine at Leadville is progressing, and the mill will be completed before winter sets in. The mill is being built to treat zinc ores by concentration.

### Larimer County.

The Le Bar Oil Co. has abandoned its well on Box Elder creek, Douglas, near Fort Collins, after attaining a depth of 2625 feet. Four sands were found, all of which contained oil, but so flooded with water that none of them would produce in paying quantities.—The Douglas Oil Fields Co. has sold its entire holdings to an English company headed by R. O. Hilliard of London.

### Ouray County.

The Treasury T., M. & R. Co., at Red Mountain, has started building a stamp mill. Excavation will be made for a 100-ton plant, but for present machinery will be put in for fifty tons daily.

More men are being put on at the Ouray Chief mine at Ouray. The shaft which is down 100 feet will be sunk to the contact at 300 feet. In bottom of shaft is a body of high-grade ore. Stopes and drifts will be worked by hand and later machine drills will be put in.

### San Juan County.

The Silver Wing mill above Eureka, on the Animas river, will be overhauled and put in operation by M. Schmelzer for the Eureka Exploration Co. that has 1000 tons of ore mined at the Silver Wing mine near the mill and has ore at the Frederica mine 2 miles from the mill. The mill has capacity of fifty tons a day. Extension of the Silverton Northern Railroad, and a short tram line connecting the mill with bins beside the track, will be built.

The Galty Boy group of seven claims has been sold to T. Ross et al. of Waynesburg, Pa., for \$40,000. The Galty Boy group is in Dry gulch, 1 mile from Cement creek, near Gladstone.

Negotiations are reported pending for sale of the Kendrick-Gelder smelter, at

Silverton, to the Red Mountain Railway Mining & Smelting Co., of Red Mountain. This smelter is said to be adapted to treatment of the heavy sulphide ores of the Red Mountain country.

Daily shipments from Silverton average seven cars of ore and concentrates, says the Silverton Standard. The incoming freight, of coal, lumber, machinery, merchandise, etc., also averages seven cars daily.

### Summit County.

Superintendent C. A. Finding says the Mountain Pride mine on Baldy, near Breckenridge, will resume operations.

### Teller County.

Lessees Wright & Co., operating the Zenobia claim on Bull Hill, at Victor, owned by the Stratton estate, report sending out ore averaging two ounces gold per ton. The ore is mined from the 900 foot level, 550 feet north of the shaft, where the vein averages 5 feet in width. They are shipping a carload per day.

Whiting & Co., who have a lease on the Bluebird dump, near Cripple Creek, are shipping two cars of ore per day, and will double the tonnage. They have put in machinery, including a 15 H. P. electric motor, with which the ore is raised on a tram car from the dump to a height of 80 feet. By gravity the ore passes through screens, through a spray washer and then into the bins and tanks. The ore is giving returns averaging \$15 in gold per ton. It is estimated that there are 20,000 tons of rock in the Bluebird dump.

Seven sets of lessees are operating on the Prince Albert group on Beacon hill, at Victor, and all have ore. Two other operators have been granted a prospectors' license. The company will deepen the shaft an additional 200 feet. This will open the ground to a depth of 450 feet.

Work will be resumed in the Moffat tunnel, which is in over a mile and in its course penetrates Gold and Raven hills. Its destination is a point on Bull hill below the Victor mine. A number of properties may be reached from the adit. Operations will be under direction of J. M. Parfet, manager.—Production at the Zoe mine, on east slope of Beacon hill, has begun by Nichols & Co. A 4-foot body of ore is opened at depth. Values run \$30 per ton.

## IDAHO.

### Bannock County.

W. R. Kivett of Boise says in Lava Creek mining district, near Arcola, he has bought a group of twelve claims and will develop the ground. Equipment will be put in.

### Boise County.

W. H. Simpson of Boston, Mass., has bought at Pearl the Mather claim, near the Black Pearl mine. It has been developed by a tunnel. At Marshall lake, in Idaho county, he has also bought the Big Dutchman group of seventeen claims.

### Elmore County.

M. M. Johnson, mine manager of the Newhouse M. Co. of Salt Lake City, Utah, reports having an option on a group of gold-bearing mines at Atlanta. Developments at depth of 400 feet on the ledge show a width of 7 feet between walls, averaging \$15 per ton. A mill will be built in the spring.

N. L. Raber, manager of the Canton G. M. & Dredging Co., operating on Snake river at Glenn Falls, near Glenn's Ferry, says a new dredger has been completed at a cost of \$55,000. It has a capacity of handling 2000 yards of gravel daily.

### Idaho County.

F. J. Conroy of Nampa, manager of the New Century M. Co., operating in Black Warrior district, reports forty men at work, building a road, by which to take in mining and milling machinery. Gold ore is being opened up in Mammoth No. 2 of the company's group.

G. L. Hedges, manager of several mines at Buffalo Hump, reports he has bought the Lone Star group in the Four Mile country, 20 miles north of Hump. The Lone Star has a porphyry dyke 300 feet wide which Hedges says will average \$4 per ton in free-gold values. It can be worked by quarry system. Supplies are being taken to the mine.

The Hogan mine, near Elk City, says G. L. Hedges, proposes to increase the mill from 20 to 100 stamps. They will put in a cyanide plant. They report making a profit of \$1 a ton on the ore. Treatment costs 80 cents a ton.

### Nez Perces County.

Culdesac reports say deposits of aluminum ore (presumably bauxite) have been found near the brick plant north of Culdesac. It is said the organization of a company is under way to develop the land held by the brick company and to arrange for extracting the aluminum values.



**Shoshone County.**

O. Gorke et al. of Chicago, Ill., of the Gold Dollar M. Co., owning placer and quartz properties in Pierce City district, near Greer, have an option on the Rose quartz mine for \$40,000. The company is operating its placers and proposes building a 20-stamp or 30-stamp mill for the quartz property. The Gold Dollar Co. owns the Chicago-Pierce placers, covering 320 acres.

Low water in the streams is reported affecting the mining companies in the Cour d'Alenes. At the Morning mine at Mullan there are but forty-five men at mine and mill, over 200 employees being laid off last week on account of lack of water. The mill is closed down. Operations will not be resumed until the rains have raised the creeks. This may not be before October 15. The Black Cloud mill has suspended operations, due to low water in Nine Mile creek, and ten men are employed where there were thirty on September 1. The low stage of water in Canyon creek is causing trouble with the tailings at the Mammoth and Standard mills. There is insufficient water to carry the tailings far away, which has caused the channel to fill up and the water to spread. The Federal Co. has men at work attempting to keep the water in the channel.

A consolidation has been made by which the Bernier and Flynn groups will be worked through the lowest tunnel level of the Frisco mine at Gem. The Bernier group adjoins the Black Bear, which is part of the Frisco group, and the Flynn group lies in line and southeast of the Bernier group, extending to the summit of the divide between Canyon creek and the South Fork. The Frisco tunnel, beginning at the mill, extends several thousand feet, reaching into the Black Bear claim. This consolidation gives 5000 feet in length of unopened ground. The Black Bear Fraction, of the Bernier group, has ore in the upper workings carrying values in silver and lead. The Frisco tunnel extended will come under that ore body at vertical depth of 1400 feet. Extended to the east limit of the Flynn group it will reach a depth of 2500 feet. D. M. Hyman, owner of the Frisco mine, P. Bernier and F. Burbidge, of Spokane, Wash., are principal owners. The consolidation will be incorporated.

The main shaft on the mine, so that cars from the mine will run the ore direct from the cage to the ore bins in the mill. The mill will also be near the tunnel development.

On Miller mountain, near Weiser, the Magnolia Co. is operating its 5-stamp mill and has cut the ore shoot in its tunnel at a depth of 165 feet from surface. The ore is free milling.

On Little Goose creek, 4 miles east of Meadows, the Rock Flat M. & M. Co. is developing a group and reports opening up a 45-foot ore body. The management expects next spring to build a 100-ton cyanide plant at mouth of the tunnel. The company has been incorporated by A. H. Butler, D. C. Blake, S. H. Coon, W. E. Webb and C. W. Merritt of Meadows.

The Hunter mill at Mullan is being overhauled and improved machinery put in under direction of W. A. Bradley. Development work continues in the mine.

The electric power line for Larson & Greenough's compressor plant at mouth of Grouse gulch is reaching completion. The addition to the compressor plant is under cover and ready for the machinery. Another flume line has also been built from Rock creek to the compressor with 150 feet fall.

A company has been incorporated by T. W. Clayton, G. E. Miller, D. Keith, J. W. Phillips and E. G. Soule of Spokane, Wash., and A. J. Prichard and S. V. Osburn of Osburn to operate the Evolution group below Osburn.

**Washington County.**

The Flat Rock M. & M. Co., Ltd., has been organized by A. H. Butler, D. C. Blake, S. H. Coon, W. Webb and C. W. Merritt. The ground owned by the company comprises the B. B. B. placer and other claims near Meadows. A crushing plant and a cyanide tank will be put in. Fifteen men will be put to work.

Manager C. F. Macey of the Iron Springs M. Co. says he will build a cyanide mill on the company's mines at Iron Springs, near Council. Foundations are laid. The saw mill owned by the company is getting out lumber for the mill. The reduction works will be located below

**KANSAS.**

**Cherokee County.**

At Galena the pumps on the Windsor ground have been repaired and are unwatering the workings. Four pumps are going and it is estimated 25,000 gallons a minute are being thrown. The Murphy pumps were also started to drain the ground there. On the Southside ground

24,000 gallons were being pumped when the water was "beaten" at the 94-foot level, at which the miners are working. Boughton Bros. have started up the Victoria mill. Jeffries & Co. will put in an 8-inch pump on the Wyandotte ground.

**MICHIGAN.**

**Houghton County.**

Houghton reports give the copper output of the Lake mines for August as follows:

Mines.	Tons.
Quincy	1,306
Atlantic	324
Mohawk	189
Michigan	171
Franklin	350
Winona	40
Adventure	115
Baltic	788
Tricontinent	635
Copper Range	1,823
Champion	800
Oscoda	1,210
Wolverine	506
Massachusetts	105
Centennial	150
Columet & Hecla	3,390
Tamarack	410
Isle Royale	105
Phonix	80
Abnbeck	29

Increase is shown over the output for the corresponding month of 1903 by all except the Winona, Wolverine, Massachusetts and Isle Royale.

**MISSOURI.**

Joplin reports give the output of the Missouri-Kansas-Arkansas lead-zinc district for the thirty-seven weeks of 1904, ended September 16, at 365,921,870 pounds of zinc, valued at \$6,097,810, and 46,194,990 pounds of lead, value, \$1,257,790. Both metals show an increase of about 5,000,000 pounds in quantity over the same period of last year.

**Jasper County.**

J. J. Luck is building a mill on the Horton land at Webb City and expects to have it ready for operation next month; an air compressor is also going in.—L. M. Janes is building a mill at Hard Shaft on the American Cornfield lease. The mine and mill are owned by the Fullerton M. Co.—The New Hope mill, being erected by J. J. Luck et al., is progressing. They have developed a sheet of zinc ore at depth of 200 feet. Six drill holes have been put down on the lease, which includes 123 acres, and all are said to show same run of ore.

The Baker mine in Central valley, near Joplin, has been leased by G. H. Davis and will be operated by the Ozark Lead Co.

**MONTANA.**

**Gallatin County.**

Bozeman reports say A. D. Sheridan and G. Whitney, near mouth of Leverick canyon, made a strike of copper showing a vein 12 inches which assays 13% of copper and \$13 in gold. They have also struck a deposit of magnetite, with a trace of gold. The Bozeman C. Co. has been incorporated to develop the property by A. D. Sheridan, G. Whitney, M. L. Rickman, J. T. Mitchell, C. O. Daggett, W. J. Killiam and R. A. Blackall of Bozeman.

**NEVADA.**

**Esmeralda County.**

The Kinkead-Goldfield Con. M. Co. has been incorporated to operate mines in Esmeralda county, and owns a group of fifteen claims near Kinkead, 12 miles east of Hawthorne. Ore has been taken out assaying \$15 in gold. A mill will be built. The mines are 3 miles north of the railroad track; water can be procured by sinking in the basin near the mines, says the Hawthorne Bulletin.

The Goldfield Great Bend M. Co. has been organized in Salt Lake City, Utah, to operate the Great Bend group, near Diamondfield, in Goldfield district. The officers are F. A. Keith president, F. B. Cook and P. Porter.

The New York-Tonopah M. Co. has been reorganized as the New York-Tonopah Con. M. Co., and will resume operations. The New York-Tonopah is equipped with a hoisting plant.

**Lincoln County.**

The bond of the Good Hope M. Co. on the Good Hope mine at Searchlight has reverted to the owners, G. F. Colton et al. Operations will continue under Superintendent T. L. Henderson.

The cement blocks for the ten additional stamps in the Quartette mill at Searchlight are in. Other improvements will be a larger hoist and enlarging the electric plant. The hoist will be 60 H. P. and the electric plant will have a total of 90 H. P. F. J. Harrington is superintendent.

Smith Bros. and Ryan Bros. of Caliente, owners of the Hope and Jackson mines west of Caliente, will resume work on the claims. There are 380 feet of development work on the Hope in a shaft sunk on a ledge 3 feet wide, carrying values of \$13

in gold, silver and copper. There is a 5-stamp mill and abundant water for treatment of ore. A good wagon road runs from the mines to the railroad. A ledge of cinnabar has been struck 3½ miles north of Caliente.

J. Foley, owner of the U. S. group of free-gold claims near Virgin river, 23 miles south of Moapa, reports striking a ledge in his 200-foot tunnel 4 feet wide, with ore assaying \$160. It is coarse free gold in honeycomb, quartz in lime and porphyry. He says he will build a mill.

Well drilling machinery is being set up by the Southwestern M. Co., says C. Gracey, superintendent, at El Dorado canyon. A well will be drilled at the Wall Street mine, owned by the company, to obtain water and to prospect the vein at depth. The mine is some distance from the mill, and if water can be obtained in quantity it is expected a reduction plant will be built at the mine.

**Nye County.**

C. E. Knox, president of the Montana-Tonopah M. Co., operating at Tonopah, in his report for the past fiscal year says ore of value of \$3,162,655 is awaiting reduction. The ores exposed are divided into two classes. Of the first class there are 14,166 tons of net value of \$98.25; of the second class, 70,834 tons of net value of \$25; these deductions being based on results derived from sales to the smelter. During the year the management opened up 4828 feet of ground, with a total of 7337 for the two years since opening the mine. Of this a large percentage was in ore, one drift extending 200 feet along strike of Macdonald ledge, which has maintained average width of 12 feet. From ores sold during the year there was derived \$201,000; shipments, however, having been confined to actual working requirements, while in July, after an all-rail outlet had been assured, production was practically suspended. On September 7, after delays by washouts, shipments were resumed. The crosscut on the 765-foot level is advancing. A new shaft will be sunk 500 feet north of the present one, and will connect with the Macdonald ledge, 970 feet below surface, while a recent development in the North Star shows ore in the Montana's south ledge, 150 feet below the 765-foot level in the Montana. D. B. Gillies, of Butte, Mont., is manager and superintendent.

At Tonopah, F. W. Hunter of San Francisco, Cal., has bought the Z and Colleen Bawn claims adjoining the Red Rock claim of the Pittsburg-Tonopah M. Co. on the west, and a company will be incorporated and development work started.

The drifts from the 60-foot level of the Lucky Baldwin mine at Gold Mountain are opening up ore. R. T. Brodek, manager, is having trial crushing at the mill of the Tonopah M. & Dev. Co. The engine has been repaired and the 10-stamp mill resumed crushing leasers' ore. Since starting up the mill has turned out 146 bars of bullion weighing 200,296 ounces, of a total value of \$100,000.

**Storey County.**

Thirty-one mining companies, composing the Comstock Pumping Association, have contracted with the Truckee River General Electric Co. for additional power, giving the mines two systems of supply, which can be used singly or together as required.

**Washoe County.**

Gold is reported found on bedrock at the reservoir being built by the Hunter Creek W. Co., 2 miles southwest of Reno.

The Springfield-Nevada M. Co., at Olinghouse, near Wadsworth, proposes putting in more mills, and will either arrange to utilize supply of water of winter, spring and early summer or take in water from Fort Defiance. In the former they will be limited to a nine months' milling season, at capacity of 100 to 150 tons per day, while a continuous run is possible with water from Fort Defiance. Superintendent J. D. Poole thinks the company will then be able to bring the cost of ore treatment down to \$1 per ton. There are several deposits of ore that carry \$4 per ton in free gold.

**White Pine County.**

The Pilot Knob mines at Ely are to be supplied with smelting facilities. In the Pilot Knob bodies of low-grade copper ores have been developed, says J. L. Gireaux, principal owner and manager.

**NEW MEXICO.**

**Colfax County.**

Two strikes are reported made at Elizabethtown. The first was in the Deep tunnel and the ore carries petzite (a silver-gold telluride). The Deep tunnel is in Baldy mountain 1400 feet and the vein struck, which is 6 feet in width, was cut at a depth of 900 feet from the surface. A considerable flow of water was opened up. The other strike was made on Goose creek, showing a body of sylvanite, and is 6 miles from Elizabethtown.

**Rio Arriba County.**

Machinery, consisting of boiler, hoist and drills, is being put in by the Dixie M. Co. at Hopewell.

**OREGON.**

**Baker County.**

The 10-stamp mill at the Emma mine, 6 miles east of Baker City, has been put in operation. The mill is at mouth of 1000-foot tunnel, which taps the pay shoot at depth of 500 feet. The mill is operated by electricity.—The big hoisting plant at the Virtue mine is in operation and work has been resumed on the triple-compartment shaft, which is down 300 feet. The hoisting plant is of capacity to sink 2000 feet. The number of men at the mine will be increased.

The Morning mine at Greenhorn, near Sumpter, has been taken over by the Morning G. M. Co., in which D. L. Killen, H. H. Ames et al. of Sumpter are interested. H. H. Nicholson is consulting engineer. A crosscut of 500 feet has been driven on the mill level and will open the Fairview and Parallel veins near their intersection. This work will be completed. The equipment of the Morning consists of a 5-foot Bryan mill, two concentrating tables, rock breaker of the Blake type, and 35 H. P. steam plant.

The Sumpter smelter at Sumpter, after several months' idleness undergoing alterations, has again been blown in.

Baker City reports say the Maxwell group, consisting of twenty-five claims, has been sold by the Pierce M. Co. to the Elkhorn Con. G. M. Co. The property is on Rock creek, 20 miles northwest of Baker City. Water rights, a 10-stamp quartz mill and a millsite are included in the property transferred for \$66,000.

Baker City reports say the reorganization of the Red Boy Con. M. Co. under the direction of A. Prussing of Chicago, Ill., who bought the property at sheriff's sale, has been completed, and \$100,000 will be available for development of the property. Operations will resume at the Red Boy. The development work will consist of 2000 feet of work. The new company will be the Red Boy Mines Co. The following are directors and officers: R. Nye, Fremont, Neb., president; J. G. English, R. P. Schneider, A. Prussing, J. O. Milligan, E. J. Godfrey and J. Thompson (the last named of Baker City).

H. Gerhardus, superintendent of the Monarch group in Cable Cove district, near Bourne, comprising eleven claims, owned by the Monarch G. M. & Dev. Co. of Portland, reports progress made this season in running on Crater ledge. The main ledge was crosscut for 30 feet. The ore extends across the Monarch, Debs and Hope ledges, all of which run into Crater ledge at one point. The dump contains 1000 tons of ore, which assays average of \$17, and a 5-stamp mill will be built. He has men on a new road that will cut off 5 miles of the distance from the camp to Bourne. F. Jennings is president of the Monarch company.

**Douglas County.**

The Continental G. M. Co., operating on South Myrtle creek, near Roseburg, will build a 40-ton milling plant, says Manager W. B. Stewart. Three tunnels are being driven on the main vein and all opening up ore.

Bohemia reports say the main working tunnel of Le Roy M. Co. is now in 600 feet on the ledge, which shows concentrating ore. The ledge has been exposed by six tunnels and a shaft for 1200 feet, showing average width of 15 feet. A reduction plant will be built. Short aerial tramways will be built from the lower tunnels on either side of the canyon to the mill-site on Champion creek, near Bohemia, where water and timber is at hand. The company has an air compressor plant and drills. A sawmill will be installed to turn out lumber and timbers for the plant and bunk and boarding houses.

Work on the Grizzly group, near Bohemia, will be resumed next week. The upper tunnel is in 500 feet, showing a shoot of ore 8 feet wide, with 180 feet of backs. About 200 feet lower down a crosscut tunnel is being run to cut the ledge. The property is on Grizzly mountain, and the ore is concentrating and smelting. The mine has millsite, water power and timber.

In Champion basin at Bohemia the Oregon Securities Co. is running an 8x9 tunnel through Grouse mountain to connect by electric railway the Musick mine on east slope of Bohemia mountain with the new mill in Champion basin. This tunnel will be 1600 feet in length, of which 800 feet is completed, and work is progressing at the rate of 5 feet daily. From mouth of tunnel down the mountain has been built a double-track endless wire tramway for 2600 feet to the mill, and enclosed with snowsheds. The 30-stamp mill is being finished. The company has an assay plant. The 500 H. P. electric plant of the company on Brass creek, 5 miles below, is in operation. The sawmill,



near the mill, is run with electricity. In the tunnel, at 400 feet, the Gray Eagle ledge has been cut, showing 6 feet of milling ore, and at 200 feet farther in, the Excelsior ledge has been cut, exposing 50 feet of milling ore. At 1000 feet the Champion ledge will be cut. All these ledges will have 1000 feet of backs from the tunnel level. One shift of two drills is driving, but a double shift will be put on next week.

F. J. Hard of the Vesuvius mine, near Bohemia, will add an electric lighting plant to his mill. The Vesuvius mill is about completed and will be ready to start work about Oct. 1st.

#### Grant County.

Near Alamo, Manager Witherop of the Oro Fino says the mine is being equipped for deep sinking. It includes a 40 H. P. boiler, hoisting and sinking plant of 600 feet capacity and pump. It is intended to sink between vein 1 and veins 2 and 3 and crosscut from the levels to the veins, which will be explored by drifts.

C. J. Allen, of Portland, principal owner of the Monumental mine, near Granite, has put men to work to reopen the mine. The machinery is being overhauled, which, with addition of improvements, will put the plant in condition to handle ore. There is a 6-drill compressor in the equipment. They will sink from the lower adit level at 1100 feet from portal of main crosscut. Alteration of the mill will be taken up next spring. The pan amalgamators will be taken out and amalgamating plates and concentrators put in. The ore will be roasted and wet-crushed. At present the Monumental mill is for dry crushing and the pan amalgamating process. By changing the mortars for new types the battery will be used as it is. Cyanide will be used after amalgamation and concentration, says Manager Allen.

#### Jackson County.

Opp, Reddy & Perry will put in machinery for a mill on Jackson creek below their present mill, near Jacksonville. Manager J. W. Opp says ore can be brought to the mill on cars by gravity from the mine. A building for a 20-stamp mill will be erected and ten stamps will be first put in. Power will be electricity from one of the Rogue river power stations.

Progress is reported in development at the Blue Lead copper mine of Upper Applegate, near Applegate, under management of the Bradshaw M. Co. of New York. Twenty-five men are employed. Superintendent G. W. Geddes states his company will put in a compressor and drive the tunnels with power drills.

#### Josephine County.

F. D. Million of Ashland and W. S. Love of Portland, with J. W. Thomasson, owners of the Blue Channel M. & D. Co., will put a hydraulic plant in on their claim in Robinson gulch, near Wolf creek. The property consists of three placer claims. Men are at work cleaning out ditches and sluice boxes, says Superintendent Thomasson.

Ore carrying free gold and sylvanite values is being taken out at the Lewis & Clark mine on Canyon creek, near Kerby. The mine is being opened up by the Lewis & Clark M. Co., of which M. Layman is manager, and headquarters are at Urbana, Ill. The formation is limestone and slate. The rich ores are from a depth of 100 feet in a tunnel on the vein. Development will proceed in this and also in five other tunnels. The company proposes to put in a milling plant soon. Electric drills are being used.

F. V. Metts, manager of the Silver creek basin placer mines near Grants Pass, says work is being carried on and 600 feet of tunnel is completed. The ditch is finished and the sawmill ready for operation. The tunnel will tap the basin at a depth of 210 feet from the surface, and 300 feet of tunnel remains to be run before the basin is tapped. After the tunnel is put through it will be enlarged and retimbered and double flumes put in.

C. Crane, superintendent of the Gold Lucky Queen mine on Jump-Off-Joe creek, near Grants Pass, says a 10-stamp mill will be put in this fall. The Granite Hill mine reports developing an ore shoot 500 feet long, the vein being 5 feet in width at the 200-foot level. The ore is milling rock. The company is steadily operating five stamps of the mill.

The Galice Con. M. Co. has opened a low bar on Rogue river, below Galice creek, near Grants Pass, taking advantage of the low water stage. A flume has been extended into the river. The gravel is said to be yielding 50 cents per yard.

At the Mountain Lion mine, in Missouri Flat district, 12 miles south of Grant's Pass, work is reported progressing under Crawford & Poindexter. Since June they have added 500 feet of tunnel, exposing two ore veins of an average width of 14 inches each. Two stopes have been

opened. The 5-stamp mill and concentrator have been overhauled and remodeled. Assay office and other buildings have been put up. The Mountain Lion is under bond to J. S. Crawford, M. B. Smith of Minneapolis, Minn., and C. H. Poindexter.

In Sucker Creek district, south of Holland, the Sucker Creek M. Co. has holdings of placer ground on California Bar. The company is working the ground and determining its value for more extensive operations by pumping and hoisting. While it is prospect work, and being done to ascertain the width and depth of the pay channel, the gravel is being hoisted and dumped into a sluiceway provided with riffles, where the gold is washed out, says Manager H. Warner. Two pumps supply water for the sluices and keep out the water from the drifts. A 7-mile ditch has been surveyed from the head of Sucker creek.

T. T. Burkhart of Portland, interested in the Gold Bug mine in Mount Reuben district, near Grants Pass, says development is progressing. The 5-stamp mill is not running at present, but will be opened again next month. The Benton, Gold Bug, Kramer and other mines in same district are being opened up.

#### Lane County.

A. O. Waller of the Great Northern Dev. Co., which operates near Blue River, says the Lucky Boy, which has been shut down while adding machinery, will resume operations this week. He also reports Woods & Diamond have started up their 2-stamp mill near the Lucky Boy.

### SOUTH DAKOTA.

#### Lawrence County.

The Copper, Gold & Silver M. Co. group at Galena has been bonded to J. S. Ford et al. of Chicago, Ill., who will build a mill and operate the mine. The price is \$25,000. There is low-grade ore in sight. The Gilt Edge Maid Co., 2 miles from Galena, has its 150-ton plant enclosed. The Cora M. Co. has been shut down temporarily. It is said there are 20,000 tons of ore on the dump, averaging \$5 per ton.

The Branch Mint M. Co., near Galena, is making improvements, including a 120-stamp mill and a branch railroad 3½ miles long.

It is reported the Homestake M. Co. at Lead will replace the horses hauling ore underground with compressed air engines. T. J. Grier is manager.

The Rossiter mill at Deadwood has resumed operations and will treat 60,000 tons of tailings on Deadwood creek, said to assay \$2.40. It is said a successful extraction can be made at cost of 43 cents per ton. Cost of conveying the ore from dump to tanks is given at 8 cents and the emptying at 2 cents per ton, or a total expense of 53 cents per ton for handling and treatment. The dump is 125 feet from the mill.

Sinking in the shaft of the Anaconda M. Co. near Lead will begin this week. The mine is on south extension of the Homestake ore belt and the shaft is following down a vein of free-milling ore. There is a steam hoisting plant on the ground.

The framework of the 100-ton cyanide plant of the Gilt Edge-Maid M. Co., east of Deadwood, is up and machinery being put in to run the plant. S. A. Duncan is manager. At the Dakota mine at Bald mountain the framework for the steam hoist is up. A shaft is being sunk to the quartzite level, already being 65 feet deep. A body of low-grade ore has been cut in the shaft and a mill will be built. The Dakota is shipping 130 tons of ore daily.

#### Pennington County.

The Holy Terror and Keystone mines at Keystone have been sold to C. J. Gunderson, A. E. Lee et al. of Vermillion. The mines have been idle for a year and the lower workings are under water. They will be opened and further developed. The ore carries arsenic and sulphides, and roasters will be put in to treat the mill tailings. The ore in the Keystone will be worked first and will be taken out through the Holy Terror shaft. Value is \$5 gold per ton.

### UTAH.

August, in the ore and bullion market, closed on settlements aggregating \$2,317,900, compared with a total of \$1,171,500 for August, 1903, says the Salt Lake Tribune, while to it may be added \$1,000,000 derived from sales of copper bullion containing gold and silver by owners of the copper smelters. There has been enforced curtailment of output at some of the producers. The American at Bingham blew in another furnace; the Bingham is installing a fifth and preparing with other equipment to make greater capacity. At the United States smelter, also at Bingham, work on the lead smelting plant is progressing, says G. K. Fisher,

superintendent of construction. Other plants are increasing capacities. The August output of pig-copper, in combination with gold and silver forwarded to the Eastern refineries during the month, was 3,744,986 pounds, compared with 2,573,580 pounds for August, 1903, divided as follows:

	Pounds.
Bingham Con.	1,030,400
Utah Con.	1,551,824
United States	1,152,762
Copper bullion contained in A. S. & R. Co. matte	900,000
Total pounds	4,644,986

The furnaces of the Utah Con. at Bingham are reducing metallic contents from 750 tons of ore daily, which will be increased to 800 tons.

#### Grand County.

Manager Wheat of the Grouse Mountain M. Co., operating at Miner's basin, near Basin, in La Sal district, says work will start next month, building a mill. L. V. Guthrie of Huntington, W. Va., is vice-president of the company.

#### Iron County.

Operations at the Johnny mines and mill at Stateline have been suspended indefinitely, as the water in the properties has become too heavy to handle with the equipment, says Superintendent Francis.

#### Juab County.

Work will be resumed in the Victoria mine at Tintic, either through the shaft put down by the company or the workings of the Grand Central mines, says Manager J. C. Sullivan.

Preparations are being made for the development of the ground owned by the McKinley M. Co. near Eureka. It is said a deal is under way to combine that ground with the property owned by the General Logan M. Co.

At Robinson, in the Mammoth mill, which has been closed for a year, dropping of the stamps has been resumed, and sixty men will be employed in the mill. At the Mammoth mine the main shaft, which is down 1990 feet, is going down at rate of 5 feet a day and will be sunk to the 2100-foot level. Shipments of first-class ore concentrates will be resumed.

The Latham M. & S. Co. will proceed with the equipment of its properties in Deep Creek section, near Fish Springs, for the concentration of its ores, says Manager Moats of Salt Lake City. The annual report of the management shows 32,900 tons of ore averaging 26% lead, ten ounces silver, 3% copper and fractional values in gold. The financial statement shows that during the year there has been expended on development of the properties \$41,775.71. G. L. Moats is treasurer and manager.

The Eagle Eye M. & M. Co. has been incorporated at Salt Lake City to develop properties in Tintic mining district. The officers are A. C. Lee, L. O. Ensign and B. A. Midgley.

#### Plute County.

The Annie Laurie M. Co. reports it will increase equipment in its mill at Kimberly, near Marysville, and will also put in electric haulage system in its lower tunnel.

#### Salt Lake County.

Excavations are being made for a concentrating mill for the Continental-Alta mines at Alta, says Manager Crowther. The first unit of the plant will have capacity of 100 tons daily.

A heavier hoisting plant will be put in at the Butler-Liberal mine in Bingham. The hoist will be placed over the shaft which is to connect with the main tunnel workings. Raising to the shaft is in progress, says Manager Jacobs.

August at the properties of the Boston Con. at Bingham, says Manager Johnson, gave net earnings of \$42,000, and yet the smelter required during last half of month to confine its daily output to 250 tons. There was forwarded to Bingham Con. smelter 7567 tons, showing 5% copper and \$6 gold and silver. A concentrator will be built.

The Valentine C. & G. M. Co. has been incorporated at Salt Lake City by J. W. Cairns, president; E. M. Cairns and D. M. Kennedy.

The Utah-Apex Co. at Bingham reports work will be started on a tunnel by which the expense of an angular haul will be reduced. It will be driven 3000 feet, the first vein to be tapped at 600 feet from the mouth. With this as an outlet a tramway over which to forward the output to market will be built. It is also said the company will provide a mill, and to that end has bought a site. Manager Orem of the Utah-Apex and New Red Wing is rebuilding the flume of the Live Oak mill, which was burned several years ago. P. M. McCrea is superintendent.

Material with which to build a tramway between the United States M. Co.'s Galena group and Jordan head-house, on the company's main line, is now on the ground, says Superintendent Mayberry at Bingham, and 1700 feet of aerial tramway

will be built. Lead, silver and gold-bearing ore have been opened up. Foreman Garland of the company's Telegraph group, says he is forwarding 350 tons of ore daily, and is prepared to increase the volume. In addition to the tonnage from the Telegraph, there is being sent out from the Old Jordan group 225 tons daily, or a total of 575 tons from the two, the contents consisting of copper, gold and silver in iron sulphides.—Bingham camp is supplying the mills and furnaces with 80,000 tons of ore per month.

#### Summit County.

Agreement has been signed by which the Daly West M. Co. acquires use of Ontario drain tunnel at Park City, and through which ore of former will ultimately pass. Work of extending the drain tunnel, now over 17,000 feet into the zone, will be started, the end-line of the Daly West to be reached in 1500 feet, the shaft to be connected with at a point 1500 feet in from the end line. With this the water problem at the Daly West will be settled, the horizon at which Daly West territory is penetrated being 1600 feet below that at which water has made its appearance in that mine. J. E. Bamberger, of Salt Lake City, is president of the Daly West Co.

At Park City, Manager C. L. Rood of the Daly M. Co. says operations have been discontinued at the Mazeppa shaft and that the Mazeppa country will be opened through the old Federal tunnel. Men are at work cleaning out the old tunnel workings. Crosscutting from the nearest point in the Federal tunnel level has begun in direction of the Mazeppa ledge. Power drills will be used. The ground has been explored to depth of 200 feet by the shaft and the tunnel will open the ground at 200 feet deeper and more than that on the dip of the vein. To get directly under the Mazeppa shaft, it is said 600 feet of work will have to be done.

Operations have been resumed at the Comstock mill at Park City.

#### Tooele County.

It is reported T. C. Wiswall et al., owning the Geyser-Marion group at Mercur, will also take over the properties of the Gold Dust M. Co. and the Silver Cloud mine. The Gold Dust has gold-bearing ores, as also the Silver Cloud. A cyanide plant will be built to handle the tailings dumps of the Geyser-Marion group. Some of the sands are said to show \$3 per ton gold, and the average is \$1. The ores from the Gold Dust and Silver Cloud will be mixed with the auriferous tailings in the dumps for treatment.

E. J. Raddatz, superintendent of the Honerine properties at Stockton, says good headway is being made in driving the tunnel to connect with the main Honerine shaft notwithstanding that water is issuing from mouth of the tunnel at the rate of 7000 gallons per minute, and that it makes a stream 2½ feet deep. The adit is completed for 6350 feet, and will be driven 650 feet more to make connection with the Honerine shaft. The mill is running and is reducing to concentrates 300 tons of ore per day.

For 1000 pounds of slag from its refinery at the mill at Mercur the management of the Con. Mercur reports last week receiving \$4221.28.

### WASHINGTON.

#### Stevens County.

A. L. Hughes, manager of the Knob Hill and American Flag Con., near Rock Cut, Lake Perie district, reports cross-cutting a 75-foot ledge assaying \$10 per ton. The company has cut the First Thought ledge on the American Flag Con., and development work will be increased. The American Flag Con. is ¼ of a mile from the First Thought. Hughes states the Giant company will put in an air compressor on its mine near the American Flag Con. The Abe Lincoln property will start next week after an idleness of several months.

#### Whatcom County.

The mine owners of Slate Creek mining district are considering building a smelter for that region, says O. B. Brown of Chicago, Ill., secretary and treasurer of the Chancellor G. M. Co., operating in that district. The chief problems are transportation and fluxing ores. A suitable site to build the plant, says Brown, is below the Chancellor mine. Pending decision regarding the smelter the Chancellor company is withholding the installation of a 10-stamp mill. Brown says it may be necessary to have a concentrating plant even though a smelter is built.

### WYOMING.

#### Carbon County.

Another strike is reported made in the Doane Rambler copper mine at Rambler. In running a crosscut from a tunnel 125 feet from the old shaft, a breast of copper ore 4 feet wide was cut. It is estimated the ore runs 15% copper.



FOREIGN.

BRITISH COLUMBIA.

Boundary District.

A compressor plant will be put in at the Betts & Hesperus mine of the Hesperus G. & C. M. Co. of Marquette, Mich. The mine is 3 miles from Grand Forks.

Greenwood reports say the E. P. U. mine has been bought by W. F. Honey et al. of Park River, N. Dak. D. McIntosh, manager of the Providence M. Co., will have charge. Men will be set to work this week. — The Combination, north of Greenwood, adjacent to the Elkhorn, has been bonded to Gaunce & Wickwire. The property will be incorporated. — A deal is reported pending for the Canadian mine, owned by J. Sutherland.

The Montreal & Boston C. Co. has put men to work on the Rawhide, adjoining the Snowshoe mine, near Phoenix, to get ready for making shipments of ore. A tunnel is into the hill and connected with the shaft, showing up bodies of ore. It is intended to build ore bunkers at the Rawhide capable of holding twenty railroad cars of ore, and to ship the same to the company's Boundary Falls smelter. At the Brooklyn enlarging and retimbering the incline shaft is progressing. It is intended to blow the smelter in about October 1st, when the properties will be in position to maintain regular shipments of ore.

At the Mother Lode mine at Greenwood 130 men are at work. — On the last monthly payday at the Granby and Brooklyn mines at Phoenix \$40,000 was disbursed in wages. During August the Granby mines shipped 42,030 tons of ore, being 8000 tons more than in July. In August 400 feet of development were done.

**Cariboo District.**

Hydraulic mining in the Cariboo has ceased for the season and all the gold has been cleaned up from the sluices. Despite the dry season the clean-up has been satisfactory, the Con. Cariboo, Ltd., alone reporting \$130,000.

**East Kootenay District.**

During the month of August 1800 tons of concentrates were shipped from the Eugene mine at Moyie.

The Kootenay Coal Co. of Victoria, L. H. Prather of Spokane, Wash., president, will increase development of its coal holdings and will build coke ovens and railroad. The company has title to 105 claims, while title to four others are in dispute at present. The railroad, in which W. F. Teetzel of Nelson is interested, will be 25 miles long and connect with the Great Northern at Elko. The Kootenay Co.'s land is 15 miles long by 10 miles wide and is 12 miles southeast of Morrissey.

F. Hogan of Spokane, Wash., of the Sullivan mine's smelter at Marysville, says it is intended to put in a lead corroding plant for manufacture of white lead and also lead pipe. In the remodeling of the smelter little of the old plant is being used. An entirely new building was built, and nearly all of the furnaces reconstructed. Two stacks will be built.

**Lillooet District.**

The mines of the Anderson Lake M. & M. Co. have been sold to J. B. Smith of Montreal for \$45,000. The mines are at Anderson lake, near Lillooet, and development will be resumed next week. Several claims adjoining the Anderson Lake mines have also been bought by Smith, and it is intended to move the mill from its present site, and ultimately to operate sixty stamps.

**Rossland District.**

P. S. Cauldrey, manager of Le Roi No. 2 Co.'s mines at Rossland, says he will increase development in the company's Josie mine. It is not intended to reopen the No. 1 mine at this time. The concentrator will be kept running on water concentration. The oil concentrator is not in operation. Forty-five tons of second-class ore are being milled daily.

**Slocan District.**

For 1903, the ore shipments from mines at Slocan City amounted to 1339 tons, made up from seventeen properties. Shipments this year to Sept. 15th have been:

Mine.	Total.
Enterprise.....	580
Ottawa.....	72
Neepawa.....	72
Port Hope.....	17
Republic.....	32
Black Prince.....	57
Alberta.....	15
Six others, a total of.....	20
Total.....	1,555

The Wakefield mine at Silverton is closed down temporarily. — There are 600 men working in the mines around Sandoz. — The Payne mine continues to ship iron ore to Trail. — The Wey-

mouth, on Ten Mile, has been crown granted.

The Reco mine, near Sandoz, has twenty men at work, and this will be increased to fifty. S. E. Davis is in charge. New ore sheds and other buildings will be put up.

**Vancouver Island.**

A group of zinc properties on Quatsino sound, near Quatsino, will be developed and the product shipped to Iola, Kansas. T. Jones of the Lanyon Zinc Co. of Iola, Kan., has at the Minerva and Peerless claims on southeast arm of Quatsino sound, arranged for development work and shipment of the zinc ores. The vessel will land it at the mouth of the Mississippi river for \$4 per ton, and it will be sent up the river on barges to the smelter.

T. R. Stockett, manager of the Nanaimo coal mines at Nanaimo, says the pit head erected in place of the one destroyed by fire has begun hoisting coal. At the Northfield mines it will be possible to load coal direct from the mine to the ships.

**West Kootenay District.**

E. M. Morgan and P. H. O'Connor at Poplar will build a stamp mill to treat the ores of the Lucky Jack and Swede groups. — D. McRae and C. Diamond are working the Alhambra group at head of Rapid creek. A 30-foot tunnel has been run and a 16-foot shaft sunk. There are two ledges on the group. One carries galena 3 feet wide at bottom of shaft, showing ruby silver.

**CANADA.**

**Alberta.**

H. N. Galer, manager of the International Coal & Coke Co. of Coleman, reports the first battery of coke ovens completed. Progress with installation of the plant is being made. The coal tippie is completed. It has capacity of 2000 tons per day. Next week the fan will be in operation, enabling the colliery to maintain an output of 500 tons of coal daily.

**Manitoba.**

D. H. Urquhart and A. McCall of Rat Portage report discovery of a deposit of tin-bearing ore in eastern Manitoba, about 3 miles from the Ontario boundary line and south of Cross lake. It is claimed the deposit is in granite and slate. They will develop it.

**Yukon Territory.**

The gold output of the Klondike for the season of 1904 is estimated at \$10,000,000, says the Dawson World. The Government valuation used as a basis on which to compute the export tax is \$15 per ounce. The general average is said, however, to be \$16 per ounce. The Dawson office of the comptroller reports for July \$1,300,250 received, and for August \$1,539,518 — exclusive of Forty Mile and Whitehorse. There was abundance of rainfall for the season.

**MEXICO.**

**Mexico.**

B. F. Graham of Bisbee, Ariz., president of El Tigre mine, below Douglas, says a cyanide plant will be built; and a reverberatory furnace will be built for smelting, as copper and iron ores are obtainable near the company's gold mine.

**Nuevo Leon.**

The Harrison smelter at Cerralvo, 90 miles northwest of Monterey, is working 120 men. The plant consists of three lead furnaces and a silver and lead refinery. The output of bullion is 4000 to 5000 bars of 105 pounds each, says H. C. Harrison, owner. The ore is brought from the mines in ox carts.

**Queretaro.**

O. & T. Braniff of Mexico City have entered into an agreement with the United M. & D. Co. of New York for development and operation of silver, lead and copper mines in Queretaro. J. Thompson and E. G. Spilsbury are respectively president and chief engineer of the New York company. It is proposed to spend \$500,000 in gold in development work and purchase of American machinery.

**San Luis Potosi.**

The National Metallurgical Co. will build a smelter at junction of the National and Matehuala railroads at Matehuala. Two furnaces are to be put in—a lead furnace of 150 tons capacity and another of 300 tons. The company has been delayed owing to difficulty in procuring sufficient water. Water for power will be taken from the Jordan river; but, to guard against failure of water supply, a 500 H. P. gas plant will be put in at Matehuala. The company has mines in Matehuala, Charcas, Salado and other districts.

**Sonora.**

P. E. Murray of Nogales, Ariz., says he will put in an oil rig to drill 2000 feet on the property of the Sonoita Oil Co. The 30-stamp mill of the Hays Con. M., M. &

L. Co., in the Pineta mountains east from Quijano, is in operation. The company has developed by a tunnel a 12-foot body of free-milling gold ore.

J. A. Singley, operating mines near Caborca, in Altar district, says he is putting in machinery.

H. C. Gerber, general manager for the Yaqui River S. & R. Co., at Toledo, on the Yaqui river, says the smelter has been blown in.

The 20-stamp mill of the Nogales C. Co. at Cerro Prieto, east of Magdalena, is closed down, pending enlargement to sixty stamps. F. Cox is superintendent.

It is reported the Yaqui C. Co. will put in at the Yaqui river, near its mines at Campo Santo Nino, a hydro-electric power plant of 1000 H. P. to operate its 2000-ton smelter, drills, etc. W. E. Pomerooy is superintendent, with mine office at Suquia de Batuc.

La Compania Minera de Sonora Reina de Cobre, S. A., has been organized in Nogales, Ariz., to develop copper properties near Caborca, Altar district, by J. Henderson, J. H. Elliott, P. & A. Sandoval and J. H. McKibben.

In the Vallecitos mine of the Sierra Azul M. Co., east of Imuris, a body of wolframite is reported opened, assaying \$20 in gold. The rock concentrates five tons into one. — H. C. Rolfe, superintendent of the Calumet & Yaqui River C. Co., reports that a ledge 10 feet wide, carrying copper, gold and silver, has been cut in the 150-foot level.

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**Personal.**

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G. SPERLING is city engineer of Boise, Idaho, vice C. H. Irwin.

E. R. WOAKES has returned to Linares, Spain, from London, England.

J. H. TREVORRAN is mine superintendent for Le Roi C. Co. at Rossland, B. C.

H. WITTEBERG is assayer and chemist at the Liberty Bell mill, Telluride, Colo.

C. S. VERRIL has accepted a position with the Curlew M. Co. at Republic, Wash.

C. HAWKINS is manager of the Ivanhoe Junction mine at Kalgoorlie, Western Australia.

T. CORNISH is manager of the Nevada Con. G. M. & M. Co. mines near Central City, Colo.

W. L. COBB has returned to San Francisco, Cal., from mine examination in Kern county, Cal.

Z. HOUSER has resigned as superintendent of the Standard mines, near Sumpter, Or.

J. MOYNAHAN is manager of the Pyrenees & Nimrod group of mines, near Central City, Colo.

F. ROOD is superintendent of the Big Bar M. Co., operating near Orleans, Humboldt county, Cal.

A. H. ELFTMAN of Minneapolis, Minn., has gone to British Columbia to make mine examinations.

G. W. MCCLANAHAN of Booneville, Mo., is manager of the Bertha M. Co., at Idaho Springs, Colo.

H. J. MEISEL, assayer and chemist, Rawhide M. Co., of Jamestown, Cal., is in San Francisco, Cal.

C. C. MAJOR is professor of mechanical engineering at the University of Oklahoma, Stillwater, O. T.

E. H. PLATT of Denver, Colo., has gone to Jimuleo, Coahuila, Mex., as manager of the Jimuleo M. Co.

P. E. LAWRENCE returned last week to Los Angeles, Cal., from an extended Eastern trip on mining business.

P. S. CAULDREY, formerly manager of Le Roi No. 2 mines at Rossland, B. C., has reassumed that position.

G. F. BADGETT has resigned as superintendent of the Montana-Tonopah M. Co.'s mines at Tonopah, Nev.

J. JACOBS is superintendent of the North Star group of mines, adjoining the Gold Cliff mine, at Angels, Cal.

R. W. JOHNSON of Mojave, Cal., has accepted a position at the Stonewall mine, Cuyamaca, San Diego county, Cal.

W. J. LEIGH-HUNT is superintendent of reduction works for an English company at Pachuca, Hidalgo, Mexico.

F. CRABTREE has been appointed professor of mining and metallurgy at the Colorado School of Mines, Golden, Colo.

E. H. LIVERING is consulting engineer for the Associated Mines, Ltd., with offices at Kalgoorlie, Western Australia.

JOHN FILIUS of Redding, Cal., and Denver, Colo., last week made examination of the Dewey mine, Siskiyou county, Cal.

D. B. GILLIES of Butte, Mont., is manager and superintendent of the Montana-Tonopah M. Co., operating at Tonopah, Nev.

S. S. RAYMOND is general superintendent of the North American C. Co. and its allied properties at Grand Encampment, Wyo.

E. A. H. TAYS is resident engineer at the mines of the Braniff M. & S. Co., operating near Cadereytas, Queretaro, Mexico.

E. A. NORTON is president and manager of the Cripple Creek Enterprise M. Co. of Cripple Creek, Colo., vice D. Hanley.

D. MCINTOSH, manager of the Providence M. Co. at Greenwood, B. C., will also have charge of the E. P. V. mine, in the same section.

N. F. HEATH, recently of Colorado, has been appointed superintendent of the Standard mines, near Sumpter, Or., vice Z. Houser, resigned.

N. G. THOMPSON is manager of the mines of the Candelaria M. Co. at San Pedro, on the Sierra Madre Railroad, Chihuahua, Mexico.

T. P. RIGNEY has resigned from the Summit Placer Co. and will reopen his office as consulting mining engineer at Salt Lake City, Utah.

F. E. YOUNG, E. M., Boston, Mass., is in Siskiyou county, Cal., investigating the merits of mining properties for New York and Boston investors.

REEVES DAVIS of San Francisco, Cal., has returned there from examination of several mining properties on the lower Klamath, Siskiyou county, Cal.

G. W. MABEE of Central City, Colo., has gone to Gracias a Dios, Nicaragua, to take the management of the mines and mill of the Nicaragua G. M. & M. Co.

D. HANLEY has retired as president and manager of the Cripple Creek Enterprise M. Co. of Cripple Creek, Colo., but remains as a director in the company.

W. GARRISON of Cananea, Sonora, Mexico, has gone to Puebla as general foreman of the Tezuitlan M. & S. Co. at La Aurora via Tezuitlan, Puebla, Mexico.

G. A. LAIRD, recently manager of the La Victoria y Anexas mines, in San Luis Potosi, Mexico, is manager of the Calderona group, near Ojo Caliente, Zacatecas, Mexico.

M. M. DODGE at Mexico City, Mex., has resigned from his connection with the Phelps-Dodge Co. to manage his personal mining interests in Mexico, Arizona and California.

P. GASTON of Young & Gaston, San Francisco, Cal., has returned from Philadelphia, Pa., where he went on matters pertaining to the firm's mining interests at Tonopah, Nev.

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**Obituary.**

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E. BLAKE, a pioneer miner of Park City, Utah, died in Salt Lake City, Utah, on the 11th inst.

C. L. HERRICK, a geologist and former president of the University of New Mexico, died on the 15th inst. at Socorro, N. M.

S. RAUHEIM, a mining engineer, died at New York City on the 14th inst. Deceased was identified with the opening and development of copper properties in Montana.

WESLEY HUNTER, a pioneer mining man of Colorado, died at Idaho Springs, Colo., on the 6th inst. Deceased was born in Ohio in 1836, and went to Central City, Colo., in 1860. He was interested in mining property at Idaho Springs.

C. H. COOK, a Utah mining man, died at Salt Lake City, Utah, on the 10th inst., at the age of 67. Deceased was born in Pennsylvania, but went west during the mining excitement at Leadville, Colo., in the spring of 1879. Seven years ago he moved to Salt Lake City, Utah.

THOMAS WILLIAMS, a California mining man, died at San Jose, Cal., on the 16th inst. Deceased was at one time superintendent of the Mountaineer mine at Nevada City, Cal. He was connected with quicksilver mines of San Benito county. He was a native of Cornwall, England, 64 years of age, and went to California in 1856.



## Commercial Paragraphs.

THE Stillwell-Bierce & Smith-Vaile Co. of Dayton, Ohio, will be reorganized under the new management, and in future will be known as the Platt Iron Works.

THE Brown-Corliss Engine Co., Corliss, Wis., have an order for one 24x44x48 inch tandem compound rolling mill engine for the United States Steel Corporation, to be installed at their McKeesport plant, Pittsburgh.

J. P. STERLING of 3923 Balt. Ave., Kansas City, Mo., representing the Prinz & Rau Mfg. Co. of Milwaukee, Wis., has several orders for their perfection dust collector from the General Metals Co., Colorado Springs, Colo., who are putting in a new mill and who find these dust collectors to be of material value.

THE C. O. Bartlett & Snow Co., Cleveland, Ohio, are in receipt of the following orders: Levi Cohn Bros., Lancaster, Pa., one 72-inch Triumph steam dryer; Ohio Retarder Co., Port Clinton, Ohio, one 72-inch Triumph steam dryer; Sheets Bros. Elevator Co., Cleveland, Ohio, complete elevator machinery output for their plant recently destroyed by fire; Good Roads Machinery Co., Uniontown, Pa., one elevating outfit.

W. E. HAMPTON, president National Wood Pipe Co., Los Angeles and San Francisco, Cal., while recently in the Northwest, inspected the 48-inch pipe line which his company is building for the Washington & Oregon Power Co. of Walla Walla, Wash. This pipe line is built on a bench along the south wall of the Walla Walla river. In places this is a sheer wall of solid rock, the pipe line being built several hundred feet above the river, the cliffs rising hundreds of feet above the pipe line. At several points, also, the pipe line is built on high trestle work. Building the line is in charge of J. L. Stannard.

COLORADO IRON WORKS of Denver, Colo., are filling the following orders: A 30-stamp amalgamating and concentrating mill for the Werderhoff M. & M. Co. in Idaho; a 100-ton concentration plant for the Granadina mine in Mexico; six sets C. I. W. 40x16-inch improved standard wide-faced crushing rolls for the Detroit Copper Co. in Arizona; a Bretherton hot blast box, iron work for one 42x150-inch copper matting furnace, two 31½ cubic feet elliptical slag trucks for the Bradshaw Mountain C. M. & S. Co. of Arizona, and a set of 12x12-inch sampling rolls, an elevator, a Dodge crusher and sample grinder for the Luna Lead Co. in New Mexico. The last carload of machinery for the Ruby Basin M. & T. Co.'s concentrating plant will leave this week.

## Books Received.

"The Architects' and Builders' Pocket-Book," by Frank E. Kidder, C. E. Phd., has been issued in the fourteenth edition. It has been rewritten and rearranged and brought up to date. This valuable and carefully prepared volume contains over 1000 drawings, and 1632 pages of text, besides an exhaustive index which enables the reader to readily turn to the page devoted to any subject. The fact that any technical book can endure through thirteen editions, with a large demand for the fourteenth, is as good a testimonial as any standard work should require. As a reference book it is of great value to the architect and structural engineer, draughtsman and master builder. The information contained is presented in a simple and convenient form. It contains a great many new tables, and is in many ways designed to be an authority on the subjects of which it treats. Flexible morocco cover, price \$5. John Wiley & Sons, New York; Chapman & Hall, London.

## Trade Treatises.

THE merits of the Akron Chilian mill are lucidly set forth in a pamphlet from the Wellman-Seaver-Morgan Co. of Cleveland, Ohio, portraying its operation in the wet grinding of metalliferous rock.

CATALOGUE E of the Ruggles-Coles Engineering Co., 39-41 Cortlandt street, New York, and Old Colony Building, Chicago, is devoted to the Ruggles-Coles dryers, with test results, testimonials and list of users and in what capacity the dryer is so used.

## Latest Market Reports.

SAN FRANCISCO, September 23, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 57½c, refined (1000 fine); San Francisco, 57½c; Mexican dollars, 47c; San Francisco, 45½c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$13.00; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £58 2s 6d spot per ton.

The total visible copper supply reported by James Lewis & Sons of Liverpool, England, Sept. 1, 1904, was 13,420 tons, a gain of 558 tons over the total supply of Aug. 1.

LEAD.—New York, \$4.30; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 17s 6d long ton.

SPELTER.—New York, \$5.20; St. Louis, \$5.00; London, £22 10s 3d; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$27.62½@27.85; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, 32½@35c. London, £126 15s spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 16c.

ZINC.—Metallic, chemically pure, 3½d., 50c; dust, 3½d., 10c; sulphate, 3½d., .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.85 @13.20; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c per lb.

### CHICAGO CURRENT QUOTATIONS.

Bessemer .....	\$14 75@15 00
Foundry Northern 1.....	14 00@14 50
Northern 2.....	13 50@14 00
Northern 3.....	13 00@13 50
Southern 1.....	13 65@13 90
Southern 2.....	13 15@13 65
Southern 3.....	12 65@12 90
Forge .....	11 90@12 15
Charcoal .....	14 50@15 00
Billets, Bessemer .....	23 00@23 00
Bars, iron .....	1 35@1 40
Bars, steel .....	1 51@1 51
Rails, standard .....	28 00@28 00
Rails, light .....	23 00@25 00
Plates, boiler .....	1 71@—
Tank .....	1 56@—
Sheets, 27store .....	2 17@2 22
Angles .....	1 46@—
Beams .....	1 46@—
Tees .....	1 51@—
Zees .....	1 51@—
Channels .....	1 46@—
No. 1 railroad wrought.....	11 50@12 00
No. 1 cast, net ton .....	10 00@10 50
Iron rails .....	16 00@16 50
Car wheels .....	11 00@11 50
Cast borings .....	4 00@4 50
Turnings .....	7 00@7 50

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ¾c per lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, ¾c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chloride of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1½@2c per lb.; nitric acid, carboys, 8c per lb.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; Lucol oil, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 88° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, 7½c per lb.; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

MOLYBDENUM.—Best, \$2.00 per lb.

CHROMIUM.—90% and over, 3½c, 80c.

PHOSPHORUS.—American, 3½c, 70c.

SILVER.—Chloride, 3½ oz., 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride, 3½ lb., 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—3½ lb., \$2.75.

SODIUM.—Metal, 3½ lb., 50c.

BISMUTH.—Subnitrate, 3½ lb., \$2.10.

URANIUM.—Oxide, 3½ lb., \$3.50.

FIRE BRICK.—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

HYDROCARBON STEAM GENERATOR.—No. 769,901. Sept. 13, 1904. Benj. Hall, Nevada City, Cal. This invention relates to an improved hydrocarbon burner and self-contained steam generator attachment. Its object is to provide a simple apparatus which shall combine a burner and generator

wherein the steam will be formed gradually, the pressure equalized, and the product supplied to the burner without the puffing, spluttering, and noise usually incident to apparatus of this type.

AUTOMATIC WEIGHING MACHINE.—No. 769,909. Sept. 13, 1904. A. W. Livingston, Alameda, Cal. This invention relates to an improved apparatus for automatically segregating, weighing and delivering dried fruits or other material in any predetermined quantity to be put up subsequently in packages of uniform size and weight. Its object is to provide a continuous movement machine which shall be automatic, accurate, and of large capacity.

WATER PURIFYING TANK ATTACHMENT.—No. 769,956. Sept. 13, 1904. Winfield Curtis, Sacramento, Cal. One-half assigned to E. F. May of San Francisco, Cal. This invention relates to improvements in water tanks; and it consists of a preliminary receiver and aerator, preferably located within the tank, firmly secured to the bottom and sufficiently higher so that the water which is first delivered into this small receiver overflows from top when it is full into the larger outer tank. In operation, with the receiver and tank, are separated draw-off pipes with control valves, so that the water may be drawn from either one independent of the other or may be drawn from either or both the tanks to different points of delivery.

GOLD SAVING APPARATUS.—No. 769,886. Sept. 13, 1904. J. S. Bollinger, Cherokee, Cal. One-half assigned to J. R. Clark, of Yankee Hill, Cal. This invention relates to improvements in gold saving apparatus, and particularly in means for use in conjunction with riffled or like surfaces for retarding the velocity of the under-current to allow concentration of the values.

WASHING MACHINE.—No. 769,890. Sept. 13, 1904. E. L. Davis, Santa Rosa, Cal. This invention relates to improvements in clothes-washing machines. Its object is to provide a practical, simple, durable, and efficient mechanical washer which will automatically adjust itself to any quantity of clothes in the tub, which will not interfere with the wringer, which may be quickly folded back out of the way to save space to the contents of the tub, which will not become loose-jointed, which will confine the steam, and which may be operated with a minimum amount of exertion on the part of the housewife.

TRAVELING HARVESTER.—No. 769,965. Sept. 13, 1904. James Tretthewey, Stockton, Cal. Assigned to the Harris Mfg. Co., of Stockton, Cal., a corporation. This invention consists in the combination of parts including a gasoline engine by which the cutting, threshing and cleaning mechanism are driven while the machine is hauled over the ground by separate and independent power. The object of said invention is to combine the power of a plurality of internal combustion engines which are centrally located and with such relation to the main bearing wheels as to assist in counterbalancing the weight of the machine, and by means of supporting girders extending across the machine the engine is centrally located approximately above the threshing cylinder and in position to transmit its power to the shafts to all parts which are to be driven by the engine.

REVERSIBLE WAGON SEAT.—No. 769,876. Sept. 13, 1904. M. A. Schuster, Newman, Cal. This invention consists in a combination of parts whereby the seat of a wagon may be reversed to present either side upward.

HEAD-GATE FOR IRRIGATING DITCH.—No. 769,968. Sept. 13, 1904. Wm. J. Warren, Modesto, Cal. This invention relates to a head-gate and connections therefor especially adapted for use in conjunction with irrigating and like ditches which are laid in the soil. It consists of a concrete base with means for preventing the seepage of water and a gate with means for moving it in grooves or channels formed in the base, said gate having elastic flexible peripheral edges adapted to make a tight joint.

GRAVITY TRAMWAY BLOCKS.—No. 769,998. Sept. 13, 1904. A. D. Foote, Grass Valley, Cal. This invention relates to a pulley-block and brake attachment adapted for use upon gravity and like tramways. The object of the invention is to provide a means for regulating the speed upon inclined tramways where a loaded car connecting with one end of a rope pulls an empty car up while itself is going down.

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING SEPTEMBER 13, 1904.

769,978.—GRAINING MACHINE—B. A. Augustine, Alameda, Cal.  
770,215.—CONTAINING VESSEL—Blatz & Fales, Los Angeles, Cal.  
769,886.—GOLD SAVING APPARATUS—J. S. Bollinger, Cherokee, Cal.  
769,981.—OIL BURNER—H. B. Cary, Los Angeles, Cal.  
769,856.—WATER TANK—W. Curtis, Sacramento, Cal.  
769,998.—WASHING MACHINE—E. L. Davis, Santa Rosa, Cal.  
769,998.—GRAVITY TRAMWAY BLOCK—A. D. Foote, Grass Valley, Cal.  
770,058.—WRENCH—W. P. Foster, Jacumba Springs, Cal.  
770,060.—JAR CLOSURE—C. Fricke, S. F.  
770,093.—BEDCLOTHES CLAMP—A. Grandjean, National City, Cal.  
769,901.—STEAM GENERATOR—B. Hall, Nevada City, Cal.  
769,747.—PAPER FEEDER—J. W. Hoag, S. F.  
769,909.—WEIGHING MACHINE—A. W. Livingston, Alameda, Cal.  
769,940.—FISH TRAP—O. Melbye, Cypress Island, Wash.  
769,953.—WATER HEATER—G. H. Miner, Pasadena, Cal.  
769,880.—SHUT OFF—J. G. Nehrhas, Seattle, Wash.  
769,768.—LOCK—B. Phelps, Seattle, Wash.  
769,769.—LOCK—B. Phelps, Seattle, Wash.  
769,770.—LOCK—B. Phelps, Seattle, Wash.  
770,105.—BAND SAW GUIDE—A. Prana, Everett, Wash.  
769,832.—WEED CUTTER—L. C. Preston, Weston, Or.  
770,115.—DENTAL APPLIANCE—F. C. Rood, Walla Walla, Wash.  
769,876.—REVERSIBLE WAGON SEAT—M. A. Schuster, Newman, Cal.  
769,877.—UMBRELLA FRAME—P. Serge-Kisslow, Portland, Or.  
769,963.—TOILET PAPER HOLDER—A. E. Sexton, Los Angeles, Cal.  
770,127.—CONDENSER—O. S. Still, Annette, Cal.  
769,965.—HARVESTER—J. Tretthewey, Stockton, Cal.  
769,968.—HEAD GATE FOR DITCHES—W. J. Warren, Modesto, Cal.  
770,137.—PAYING COMPOSITION—H. F. Williams, S. F.



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## Extension of a Mining District.

The Leadville, Colorado, mining district is one of the most noted in the world, and also one of the most interesting, both geologically and mineralogically. In its early history Leadville was known as Oro City, a placer camp which grew up about the diggings in California gulch in 1860-61. Although the existence of lead carbonate ores was known for several years prior to 1877, no particular attention was given

become quartzite by crystallization of the infiltrated silica

Overlying the sediments, there was accumulated during the Glacial epoch a great thickness of glacial material derived from the neighboring mountains. This detritus occurred partly in the form of sediments, which were deposited on the floor of a fresh water lake that extended over the entire mining district, and partly as morainal material. During the Glacial epoch thousands of feet of sedimentary strata

part of the capital and enterprise of the district that until lately little effort has been made toward extending the known limits of the ore-bearing ground. The widespread cloak of glacial material has so effectually covered the rock formations that prospecting was rendered unusually unattractive, and shaft sinking has been discouraged in the absence of known ore by the large volume of water usually found. Within the past few months, however, several bore holes have been sunk on Rock hill, south of the city of Leadville,



Cyanide Plant of Black Hills Gold Mill, St. Louis Exposition. (See Page 225.)

these ores until that date. In 1876 a small shipment was made by wagon to a Denver smelter, and active prospecting over the entire region adjacent to Leadville followed in 1877, but the discovery of ore was in most instances an uncertain and disappointing task due to the peculiar geological conditions obtaining in this district, which lies at an altitude of over 10,000 feet near the headwaters of the Arkansas river. The ore-bearing formations are chiefly limestone and quartzite of Carboniferous, Silurian and Cambrian ages, interstratified with sheets of porphyry, the entire series resting upon the upturned schists and granite of the Archæan. Dikes of igneous rock cut the sedimentary rocks and the included sheets of porphyry. While lying at great depth and probably in a nearly horizontal position, these limestones and quartzites became ore bearing by the substitution of sulphides of iron, lead, zinc and copper for calcium carbonate, or by impregnation of the sandstones, which later

were eroded and the greater portion of the material carried away down the canyon of the Arkansas, the lake beds and moraines being the later evidences of glacial action.

Dynamic forces uplifted and faulted the strata, including the glacial lake beds. The lake was drained and the ore-bearing strata brought to and near the surface. Erosion continued, but the ore exposures were comparatively few and none of them prominent. The glacial sand, gravel and boulders of the lake bed and the drift still covered the greater portion of the district. These conditions would ordinarily have made prospecting slow, but with such feverish energy and haste was the work of search and development carried on that in 1880 the geology of the district was well understood, in a general way, and exploration continued unabated for some years. In more recent years, however, the mining and metallurgical problems have so completely absorbed the greater

and it is now known that the ore-bearing formations extend in that direction and underlie Rock hill and the adjacent territory. The Iron fault, one of the most important in the region, extends in a south-westerly direction through the new territory now being investigated, and farther west the Carbonate fault extends into the same territory in a nearly parallel direction. This may or may not prove to be of importance, but it is an interesting fact that some of the greatest and richest mines of the Leadville district lie on either side of the Carbonate fault, though it is a well recognized fact that the several faults of the region have no direct connection with ore deposition, and occurred long after the formation of the ore bodies. No ore of consequence has been found in the fault planes except that dragged in mechanically. The mineralization of the district, however, is so widespread that it lends color to probable occurrence of ore wherever the ore-bearing horizon may be found.



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THE destruction of the Val Verde smelter at Val Verde, Yavapai county, Arizona, the present week by fire affords an object lesson in smelter practice, if the press dispatches correctly report the facts. It is stated that the furnace men tapped the slag hole of one of the furnaces and when ready to close the tap hole no clay balls were at hand with which to plug the hole. As a result the molten slag continued to flow and, overrunning the slag pots, spread over the wet floor. An explosion followed which caused the slag to communicate with the woodwork of the structure and set fire to the building. As a result the entire plant, valued at \$200,000, was destroyed. This suggests the wisdom of constructing smelter buildings of steel, employing wood about the works only where absolutely necessary. Other valuable lessons may be learned from a study of the situation and the conditions under which this occurred.

THE history of mining camps, like that of nations, repeats itself very often. The recent announcement that the once famous Tiptop silver district, near Castle creek, in southern Yavapai county, Arizona, is about to become a gold producer, occasions no surprise. For twenty years the miners of Colorado mined up Clear Creek to the top of the divide for silver, and there discovering gold, mined back for gold. Leadville, at first a gold placer camp, became a silver-lead producer, and is now a producer of gold, silver, lead and zinc. Butte City, Montana, was originally a silver camp. Eureka, Nevada, once a great silver-lead camp, is now producing gold, and so the list might be continued at length, but the localities and instances mentioned are merely indicative of the changes which time and opportunities bring. The poor low-grade mine of today becomes the profitable producer of to-morrow, because of the changed conditions, increase in knowledge and improvement in methods.

## Competitive Drilling Tests.

From time to time the mining journals and technical society publications print the results of competitive tests of various makes of machine drills. These so-called tests are usually made under uniform conditions at some place on the surface, but these artificial arrangements do not approximate the conditions found under ground in the mine. The artificial surface conditions prepared for the trial of durability, speed of cutting, facility of setting up and taking down the machine, cost of operating, and repairs, air consumption, and all other data which should be included in a bona fide test, and which would be of real value in determining the respective merit of the various machines on trial, usually consists of a large block of granite, rarely if ever over 30 inches thick, set horizontally. The drills are clamped to a horizontal bar; all holes are "down holes;" the limit of depth of hole is about 2½ feet; in fact, all of the physical conditions, although eminently fair and alike for each machine, are so totally unlike those found in the mine that a test of this kind has little of value in it. In mine work very few of the holes cut are drilled vertically downward—even in shaft sinking the greater number of holes are drilled at an angle, the end holes being the only ones usually to approximate the vertical. Some drills operate much more satisfactorily on down holes than others, and different sizes of the same make of machine give differing results in drilling down holes.

Another and important feature of test drilling is often noticed in the careful preparation of the machine to be used in the drilling contest. If these alterations, so carefully made at this time, are to the advantage of the drill—and they appear to be—why do not the manufacturers make the machine as perfect as this specially prepared drill? In a drilling contest there are several factors of importance, and upon these should the judgment be based as to their relative efficiency. Each machine should be of the kind sold to mining companies, just as they came from the shops; without extra care being given it in the finishing and polishing of cylinders, etc. The size of piston in each machine subjected to the test should be of the same diameter; the size of drill bit employed should be the same in each drill; the air pressure should be as nearly identical as it can be made; all holes should be drilled in the same direction and to a depth of not less than 4 feet. Short trials are of little value. Where miners have a drilling contest and drill single or double-handed, the quick work done at such times merely illustrates the result of physical training, and is an interesting exhibition of the skill and energy of the men, but in machine drilling such "spurts" are not tests of possibilities or of the enduring qualities of the machine, nor do they furnish any idea of the cost of keeping the drill in repair—an item of no small consequence. As a matter of fact, about the only "test" such trials demonstrate is the amount of free air consumed per minute. The only test which is worthy of consideration is that of continued work under the varied conditions found in the mine, and these extended over a period of at least a month, will afford, not only a knowledge of the drilling capacity of each machine, but also the expense of repairs, etc., which are a matter of important consideration. A recently published article in a technical journal gives as a record for a specially prepared machine drill, the cutting of 13,104 feet of holes drilled during a period of fourteen months (about 27 feet per day, which is a very low efficiency unless the rock drilled was extremely hard. A good machine should drill from 40 to 50 feet per shift in hard greenstone). The cost of repairs, etc., amounted to about \$33 per month, exclusive of \$45 expended in fitting up the machine for this special trial. These bills of expense are very heavy, and are not complimentary to either the drill nor the runner.

THE recent discoveries on Rock Hill, near Leadville, Colo., and those under the city of Leadville will do much to stimulate additional prospecting in that important district. These new and somewhat surprising finds indicate clearly how unsafe it is to assume what lies beneath the surface that has not been explored. Important new discoveries have also recently been made on the east side of the Mosquito

range, just over the divide from Leadville, that leads to the belief that a valuable series of ore deposits, similar geologically to those at Leadville, have been found. Although Leadville has been vigorously worked for over twenty-five years, it is evident that many surprises still await the more extensive exploration and development of that district. It is quite probable that exploration of the Cambrian quartzite will discover gold in that formation.

## Custom Works for Small Mines.

No factor in the development and prosperity of a mining town, district or region is of greater importance than a local custom plant for the treatment of ores. In a free-gold mining region nearly every mine is equipped with a mill, but there are districts where the veins are small and the rock high grade as compared with that of large bodies of what is generally recognized as low-grade ore. In some districts the ores produced are not free milling, and can only be economically treated by smelting. In either case, if the veins or ore bodies are of limited extent, a single property will not usually justify a mill or smelter, but several small mines may be able to keep a custom mill or smelter supplied continuously with ore. Blackhawk, Central City and Idaho Springs, Colorado, are noted instances of the advantage to be derived from the operation of custom mills. And Leadville furnishes an instance of the value of a custom smelter in the development and prosperity of a district. To become a success the custom reduction works must be conducted by competent and honest men. In the handling of smelting ores there is seldom a misunderstanding between miner and smelter, as all of the ore shipped to the smelter is crushed and sampled automatically, and is as fair for one as for the other, but the custom gold mill is seldom equipped with sampling devices, and both the miner and the mill man depend upon the plate and concentrator returns for a knowledge of the values in the ores. Many mills, both on custom work and those owned by the mine owner, are loosely run, and when such is the case disputes are of frequent occurrence. The miner usually overestimates the value of his ore, though not intending to do so. His method of sampling is faulty and usually leads to incorrect results. As a matter of fact the returns in amalgam and concentrates, with the value in the tailings, prove the gross value in the ore, but devices are not always at hand to properly sample the tailings and disputes arise, which are more or less difficult of adjustment. In most cases mills and smelters are carefully and honestly run, the owners being satisfied with the profit derived from the treatment charges. And their success in developing a camp suggests that there are many districts where custom works might be put in by the merchants and other property owners, aided by the miners themselves, and run to the advantage of all concerned. All acquainted with the mining regions of the West are familiar with the large benefits gained by those engaged in merchandising in a prosperous mining town or district. There are scattered throughout the West many districts which to-day are dull, though at one time active. The first enthusiasm is gone and the districts have settled down to a slow plodding life, and yet, all about are the elements of great success in the form of small veins of rich ore. The claims are owned by men of little or no means. They dislike to leave the district, and yet there seems little incentive to remain. If a custom mill or smelter were built to treat the ores of the idle mines, within a year the community would find that it was enjoying prosperity again—a real prosperity based on results and not on hopes. The mill or smelter should be run in such a manner as to warrant the confidence of the mine owners—moderate charges and honest dealing. This is all the miner expects, and if he gets it he is satisfied. Without doubt they who read the suggestions contained herein will call to mind at once several localities where the plan outlined is not only possible, but where it would prove a great success. It is an important matter familiar to all, but has simply been neglected. In this connection the proposition of a company organized at Globe, Ariz., to rent hoisting machines to small mines, and supply them with electric power, is one of interest, and the same thing might be done jointly with the establishment of custom mill or smelter.



## CONCENTRATES.

THE freight rate on structural iron from Pittsburg or New York to Spokane Wash., is \$1.23 per 100 pounds.

AT atmospheric pressure 13 cubic feet of air weigh one pound. Hence the air in a room, at sea level, 20x22 feet and 12 feet high, would weigh 406 pounds.

THE pressure per square inch at the bottom of a column pipe full of water on a slope 450 feet long at an angle of 42° would be 130.86 pounds per square inch.

FLUORINE GAS is exceedingly corrosive and will quickly corrode any metal except gold, platinum silver and lead. Hydrofluoric acid is usually kept in leaden or gutta percha bottles.

ALTHOUGH less power is required to compress air in high altitudes, owing to lower atmospheric pressure, when the air has been compressed to a given degree, say, 100 pounds per square inch, it is as effective in running a drill or a hoist as the same pressure at sea level.

SHEELITE is calcium tungstate—tungsten trioxide 80.6%, lime 19.4%. It can only be treated to advantage at a point distant from the railroad by concentrating on machines, and, if massive, require no concentration, it can only be shipped as it occurs in the vein or deposit.

WHEN locating a water right, the locator must divert all of the water he claims in his notice of location. He cannot take out a portion of the whole amount and later take a greater amount if others in the meantime have taken the surplus over the amount first diverted by the original locator.

IT is not uncommon to call an unknown rock "porphyry," and let it go at that. But "porphyry" is merely a word to describe the structure of a rock and has nothing to do with its mineral contents. Of course, this does not apply where the word is used with some qualifying term.

THE Suez canal is a salt water canal. The Panama canal will be a fresh water canal. The former is 30 feet deep. To accommodate a vessel of equal size the Panama canal will have to be a foot deeper. The biggest steamers to Australia from England do not pass through the Suez canal. The Panama canal commissioners say that canal will be 35 feet deep. That would admit a steamer drawing 32 feet in salt water.

A SUCTION DREDGER may justly be styled a hydraulic dredger. The velocity of flow in the discharge pipe of such a dredger would vary from 8 to 16 feet per second. High velocity of flow means greater friction in the pipe, and consequent greater power requirement. A fluid mixture of sand and water, or mud and water, is heavier than water alone. Hence it takes more power to pump such mixture against a given head and entails greater friction in the pipe.

THE theoretical value of chalcopryite (common yellow copper-iron sulphide) is 34.5% copper, 30.5% iron and 30% sulphur, but the ordinary ore rarely carries this value in copper, owing to the dissemination throughout its mass of pyrite, quartz and other impurities. An apparently clean ore sometimes contains only 10% copper, due to these foreign admixtures, which cannot readily be discerned by the naked eye. There is a tendency on the part of the inexperienced to overestimate the value of this kind of ore.

THE exposed blue print can probably be restored by immersing it in a bath of weak ammonia, using about two spoonfuls of ammonia to a tumblerful of water. This will cause the print to turn first purple, then pink and after a time nearly white. When it has reached the pink stage rinse it and immerse in a bath composed of one teaspoonful of hydrochloric acid in one tumblerful of water. The blue color will then return much brighter than before, but this time the lines will be white and clear. Wash the blue print thoroughly before drying.

WHERE the amalgam derived from quartz mill plates is low grade, due to the presence of bases, under existing circumstances it would be best to retort the amalgam in the usual manner, thereby recovering pure quicksilver and a "sponge" of gold alloyed with the bases. This latter should be shipped to a refinery, the mint or to some smelting company for refining, as the difficulties and possible losses in treatment at the mine would probably exceed the cost of refining. It is always advisable in such cases to melt the sponge from the retort into a bar.

IF no suitable foundation is obtainable for a heavy headframe on the surface near the shaft, pits should be sunk to bedrock or to solid "hardpan" and concrete or masonry foundations put in. It is more economical to provide such foundations at beginning of sinking with temporary hoisting engine and headframe, than to cover the site of the permanent construction with waste rock which must subsequently be removed in order to put in

substantial foundations. Experience has shown that it is unsatisfactory to build heavy structures of any sort on dumps, particularly when they lie upon a sidehill.

WHERE A locates a placer claim in 1900, but fails to perform the required assessment work, and B takes up A's forfeited claim, the use of the word relocate, in B's notice of relocation, does not invalidate B's claim. "A relocation impliedly admits the validity of the prior location," says Lindley on Mines. "There can be no relocation unless there has been a prior valid location, or something equivalent, of the same property. The courts draw a distinction between a locator and relocater, classifying the former as an original discoverer of mineral before unknown, and the latter as a mere appropriator of mineral discovered by another who had failed to exercise the privilege conferred on him by the law." Such being the case, the only inquiry is as to whether or not the original locator performed the requisite work.

THE occurrence of phonolite is no more indicative of the existence of gold ore than granite is. Gold occurs associated with phonolite at Cripple Creek, Colo., and in the Black Hills of South Dakota, but gold occurs in hundreds of other places far from any phonolite and there are numerous occurrences of phonolite where no gold is known to exist. Phonolite is a peculiar and not readily determinable rock. It derives its name from a peculiar physical and not mineralogical property—that of giving a ringing sound when thin slabs are struck with a hammer, but some other hard compact rocks possess this property in an almost equal degree, and this means of identifying phonolite is far from conclusive. It occurs in great dome-shaped masses, in injected sheets, as surface sheets, and lava flows, and in dikes. Some of the minerals characteristic of phonolite are rare in other rocks and not readily distinguished by those who are not capable of rock analysis, or who do not understand the microscopic examination of rocks.

THE first sign that timbers in a mine are taking great weight is noticeable in the joints where caps rest upon posts, or the ends of the stulls show signs of being crushed. Later the impending danger is usually indicated by the frequent dropping of small pieces of rock from the roof. When this stage is reached it is often too late to undertake to hold the ground in place. Sometimes it may be done by promptly reinforcing the timbers, but the safest and most satisfactory method is to fill the excavation as quickly as possible. Often this results in shutting off a body of rich ore, but after the filling has been run in and allowed to settle, it may be safer to drift through the "fill" and extract the ore than to attempt to remove it at the risk of caving the workings—for, already weak, the removal of more rock or ore is almost certain to bring disaster. In some instances it is less expensive and safer to reach the ore by driving a new drift or crosscut through the solid rock. This must be left to the judgment of the mine superintendent.

WHETHER or not it is advisable to strip the waste material from a placer claim before sluicing or otherwise attempting to move the payable dirt below depends upon the means at hand for doing it. If the ground can be worked by hydraulic method it will not pay to remove the soil, loam and low-grade gravel by any other method, but if it has to be shoveled it must be determined whether it be cheaper to ground-sluice it, or to shovel the waste into the boxes. If abundant water and sufficient fall be available ground sluicing is preferable. The overburden of quartz veins and other ore deposits may often be removed and sent down to the lower portion of the mine for filling. To make this possible the lower levels must be opened and connections made with the surface before the overburden is removed. In most cases the haste to realize on the most easily available ore results in attacking the surface deposits first. The overburden or hanging wall country is then removed and trammed to dumps, or elsewhere, and becomes useless for filling without extraordinary expense, as it involves the rehandling of the material and usually the cutting of special raises for passing the waste rock below.

IN attempting to concentrate black sand in sluice boxes, if the iron sand be abundant, the string of sluices must be long, or they will quickly fill and the riffles, for further concentration, are useless unless the sluices be cleaned up. It will probably be cheaper to put in long lines of boxes than to adopt any other method, and even then it may be necessary to clean up several times a day. Another method is to place a grizzly in the sluice which will permit only the fine sand, together with the iron, to pass, the coarse sand, pebbles and cobbles passing out into the tail race. The fine material passing the grizzly or screen can be conveyed to concentrating machines, operated by power derived from the sluice head, or otherwise, and thus the concentration of the black sand becomes automatic and continuous. The riffles of an ordinary 12-foot sluice box 12 inches wide will not contain, when full, more than about 100 pounds of clean black sand, the remainder of the space being taken up by voids and grains of quartz and other minerals. A sluice line of ten boxes would at this rate hold 1000 pounds of sand. Four men will shovel in about 30 to 35 tons of gravel per shift. If the material contains 5% black sand this would amount to 3500 pounds of black sand if it were all saved, but there is a

large percentage of loss of the finest sand by the sluicing method, the saving would probably not amount to over 2500 pounds of clean black sand. With the ten-box line it is evident that the cleanup must be made at least twice per shift, and as this operation consumes considerable time the day's output would be correspondingly reduced. In such case it were better to have a double line, if possible, and a length of boxes sufficient to hold all that can be concentrated in while the cleanup is in progress on the other line of sluices.

WHERE in making an excavation in earth to expose underlying rock in cutting a grade for a mill, the question of economy in moving the earth must be determined by conditions and the means readily obtainable to move the earth. If water under pressure is not available to hydraulic the earth away down to bedrock, it must be removed by mechanical means. On small jobs it is customary to use shovels and wheelbarrows, and usually this is as inexpensive as any other method; but if the amount of earth and loose rocks be large, it is more economical to use wheeled scrapers, if these be readily available. The work can then be done under contract by the owners of the scrapers and teams. Where these are not obtainable under proper conditions, it is a good plan to lay temporary tracks and put on mine dump cars. These can be quickly loaded by men shoveling on the several terraces of the grade, and, when filled, they can be trammed wherever desired by laying the track to that point and dumped. As the work progresses inward toward the hill, the tracks can be shifted over near the face by means of bars at any time. This method, if properly arranged and managed, is expeditious and economical, involving no long waits for cars or anything else. By laying shoveling floors near the face before barring, picking or shooting down the face of the bank, shoveling is made easy and much time saved. By using care, the same boards may be employed until the work is finished.

ZINC SULPHIDE (zincblende) contains sulphur 33%, zinc 67%. Zinc is a metal which causes much difficulty in lead smelting in the blast furnace, in whatever form it may occur. Zincblende is decomposed in the furnace by iron oxides and silicates, the zinc oxide resulting going into the slag; but the greater part of the zinc sulphide going into the furnace is not decomposed and goes into the matte as well as the slag, usually in about equal parts. It renders matte less fusible and causes other metallic sulphides to enter the slag and obstruct the separation. Where the percentage of zinc present is small, its evil influences can be corrected to a great extent by the addition of chalcopryite to the charge. If the ore contain a large percentage of zinc or zincblende—20% or more—it must first be roasted to change the zinc sulphide to zinc oxide, and, in order that the slag may take this amount of zinc up, the slag must be very fusible, as zinc silicate is of itself infusible, and this property renders less fusible the other silicates formed in the furnace. Metallic iron is not ordinarily employed as a flux in either lead or copper blast furnaces, though iron oxides (hematite and limonite) are largely employed for this purpose. Iron sulphides are not considered as a flux proper, but if present in large amount they will consume a large quantity of iron, and this must be added to the charge. The iron gives a base for combination with the silica in the ore. It is not a fact that all smelters lose 1.3% of copper when running, as the slags of many copper furnaces contain less than 0.5% copper, though a few may contain 2% or over, due to improper methods. The deduction of 1.3% copper is due to a custom which obtained in the early smelter practice in the West, when there was found a discrepancy of about this amount between assays and smelter returns.

THE Federal mining laws are the main guide of the miner in locating claims in California. There are, however, a few unimportant local and State laws. The Act of March 31, 1891, provided in part that "Wherever any mine owner, company or corporation shall have performed the labor and made the improvements required by law for the location and ownership of mining claims or lodes, such owner, company or corporation shall file, or cause to be filed, within thirty days after the time limited for performing such labor, or making such improvements, with the county recorder of deeds of the county in which the mine or claim is situated, particularly describing the labor performed or improvements made, and the value thereof, which affidavit shall be prima facie evidence of the facts therein stated. Upon the failure of any claimant or mine owner to comply with the conditions of this Act in the performance of labor, or making improvements upon any claim, mine or mining ground, the claim or mine upon which such failure occurred shall be open to relocation in the same manner as if no location of the same had ever been made." The Act then provides for the resumption of work and later filing the necessary affidavits, etc. In 1897 another Act more comprehensive in scope was passed. This Act repealed, by implication, the law of 1891. This last law was itself repealed in 1899, but owing to the peculiar phraseology of the repealing Act it was contended the Act was ineffectual, but the Supreme Court of California determined the Act valid. Meanwhile the Legislature passed a second repealing Act free from objectionable phraseology, and this left in force such of the provisions of the Act of 1891 as were not in conflict with the law of 1897. This Act took effect February 8, 1900. (Statutes of 1900, page 9.)



## A Proposition in Economics.

Written for the MINING AND SCIENTIFIC PRESS by  
H. E. WEST.

Some three years since an interesting problem came before the writer for advisement, and, as some of the factors and data therein may be of interest to others, possibly this may serve as an apology for bringing this subject forward.

The proposition was, in brief, whether it was advisable to capitalize further a property that had already a substantial sum to its debit, and which, after several years of desultory working, was then not meeting its costs, the hope of salvation lying in the possibility of more extensive operations and further equipment, with, in consequence, a reduction in working costs.

It will suffice to state that the mine in question is situated in the Western States; but, as the property is somewhat well known, it will not be advisable to be more explicit, except, perhaps, to add that working conditions, labor, etc., can be based on those existing to-day in the Cœur d'Alene mines of Idaho.

Briefly considered, the vein is a fault fissure along an anticlinal axis, traceable with practically unbroken continuity from 40 to 60 miles in length. There are prospect holes almost the entire distance, and one or two attempts at mining, that to the present have met with questionable, if any, success. It will be seen, therefore, with the section given, showing about 3 miles along the line of outcrop, that by nature the deposit is laid out for comprehensive working, if at all. It will also be noted that the workings have been confined to the south side of the middle gulch, since there the richest outcrops existed.

This site, unfortunately, being at the head of a steep canyon, whose walls rise 1000 feet on either hand, and blocked at the end by a mountain 3000 feet above the canyon, made a very unfavorable site for mine working and the camp generally for the greater part of the year, especially during the winter and spring, when danger from snowslides was ever imminent. Moreover, the additional thousand feet above the lowest exposure made a serious difference in getting supplies in and concentrates out. The haul to the railroad is 21 miles, with a difference in altitude of about 3000 feet. The grade of the ore was at that period too low to meet the adverse conditions successfully, the loss being about \$1 per ton of ore mined. The proposition was, therefore, as before stated, whether by installing more comprehensive working and equipment, and attacking the proposition from a more favorable base, the undertaking could not be made to yield results sufficiently satisfactory to induce additional capital to be provided.

The proposal of development was, in brief, as outlined in the section, viz., to sink the shaft (then at 200 feet) to meet the deep adit 4000 feet from the mouth and at a depth of about 1000 feet below tunnel No. 1; to install a concentrator capable of treating 600 tons per day. The concentrator would consist of two equal units.

Only one of the units to be provided, however, at first, to develop the water power higher up Creek No. 1, where ample water existed at all times for the complete working and lighting of the mine, plant and buildings. Also, in addition, to bring in a branch railroad from the main line, to materially reduce the cost of supplies and concentrates, which were freighted at \$10 and \$5 respectively, per ton. The camp would then be near the mouth of the deep adit, in a favorable position for working and habitation all the year round. So far so good. The next matter to determine was, whether the present development and past records warranted any such outlay. In the writer's opinion, clearly the most cautious plan would be to sink the shaft, say to the 500-foot level, and by drifting north and south to determine the extent and quality of the known ore shoot, which was developed in tunnel No. 1 for 1500 feet continuously, with the northern boundary still undefined; then, with the same grade of ore as that at present blocked out and with the same average width, the proposition could be shown to be payable; whereas, should the ore encountered prove either of higher grade or greater in quantity, so much the better.

A lower grade or diminished quantity would be distinctly unremunerative.

The length of the adit to be driven would be over 4000 feet. Roughly the cost of the proposition outlined would be:

Four thousand feet of adit at \$20 per foot.....	\$80,000
Eight hundred feet of shaft at \$30 per foot.....	24,000
Development, equipment, hoist, compressor, track, cars, etc..	50,000
	\$154,000
Mill, 600 tons per day, one unit.....	100,000
Hydro-electric installation.....	50,000
Camp buildings, roads, etc.....	20,000
	\$324,000
General expenses, etc., 10%.....	32,400
	\$356,400

Say, in round numbers, \$350,000.

If a railroad was justified, this would probably cost an additional \$100,000; thus, bringing the total required to \$450,000—a sum which is not usually found unless amply justified.

As similar propositions have been met and overcome at the Cœur d'Alene mines, the writer

accordingly visited the locality and spent some time examining into the special conditions relative to each prominent mine, ascertaining as far as possible, through the courtesy of the several officials, the cost required to meet and overcome same, with the financial results that had attended each.

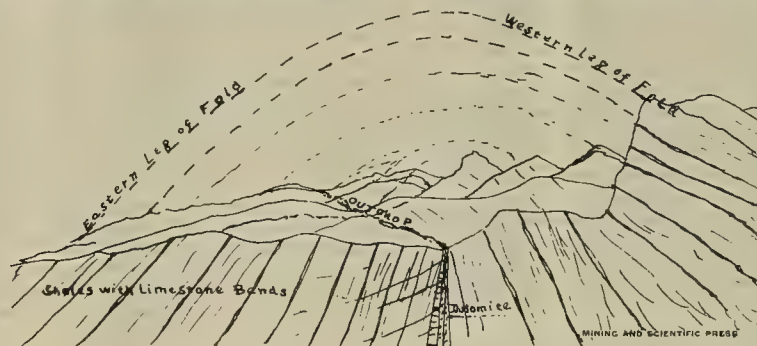
The following tabulated statement may, therefore, be of interest, although it does not pretend to absolute accuracy; yet, at the same time, most of the essentials are sufficiently so for the case in hand, and also for comparative reference to others—and, as such, it is now offered. It may be noted, in passing, that the figures are a record for 1901, and in some instances are not up to date, though it is questionable whether any very large economies have since been effected, that is calculated at the cost per ton treated.

In this table may be seen the comparative statements under the several heads, compared with each other and the mine under review. With regard to the grade of the ore, there is not much difference between the lower grade mines—but one marked difference manifests itself, and that is the tonnage of the ore treated per day. Generally speaking, a

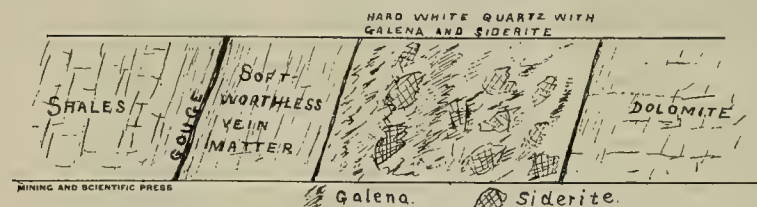
the pitch being probably to the north, so that, judging from the outcrop, there is no great expectation of cutting any considerable body of ore in the adit. Now, as to the width of the veins. It is seen that all the veins in the Cœur d'Alene system are considerably wider than that of the Competitor, whose width is, on the average, possibly 4 feet, although this is the outside limit. Hence, to maintain an output of say 300 to 400 tons per day even—not to mention 600 tons—a very considerable length of stoping ground must needs be opened up; and, with this output, the available ground above the deep adit would be stoped out in about three and a half to four years. The block of ground that might reasonably be relied on would measure 1500x4x1000 feet, or about 500,000 tons. Below this level all is problematical and cannot be advisedly enter into the calculation.

The chances are that a vein between sedimentary rock (shales and limestones) with such a considerable thickness of these bands, shown by the tilted strata, might live to a reasonable depth. Now, with regard to profits and cost of production:

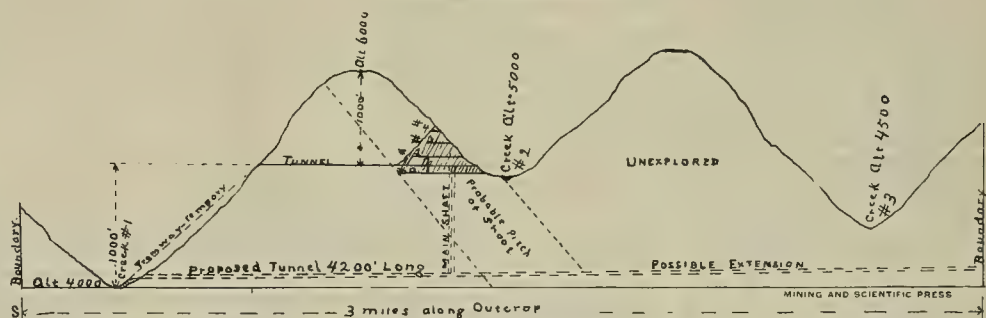
In the past this is given at \$3.23 per ton of ore mined and treated, including all general costs, but



Sketch Showing General Features of Anticline, and Vein at Axis.



Cross Section of Competitor Vein.



Sketch of Competitor Mines.

lower tonnage demands an increased ore value, and this is also true for this particular camp, for, in the early days, when tonnage was small, in such mines as the Bunker Hill & Sullivan there were deposits of easily worked lead carbonates that were shipped direct, and the early sulphides worked concentrated possibly four to one. Or, looking at the matter in another light, were the output to be cut to 150 tons per day, would these mines, with all their facilities and efficient mills, be able to subsist on a feed of 6% to 7% lead? The answer is undoubtedly in the negative. Certain mines, doubtless, paid their way from the surface down, but others, notably the Morning mine, one of the lower grade mines, experienced many reverses in its early days, and it was not until a large output was put through, necessitating a very considerable capital outlay, that the mine paid its way—and, even at the date of the writer's visit, it is doubtful whether there was an actual profit per ton of ore treated of over 75 cents, although with the completion of tunnel No. 6—virtually a deep adit—this might be increased to \$1.25 per ton. So it is, beyond doubt, the tonnage which tells in such propositions. With the considerable amount of ore developed and probably encountered these mines can afford to drive crosscuts through barren ground for 2 miles or over, and also to install large mills and all requisite machinery for efficient mining, so that the total costs shall be reduced to the lowest point—for without these economies, as has been intimated, these profits would diminish, and, in some cases, possibly disappear.

The question, therefore, resolves itself into tonnage.

The proved ore shoot in the Competitor mine is 1500 feet in length, with its northern limit undetermined—

without depreciation charges, etc. This figure is considerably more than the average of the comparative mines, but still a fair showing, considering the many disadvantages. As to grade of ore, there was developed below tunnel No. 1 about 30,000 tons of ore, averaging the following contents:

Lead, 6.8% — 136 pounds, at 4 cents per pound.....	\$5.44
Silver, 3.2 ounces, at 50 cents per ounce.....	1.60
Gold, \$1.....	1.00
Total.....	\$8.04
	Smelter Discount. Mill Loss
Lead.....	\$5.44 less 10% = \$4.90 less 20% = \$3.92
Silver.....	1.60 less 5% = 1.52 less 25% = 1.14
Gold.....	1.00 less 5% = 0.95 less 30% = 0.65
Total value.....	\$5.71
Nominal mine value.....	\$8.04
Smelter value.....	7.24
Mine value (actual).....	5.71

We, therefore, see our ore considerably shrinks in value, through factors in all probability beyond control, and our \$8.04 ore becomes \$5.71, which has to stand all costs of mining, milling and smelting.

With a ratio of concentration of 10 to 1, that seems reasonable to assume, and is in accordance with practice elsewhere on similar grade ore,

$\$5.71 \times 10 = \$57.10$  per ton of concentrates.

### OPERATING COSTS.

Mining and milling, etc., 10 tons of ore, at \$3 per ton.....	\$30.00
Freight from mine.....	1.50
Freight and treatment.....	18.00
	\$49.50
Value per ton of concentrates.....	\$57.10
Cost per ton of concentrates.....	49.50
Profit per ton of concentrates.....	7.60
Or 78 cents per ton.	

Of course, as a matter of fact, there would be two grades of concentrates produced, coarse and slime,



COMPARATIVE STATEMENTS REGARDING THE CEUR D'ALENE AND THE COMPETITOR MINES UNDER CONDITIONS EXISTING IN 1901

- 1—(Bunker Hill Sullivan.—Ore occurrence unique, lenses of ore 100' in width and up to 250' in length occurring as enlargements or branches making into the hanging. Ore occurs mostly in masses distributed throughout the vein. A long crosscut over 2 miles in length at \$20 per foot now being driven, connecting mill with mine, giving rise to additional "baes."
- 2—(Tiger Promont.—Banded, worked through main shaft situated near bottom of canyon close to mine.
- 3—Standard.—Ore occurs in vein mostly in two seams, one against either wall, the middle portion being used for filling between square sets. Main entrance by Campbell crosscut, 3000 feet long. Estimated at about \$1 per ton.
- 4—(Pisco.—The vein is banded. It was richer in the upper workings. The large quantity of zinc somewhat interferes with milling and deprecitates concentrate produced. There is no coarse slag ore in the mine.
- 5—(Morning.—There are two veins, "Morning" and "You Like." The former narrower but richer. Total cost per ton \$2.57 from \$3.27 net value of the concentrates gives 70 cents per ton profit, which will be increased later to \$1.25 when the 2-mile crosscut is finished.
- 6—(Competitor.—The vein is a banded quartz vein, with spathic iron. The galena occurs more or less throughout, almost always intimately mixed with the quartz, thus rendering coarse concentration usually impossible—culling for fine grinding with the corresponding loss of silimed galena. The loss per ton of ore treated was \$1.

NOTE.—The output for 1900 from the Cœur d'Alenes mines for ore and concentrates was 175,000 tons. Lead 56%; silver 36 ounces.

b—Difficulty of high extraction of metallic contents, owing to the unusually intimate association of the economic minerals with the gangue of the vein, chiefly quartz, spathic iron, blende, etc.

The selling value of the mine manifestly cannot be demonstrated to be anything near the amount already sunk in the property, therefore, unless additional capital is forthcoming, there must be a loss. And with further capital we are confronted with two possibilities: either the additional loss—total or in part—or, on the other hand, the return of the additional outlay, the expenses to date, and a reasonable interest on the total period of operation.

Written for the MINING AND SCIENTIFIC PRESS by  
G. E. BAILEY, E. M.

Many of these smaller occurrences are much nearer existing main lines of transportation than any of the large ones, and, if worked, could be made valuable feeders to the centrally located refining works. The refining cost at such works must always be much less than at those situated on the shores of the large lakes. It should cost no more to produce the crude material at the smaller places than at the larger ones, and may cost even less. The difference to be considered is the increased cost of transportation to the refinery, and it will be found that the well-situated central works could afford to pay this and still compete with those at the source of supply.

It is a fact, also, that the Pacific Borax Company have built a larger refinery at Bayonne, N. J., than they have at Alameda or Marion, Cal. The dense populations of the Eastern States are to-day the main consumers; but the Western consumption is steadily increasing, and with its increase will come more Western chemical works. It requires considerable capital and expensive plants to go into the borax or soda business. It also requires a high grade of chemical and technical knowledge to boil the crude material and separate the borax, carbonates of soda, sulphate of soda and salt from each other by fractional crystallization. These facts show that it is not a poor man's proposition, like placer mining. The situation is summed up as follows in Bulletin No. 24:

Nature has been bountiful in giving to California salines which await the union of capital and technical skill to become valuable producers of State and national wealth. The main source of this wealth of natural soda, borax, niter, etc., are the alkaline lakes, "dry deposits, and beach lines of the Great Basin. The technology of the salines has its special difficulties, since laboratory experiments on a small scale, no matter how carefully conducted, can rarely reproduce the condition existing in large masses of the raw material. As these difficulties have to be met by the scientific specialist, and not by the prospector, it was not thought necessary to do more than note a few points in connection with the many processes. At a later date a bulletin on this subject would be of value to those engaged in developing these resources. It would seem that the time must soon come when these vast resources will attract the serious attention of capital and business enterprise. The path is open. The general chemical lines are already well known, and the engineering problems, while numerous, are neither very complex nor very difficult. Through the present steady development of transportation facilities, the arid region will soon become the seat of new, great and prosperous industries. That these deposits will be developed is not doubtful to any one who knows the activity and enterprise of our people.

IMPROVED PROCESSES.—The history of the borax in-



dustry shows that at first only high-grade portions of the dry lakes were worked; just as in the days of '49 only the richest gold placers were developed. Speaking of these early days (1872) Bulletin 24 says:

The prospectors, however, have been aroused to interest in the mineral that was worth over \$600 per ton and "only had to be shoveled up to be ready for the market," and discoveries in the deserts of California and Nevada followed each other with bewildering rapidity. In 1873 San Bernardino county began her big record with the production of 515 tons from the so-called borax "marshes," or the "dry lakes," of the desert. Inyo county soon followed in lively rivalry, and the high-water mark of the early years was reached in 1876, when 1437 tons were produced, worth at that time over \$312,000.

(TO BE CONTINUED.)

### Pelton Water Wheel at the St. Louis Exposition.

The exhibit of the Pelton Water Wheel Company at the Louisiana Purchase Exposition aims to demonstrate graphically certain hydraulic theories which have heretofore been deduced only from calculations.

The impulse wheel consists essentially of a cast iron or steel center to the periphery of which are affixed cups or buckets. Water under pressure is allowed to impinge on these buckets, causing the wheel to revolve with the shaft on which it is mounted. The efficiency of a wheel of the Pelton type is largely due to the shape of the bucket. The bucket and the action of the water upon it naturally engage attention.

To obtain a complete reversal of the stream, with practical absence of velocity, it is essential that the bucket be divided into two parts by a wedge or splitter on which the stream might strike. (See Fig. 1.) The stream of water is thus divided, the

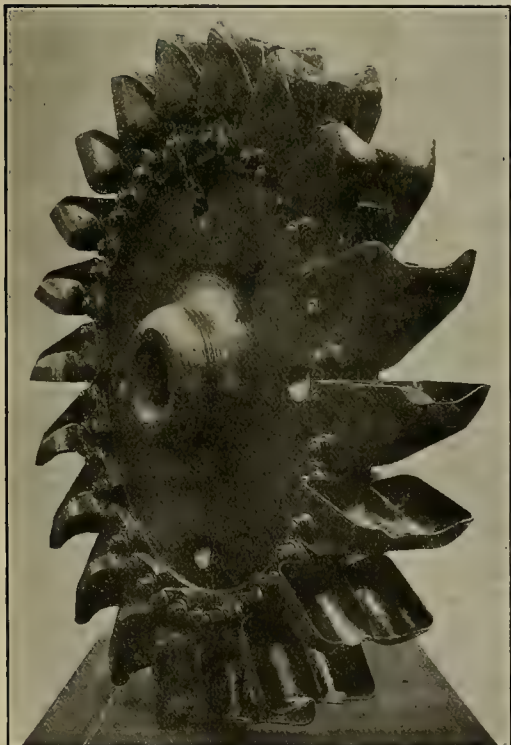


Fig. 1.—4000 H. P. Pelton Wheel, Showing General Bucket Design and Construction.

two halves following the curvature of the bucket and discharging backward and downward at a slight angle, so as to avoid interference with the succeeding bucket. To obtain this result it is necessary that the bucket curves be laid on lines of the least resistance and that the splitter bear a certain relation to the bucket sides.

In designing a water wheel bucket and attempting to carry out a particular theory it is, of course, necessary to lay out the bucket shape mathematically, and then, following well known hydraulic laws with regard to the flow of water on surfaces, note the curves and paths which the stream should follow. This plan has been productive of good results; but most of the hydraulic laws referred to were deduced from observations of water action against stationary surfaces; or, if moving, the path of the water was so obscured by spray and the moving wheel that the observations have in some cases led to mistaken theories, which are now disproved in actual practice.

The problem is, then, to observe the action of water on moving surfaces as though they are standing still. This is accomplished by applying the "skobiscopic" principle to the observation of a water wheel in actual operation, which principle may be described as being the reverse of the kinetoscope, in that moving objects are seen as stationary, instead of apparent motion being given to stationary objects. The general principle is that if a moving object be illuminated at fixed

intervals by rays of light admitted at the moment the object passes a desired position, each portion of the object will be observed as though it were stationary.

In Fig. 2 is exhibited the apparatus, consisting of a Pelton water wheel 20 inches in diameter mounted on the shaft overhang of a General Electric generator. The water impinges on the wheel through a needle nozzle, the pressure being supplied by a centrifugal pump. The luminant is a General Electric searchlight projector with automatic focal point control, which is located beneath the apparatus, and which by a system of mirrors throws its rays into the wheel housing through the glass bottom. In its normal position the light is thrown direct on the wheel, under which condition the wheel may be seen revolving and the water discharging from the buckets in apparent confusion. Interposed between the searchlight and the wheel is a sheet iron disc with radial slots, which disc is revolved by means of a gearing at a speed proportional to that of the wheel, and when the searchlight is automatically brought into its upper position the light is thrown on the wheel through these revolving slots, and thus the wheel is illuminated at fixed intervals, and one sees the wheel apparently standing still and can observe the action of the water and trace the path of the jet from its entering the bucket to its reversal and clearance of the succeeding bucket without interference.

The apparatus presented is for exhibition purposes only, and to obtain practical results the Pelton

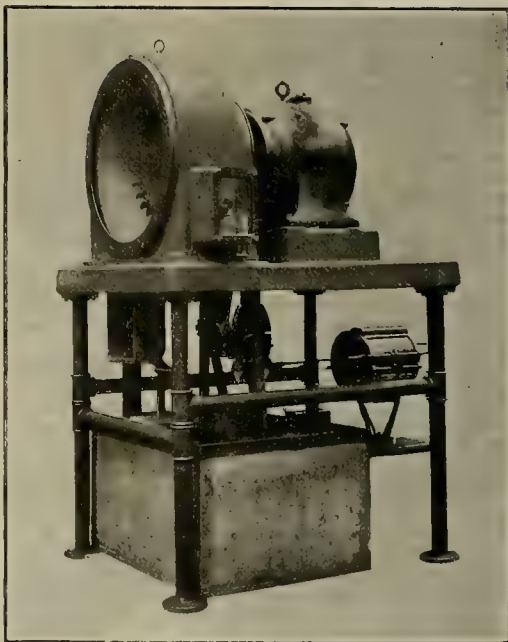


Fig. 2.—General View of "Skobiscopic" Apparatus.

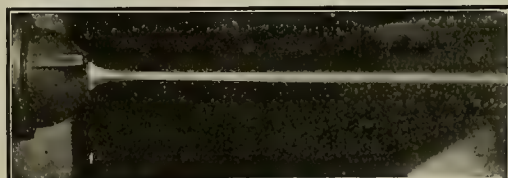


Fig. 3.—A Stream of Water From a Pelton Needle Nozzle.

Water Wheel Company has a permanent installation on a large scale in its San Francisco laboratory, where exhaustive experiments are conducted. Not relying on visual observations alone, resort is had to photography as a permanent aid in studying the action of the water on the buckets. In this laboratory also are instruments of precision for determining the relative efficiencies of different bucket shapes.

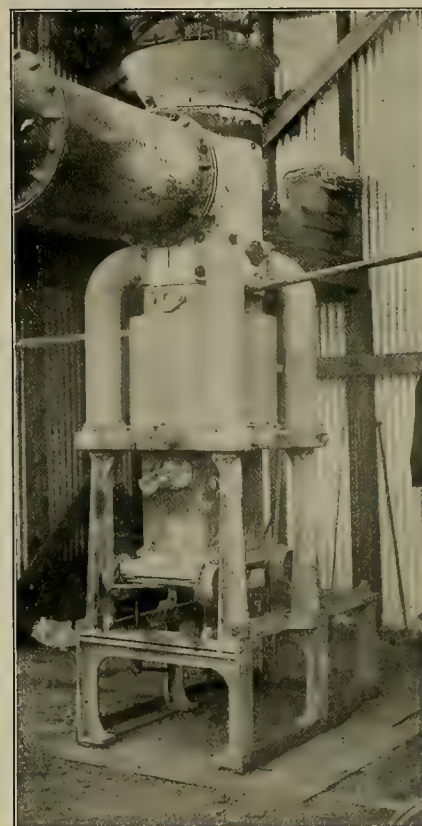
Regulation of any water wheel is necessarily at the expense of efficiency. In most cases it is accomplished by throttling the water by means of a gate, which materially reduces the working pressure. The Pelton needle nozzle (see Fig. 3) is an efficient device. The needle nozzle consists of a conical-shaped tip, in which is inserted a concentric-tapered plug or needle, generally similar in shape to a "plum-bob." A change of position of this plug causes a corresponding change of discharge area in the nozzle; the amount of water used is thus varied and the power of the wheel influenced proportionally.

The peculiar curves of the needle and tip admit of the water changing its velocity gradually and uniformly, and the stream diameter may be varied from about one-tenth to full area without changing its circular form or losing its density. The combination needle and deflecting nozzle, embracing both features in one nozzle, is deemed particularly effective in its results when varying loads are met with at certain periods in the day's run.

### A Hot-Blast Smelter.

Herewith is illustrated a shaft furnace for semi-pyritic smelting, which the inventor says is built to handle lead, copper or gold ores, with the proper variation of fluxes and adjustment of tuyere openings. Test runs are at present being made on the treatment of gold-bearing vanner concentrates consisting mainly of pyrite, but which, due to exposure, are more or less oxidized, there being barely enough sulphur present to form a matte. With this class of material about 5% of coke is required in the charge. With increase in the sulphur content the quantity of coke may be reduced, as the excess sulphur (over that required to form a matte) will serve as fuel.

The distinctive feature claimed for this furnace is the arrangement of the hot-blast system. The hot gases resulting from combustion in the furnace are drawn out by a suction fan, through a pipe contained within the air-blast pipe (seen in upper left side of the cut). By this means the air, before reaching the tuyeres, is heated, as the incoming air is in contact with and entirely surrounds the pipe carrying



The Vencedora Hot-Blast Smelter.

the exhaust gases. This effects economy in fuel and makes the furnace especially applicable to mines at some distance from cheap transportation. Such a mine could smelt its gold-bearing concentrates at the mine and ship an enriched iron matte. Charcoal may be used instead of coke.

To facilitate feeding, the concentrates are briquetted with about 10% of lime. The furnace shown in the engraving has a capacity of five to ten tons per twenty-four hours, and fifty pounds of ore and flux are charged at a time. Furnaces are built to handle up to and over fifty tons daily. The four vertical pipes outside the shaft of the furnace carry the blast to the tuyeres. The shaft of the furnace is water-jacketed. The tuyeres consist of a succession of holes in plates (each an arc of the furnace shaft's circle), each plate being readily removable, so as to carry larger or smaller holes, according to the amount of air desired. Because of the hot blast and the suction fan drawing off the waste gases, it is said that but three to five ounces pressure is used on the blast. The auriferous sulphides are concentrated (about ten into one on the first operation) into an iron matte. If desired, this matte may be resmelted by breaking up and charging with quartz, further concentrating the gold values. The matte and slag are drawn off, from time to time, from the upper of the two tap holes. The crucible or lower part of the furnace is detachable. In handling copper ores the tuyeres may be manipulated, says the inventor, so as to produce copper bullion in the first operation.

These furnaces are being manufactured by the Vencedora Mine Equipment Co., of which W. C. Ralston, 331 Pine street, San Francisco, Cal., is president and manager. The smelter may be seen in operation at the Fulton Iron Works, San Francisco, Cal.



Crushing in Cyanide Solution as Carried on in the Black Hills, S. D.\*

NUMBER II

Written by C. H. FULTON.

THE COST OF SHOES AND DIES OF DIFFERENT MATERIALS.—Shoes weigh 180 pounds and dies 120 to 140 pounds. Laid down at Terry, S. D., chrome steel costs 5.83 cents per pound, forged steel 5.72 cents per pound, cast iron 3.5 cents per pound.

TABLE III

NAME OF MILL.	Name of Part.	Material.	Tons of Ore Crushed.	Number of Days Used.	Cost per Ton of Ore Crushed—Cents.
Maitland.	Shoe	Chrome steel	250	90-95	4 9
Maitland.	Shoe	Cast iron.	105	35-4	4 05
Maitland.	Die	Cast iron.	105	40	3 28
Maitland.	Die	Forged steel.	280	105	3 06
Horseshoe.	Shoe	Chrome steel.	336	84	3 12
Horseshoe.	Shoe	Cast iron.	104	26	6 15
Horseshoe.	Shoe	Forged steel.	280	70	3 67
Horseshoe.	Die	Chrome steel.	400	100	2 29
Horseshoe.	Die	Cast iron.	120	30	4 08
Horseshoe.	Die	Forged steel.	340	85	2 85

The Dakota mill also uses chrome steel shoes and is experimenting with a cast iron die containing 20% of chrome steel scrap, made at a local foundry, which costs 3.5 cents per pound laid down at the mill. Dies

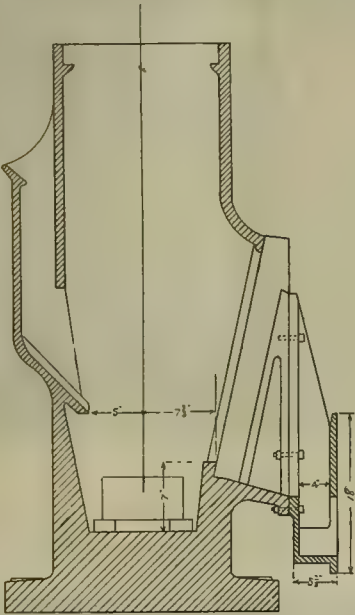


FIG. 1.

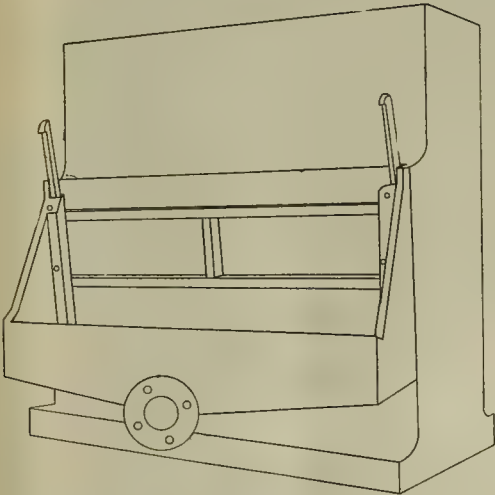


FIG. 2.

of this kind weighed 120 pounds and lasted forty-six days, crushing 175 tons of ore, and leave 14 pounds of scrap, which is sold at 0.5 cent per pound.

At the Lundborg, Dorr & Wilson mill at Terry a 6-foot roller mill is used to crush in cyanide solution in place of stamps. This mill crushes about 70 to 90 tons of ore per day, from 0.75-inch size through an 18-mesh screen, 0.046-inch space. The mill makes thirty-two revolutions per minute and has 19.5 square feet of screen area. A peculiar feature in



Alta Mines Co., Mill and Tramway, San Miguel County, Colo. (See Page 230.)

the wear of this mill is that both the die ring and the roller tire cup on wearing. Instead of the die cupping and tire crowning. This, however, does not seem to affect the efficiency of the crushing. This mill is giving satisfaction, but no figures are as yet available to afford a comparison between it and the stamps on siliceous ore. It might be stated that the ores crushed at this mill are in part comparatively soft, although some hard, blue quartzite ores are also being crushed.

The cyanide solution is introduced into the batteries at most of the mills by two 1.5-inch pipes entering at the front of the battery between the first and second and the third and fourth stamps. Each pipe is controlled by an iron cock.

At two of the mills a special form of mortar is used, having a cast iron collecting launder bolted on at the front, and having a central discharge into the main launder, collecting the sludge from all the batteries. This mortar is shown in Figs. 1 and 2, which also give the form and dimensions of the mortar used at the Maitland mill. Generally all the screens are overhung with heavy canvas to avoid splash.

(TO BE CONTINUED.)

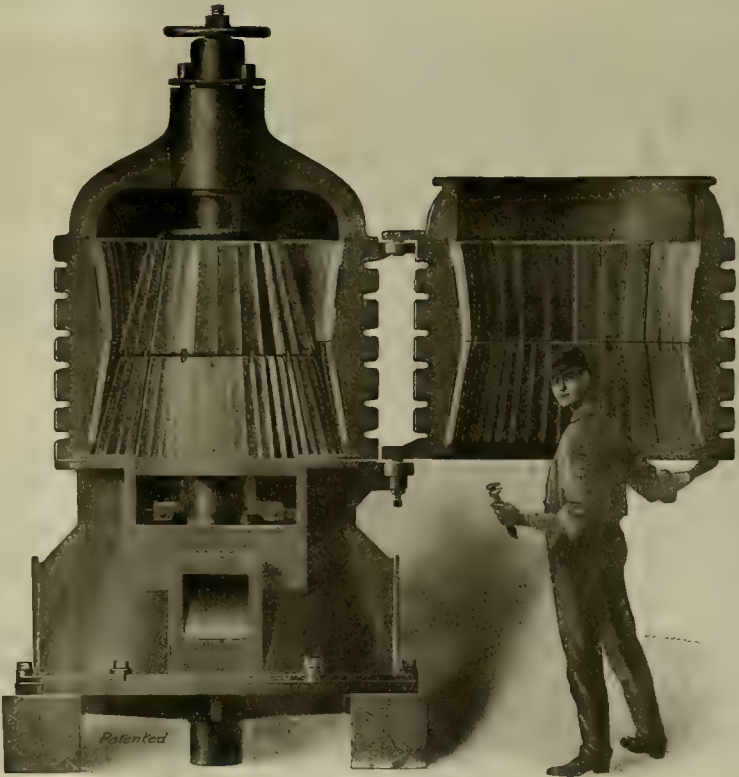
Open-Door Rotary Crusher.

A new rotary crusher is manufactured by the Sturtevant Mill Co., illustrated herewith. It is called

and other uncrushable material that gets into this class of machines may be easily removed. The heaviest wearing parts, although massive, are small enough to be lifted out by hand.

Rotary crushers are great producers of finely broken materials of moderate hardness, crushing cheaply and fine.

This open-door crusher is a very large machine. "The vertical shaft carries only its own weight and that of the driving gear, and its foot runs in a large oil-pot bearing thoroughly protected from dust. The crushing cones are supported from the top by large ball-bearings, which greatly promotes easy running and durability. This cone may be raised or lowered by the screw at the top. The range of adjustments for wear or to size output is unusually large. The scrapers require no change, except replacement for wear, and are conveniently reached without dismantling the machine. The cast steel bevel pinion shaft is supported from the inner end, giving great strength to this important part. Discharges are from three sides. The door bolts are removed from slots, a single turn of each nut allowing speedy removal. Thus the door may be opened as easily as the door of a steel safe and swung entirely out of the way, giving full access to the interior of the crusher. Removal of any part is therefore easy. The case is not weakened by the door, which, held by its bolts, is rigid and secure. Having no flywheel, this crusher is not subject to breaking flywheel shocks in case of sudden stoppage. This danger is avoided, and yet



Open-Door Rotary Crusher.

the Open-Door rotary fine crusher, and its massive door, swinging wide as easily as the great door of a large safe, exposes all its wearing parts to quick inspection and removal. Railway links, coupling pins

the machine has abundant power for any work. Every part of the open-door crusher is massive; the main shaft is 7 inches in diameter and in every way reliable." The Sturtevant Mill Co. of Boston, Mass.,

\*Bulletin No. 7, South Dakota School of Mines.



have issued their 1905 Catalogue No. 12, showing and describing these rotary crushers and eight other types of rock crushers; also rolls, mills, screens, engines, boilers, etc., and will gladly mail it to interested parties.

### Gold Reduction Plant at the World's Fair.\*

[FROM A SPECIAL CORRESPONDENT.]

S. W. Russell of Deadwood, S. D., president of the South Dakota Commission to the Louisiana Purchase Exposition and of the Black Hills Mining Men's Association, made the opening address at the dedication of the Black Hills gold reduction plant in the mining gulch at the World's Fair on August 25th. Mr. Russell said in part: "The center of the world's civilization, of its progress, its arts and sciences, has been brought this year to St. Louis, and as I look about me and see the faces of many of those who have brought this magnificent triumph to our nation, I realize that this plain, unpretentious little building, has become for me to-day the finest palace in all the world. \* \* \* President Francis, in presenting this exhibit, I not only do so as president of the South Dakota Commission, but especially as the representative of the Black Hills Mining Men's Association, for it is this Association that makes the exhibit. I realized that my commission could not, in justice to the other State interests, undertake an exhibit of this magnitude, the cost of which would well nigh equal the whole State appropriation, but desiring to put into effect Dr. Holmes' plans for a practical gold milling plant and knowing that I had the support of the Black Hills Mining Men's Association, this standard, up-to-date gold plant, supplied with Black Hills gold ore, greets you to-day. In this plant we will show you how modern science and business methods and careful practice enable us to mine our ores at a profit; to hoist, stamp and treat them so that by extracting only from a third to a sixth of an ounce of gold from a ton of rock, we cause our companies to pay their dividends. \* \* \* For the Association and the State I desire to extend our thanks to the makers of this machinery, the Colorado Iron Works Co. of Denver, Colo., who have generously assisted us, and to you, sir, and to Director of Exhibits Skiff, and to Dr. Holmes, and to all those connected with the Exposition, I desire to express our appreciation."

President Roosevelt sent the following message to Mr. Russell:

Through you I send cordial greetings to the Black Hills Mining Men's Association and best wishes for the successful opening of your gold reduction plant. I heartily congratulate you and the Association on the establishment of your interesting exhibit.

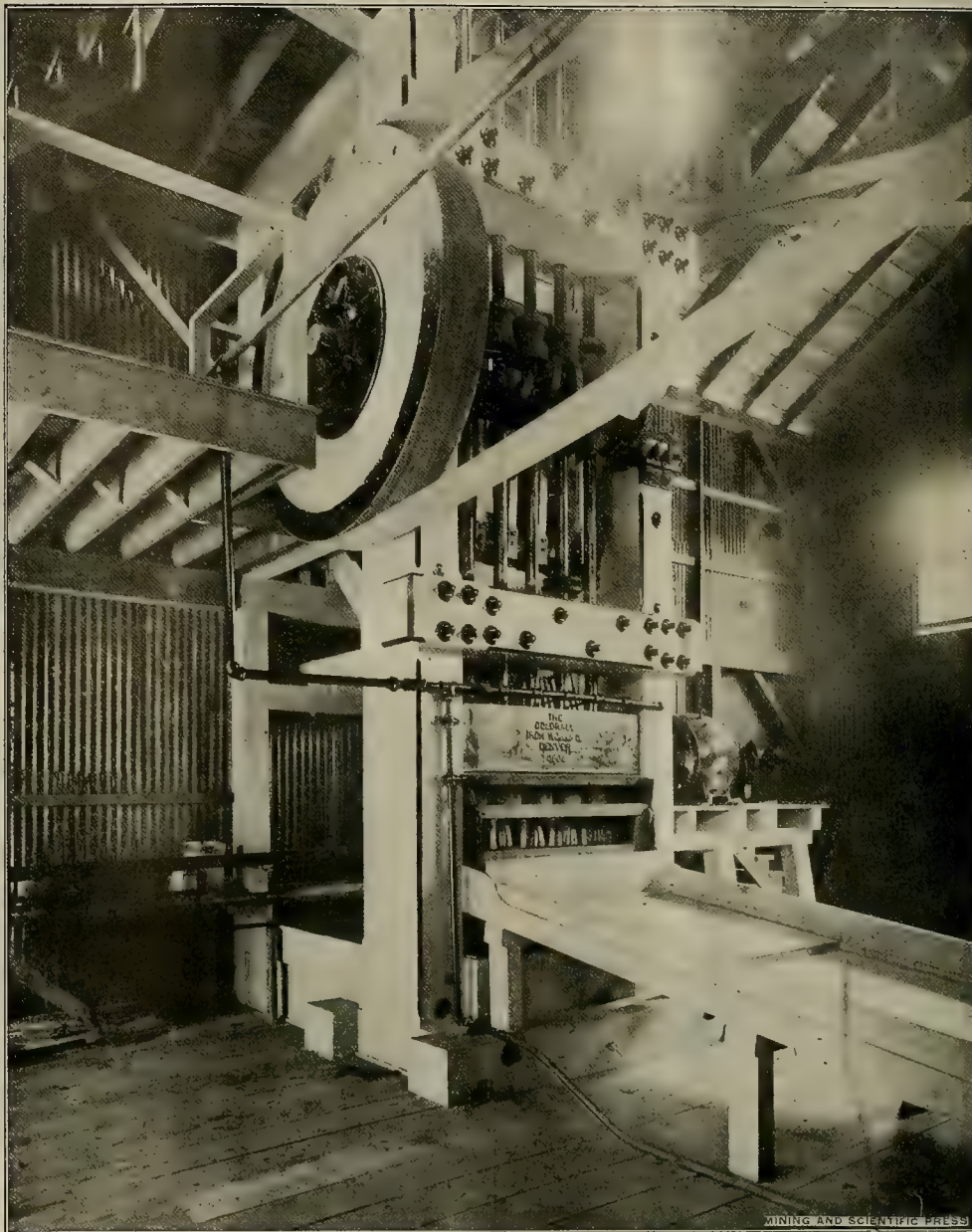
THEODORE ROOSEVELT.

Governor Herried of South Dakota wired as follows, also to Mr. Russell:

Congratulations on the opening of the gold reduction plant representing one of the various industries of one of the youngest, but best States, having the largest gold mine and richest 100 square miles on earth.

Other telegrams were read from Congressman Burke and A. B. Kittredge and E. W. Martin.

\*See illustration on front page.



Stamps and Plates of the Black Hills Gold Mill at St. Louis Exposition.

President Francis, the next speaker, then said in part: "In rising to accept on behalf of the Exposition I did not pay proper tribute to the enterprise and company this characteristic exhibit \* \* \* I would be untrue to my own feelings and unjust to you if I did not pay proper tribute to the enterprise and the perseverance which you, sir (Mr. Russell), have



The Black Hills Gold Mill at the St. Louis Exposition.



brought to bear to install this exhibit. I accept, on behalf of the Exposition company, this most interesting exhibit. It is a component part of a great universal exposition, an exposition which comprises all the best products of all the civilized people upon the globe, but no exhibition held in America to-day, characteristic of the products and the progress of the country would be complete that failed to show the processes by which this very important contribution to the wealth of our country is realized. I make the prediction that this gold reduction plant will be one of the interesting features of the Exposition from now until its close. I felicitate you, the people of South Dakota, and the Colorado Iron Works Co. upon this excellent installation."

Director of Exhibits Skiff, in concluding the exercises, said: "The roof under which we are gathered to-day is not unfamiliar to me in its purposes, at least, and from what an observing and experienced

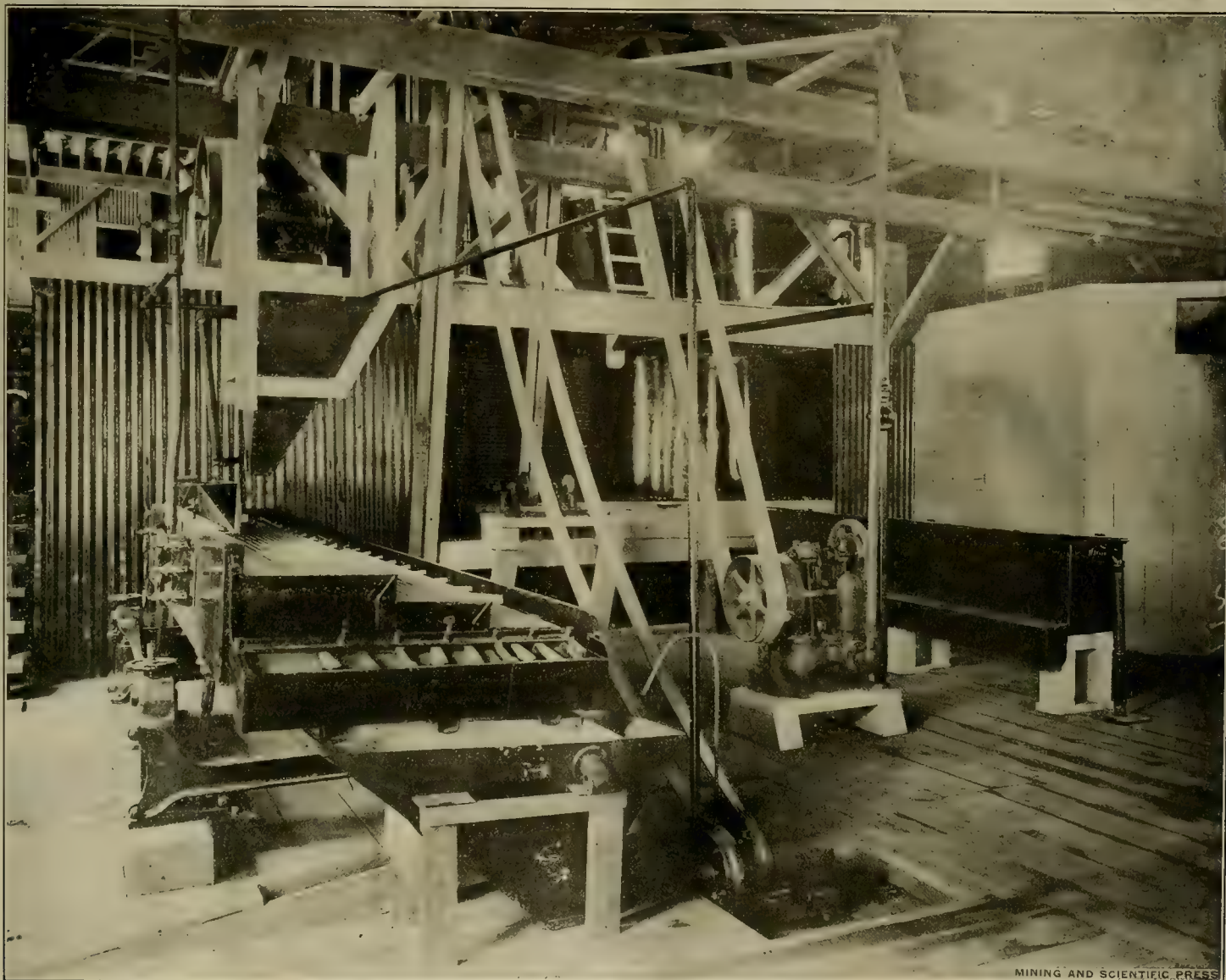
feeder, hanging pattern, and after being crushed passes through the screens (which are changed from time to time as the ore varies in character), the mortar being of the single issue Homestake pattern. The mill is equipped for compound ore treatment; either wet stamping with cyanide solution and treatment of sands and slimes separately, or wet crushing with water, and amalgamation and concentration following. In the latter process the pulp passes over 12 feet of silver-plated coppers (three plates each 48x54 inches in terrace), the plate washings being concentrated on a 1904 (No. 5) model of the Bartlett concentrating table. In the wet stamping cyanide treatment the pulp is conveyed by launder to a sump and elevated therefrom by a 54x6-inch Frenier sand pump to two C. I. W. type of standard hydraulic classifiers 30 inches and 20 inches, respectively, when the separation of the sands and slimes takes place. The sands flow to the automatic distributors over the

represents the Colorado Iron Works Co. S. W. Russell selected the various ores that will be treated in the mill from different mines in the Black Hills gold district, and it is estimated that when all shall have been crushed that the net bullion returns will be about \$10,000. Altogether the mill in operation was pronounced a most interesting and instructive feature of the great Exposition.

Mining Gulch, World's Fair, St. Louis, Aug. 26.

### The "Semi-Diamond" Tool.

An emery wheel dresser, manufactured by the International Specialty Co., 35 Holden Avenue, Detroit, Mich., is designed by them to take the place of the black diamond. They write that it will do the work of truing and shaping emery wheels in as satisfactory a manner as the diamond dresser. The "Semi-



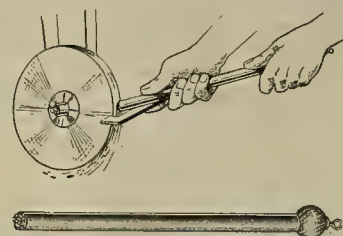
Concentrator Floor of Black Hills Gold Mill at St Louis Exposition.

gentleman from California has said, it appears to me that it can be generally challenged that this is the most perfectly equipped extraction plant that the ordinary visitor to mining camps and localities has seen. \* \* \* There is probably no exhibit on these grounds that more thoroughly meets the hopes of the Exposition management in placing product and process in juxtaposition than this. To what extent this exhibit may point the young man without ambition and the unemployed to the unknown and unexplored territories of mineral-bearing country to the west and northwest, is, of course, problematical, but that these exhibits, instructive of the industries of men and of wealth waiting upon effort are of distinct influences on the march of civilization cannot be denied. I am grateful for the opportunity of being present to-day. I am glad to receive this structure and this exhibit at the hands of our president, and in surrendering it into the custody of Chief Holmes I am passing it to strong and grateful hands."

An inspection of the plant following showed that the ore to be reduced is received at the highest point of the mill and tumbled into a large ore bin, from whence it is fed into a standard pattern 7x10-inch Blake crusher, the product being crushed to pass a 1½-inch ring. The ore then passes to a large bin back of the battery of five stamps, each of which weighs 1000 pounds, and drops 8 inches at the rate of ninety times per minute. The ore is fed to the stamps by a C. I. W. type of Challenge (eclipsed) ore

steel sand tanks, of which there are two, each 12 feet by 3 feet 6 inches, and equipped with separate air and leaching pipes, overflow launders, and sectional filter bottoms. The filtering medium is No. 2 cocoa matting, rope being used for caulking. The residues after treatment are discharged by flushing through 10-inch side gates. The gold solution which percolates through is conveyed by the leaching pipes to the 7x4-foot gold solution tank, from whence it flows through a 10-foot Webb precipitate box, zinc being used as precipitant. It is here that the gold is deposited and the spent solution flows to the sump tank, which is 10x4 feet. The slimes after separation pass directly to two 8x6-foot slime tanks, also steel, where they receive the agitation (air treatment). The supernatant solution after settling is decanted by means of decanting pipe and cocks at various levels into the gold tank also. The slimes tailings are flushed out the same as the sands residues, through 10-inch side discharge gates. The solution pump in use has a 2-inch suction and 1½-inch discharge, and is of the triplex type. The usual methods of refining the precipitate in practice at leading plants are followed. The equipment of the plant is completed with a 6x6-inch belt driven air compressor, zinc lathe and 20 H. P. motor, which furnishes the power. The mill is in operation about ten hours per day under the management of B. C. Cook, late of the Portland company in the "Hills," and a pioneer "wet crushing" cyanide man. R. P. Akins

Diamond" dresser is a steel tube filled with a hard abrasive, presenting new cutting edges the entire length of the tube as long as it lasts, which, they say,



"Semi-Diamond" Emery Wheel Dresser.

is from three to five years with ordinary use. The dresser is not recommended for water grinders or very hard wheels, although it can be used on such if necessary. Its efficiency is best demonstrated on grades up to medium hard.

In addition to the ore discovered on Rock hill, new strikes of importance are reported in the heart of the city of Leadville, Colo.; in what is known as the downtown district, in view of which other discoveries are anticipated.

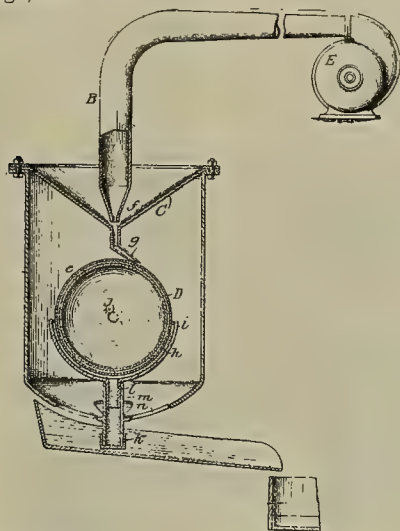


## Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 20, 1904.

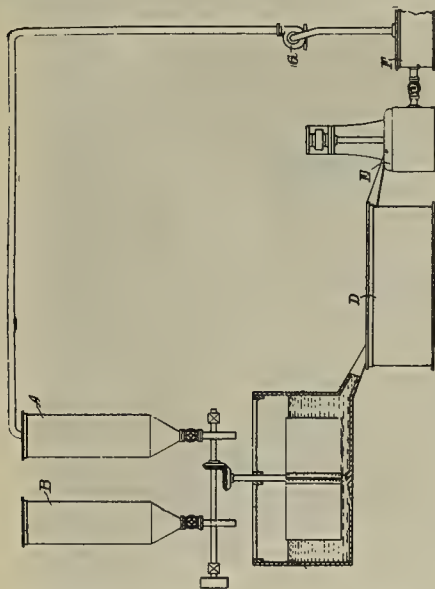
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

AMALGAMATING MACHINE.—No. 770,290; F. J. Hoyt, Chicago, Ill.



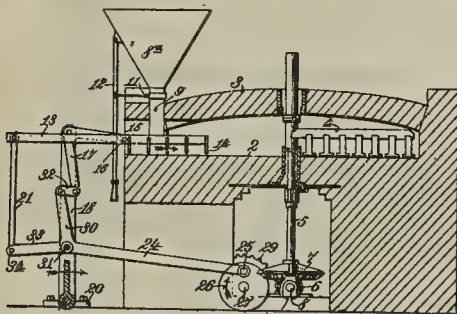
Combination with air tube having air mover at one end and nozzle at other end and funnel under nozzle of bowl and globe in bowl semi-submerged in mercury, and casing around globe supporting funnel.

SEPARATION OF METALS FROM THEIR ORES.—No. 770,659; J. B. Scammell, London, England.



Process of separating metals from ores which consists in bringing finely ground ore suspended in water into contact with chloride of sulphur diluted with oily or greasy matter, agitating mixture whereby metallic particles combine with sulpho-chlorinated oil, skimming off from mixture compound of metal, chloride of sulphur and oil which floats and separating grease or oil in order that it may be employed again.

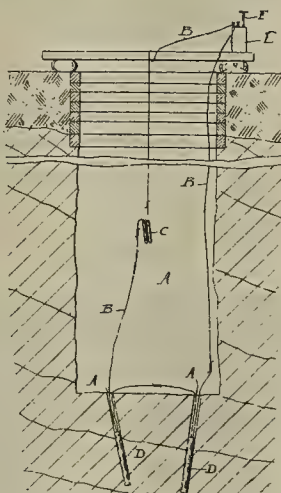
FURNACE FEEDER.—No. 770,701; J. Roger, Denver, Colo.



In apparatus of class described, ore feeding element comprising body member provided with plurality of rigid depending blades or hoes, means for

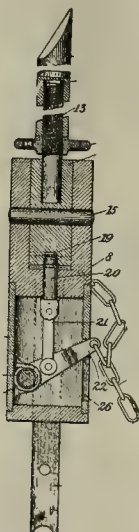
actuating successively downward, forward, upward, and retracting movement of element, and means for delivering material between blades.

METHOD OF BLASTING.—No. 770,459; C. O. Frye, Joplin, Mo.



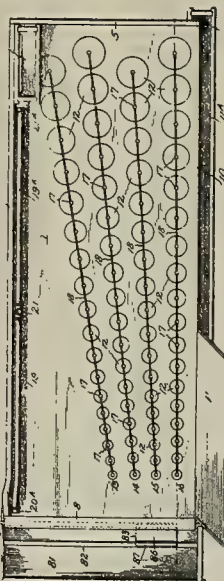
Method of blasting, which consists in exploding compression charge in proximity to surface in which blasting charge is embedded, with body of air between it and surface, explosion of compression charge taking place at time of upheaval produced by blasting charge.

JACK FOR MINING MACHINES.—No. 770,607; M. Raines, Decota, W. Va.



A jack for mining machines, comprising pivoted adjustable jack pipe, and means for locking jack pipe against pivotal motion with respect to body of jack; means for pivotally connecting jack pipe with body, pivoted lever and locking pin connected with lever and adapted to lock means against pivotal motion.

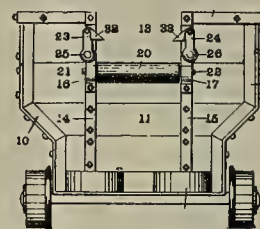
ORE CONCENTRATOR.—No. 770,283; A. Guionneau, Denver, Colo.



In reciprocating table concentrator, flat, smooth table surface provided with several rows of inverted

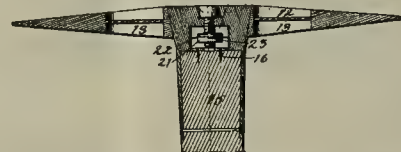
conical cups extending from head end portion of table throughout portion of each table's length, each row of cups being connected together with sunken groove or raffle.

MINE CAR.—No. 770,498; W. E. Hamilton, Zanesville, Ohio.



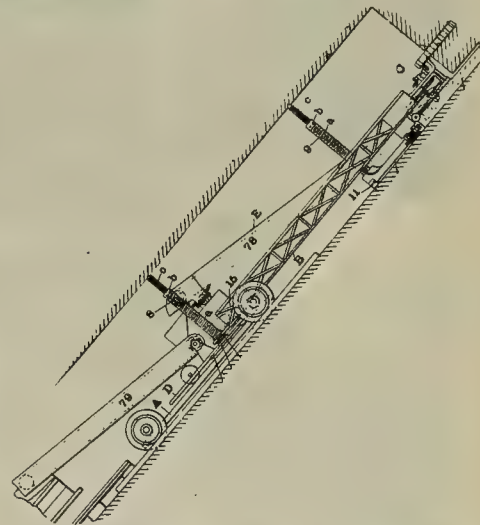
Mine car comprising side and end walls, one of walls having opening therein adapted to receive part of loading machine, and means on wall normally projecting into opening to engage part to couple car and loading machine together.

DETACHABLE TOOL HANDLE.—No. 770,413; W. Ashert, Des Moines, Iowa.



Handle socket, tapered head thereon having transverse opening, nut in tapered head, in one position contained wholly within head and in another position having its sides projecting beyond head and screw rotatably mounted in head and passed through nut, and means for locking nut in position with its sides projecting beyond head.

MINING MACHINE.—No. 770,286; W. E. Hamilton, Zanesville, Ohio.



Mining machine comprising movable platform, radial frame pivotally mounted on platform, cutting mechanism and breaking mechanism mounted on forward end of frame and loading mechanism movably mounted on movable platform and detachably connected at forward end with forward end of frame in such manner that loading mechanism projects beneath and moves with breaking mechanism.

THE Department of Commerce and Labor reports that the coal production of the country has increased from 152,447,791 tons in 1894 to 319,068,229 tons in 1903, according to the preliminary figures of the Geological Survey, having thus more than doubled during that period, while the increase in coal exportation during that time was less than 3,000,000 tons. The production of pig iron has increased from less than 7,000,000 tons in 1894 to 18,000,000 tons in 1903, yet the exportation of pig iron in 1903 was only about 18,000 tons, indicating that practically all of the enormously increased production was utilized at home for the manufacture of finished products of iron and steel, of which the exportations have grown from \$29,220,264 in 1894 to \$111,948,586 in 1904.

MINERS are engaged in driving a tunnel under Silver Dollar lake, near Georgetown, Colo., the object being to tap the lake 30 feet below the surface for power purposes. The undertaking is one of great risk as the workmen approach the flow of the lake. They have already passed out of the solid granite into broken rock.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ARIZONA.

### Cochise County.

B. W. Clair reports opening up a vein of ore in his Empire State mine, showing 30 inches of shipping ore that will run \$60 per ton, and has a large body of low-grade ore that will concentrate. This find is on the 100-foot level in the drift. Clair is stopping ore and getting ready to ship. R. L. Taylor, in the same district, is working his Mountain Beauty and has cut 12 feet of copper ore. These mines are 17 and 19 miles from San Simon, on the Southern Pacific Railroad, and as there is timber and water the ore can be worked cheaply. The Clair body is lead ore, but carries values in silver and gold, and the vein is 20 feet wide.

### Graham County.

W. B. Thompson at Clifton, a director of the Shannon C. Co. properties, reports both mines and reduction works giving satisfactory results. The smelter is making twenty tons of blister copper daily. The concentrator is working satisfactorily and making a close saving on all except a new ore that has been found, which is a combination of sulphides and oxides. Superintendent Bennie is experimenting, and is now saving some of the oxides. This is said to be the first ore of this character found in Clifton district.

### Mohave County.

T. and J. Ewing of San Francisco, Cal., report work progressing on their Vivian group, near Needles, Cal. The number of men will be increased and development continued with intention of placing a stamp mill on the mine.

### Pinal County.

It is said the Ray mines at Kelvin will resume operations this month. The owners will sink an 800-foot shaft and drift to determine the extent of the body of copper sulphides which shows at the surface. It is intended to start the reduction plant. The narrow gauge railroad from the mines to the concentrator at the camp will be put in repair.—At the Wooley mine an 800-foot, timbered shaft is being sunk and is 50 feet below the 300-foot level, at which point a crosscut is being run. This is a copper proposition with gold values. Machine drills are being used.—The Copper Buttes mine, on the north side of the river, was shut down three or four weeks ago on account of high water in the Gila. No supplies could be obtained from the railroad, as the river was unfordable. Work will be resumed. The double-compartment shaft is down 500 feet and will be sunk 300 feet more and the ore bodies lying to the north tapped by crosscuts.

The Troy-Manhattan mines at Troy are reported showing up well. A body of wulfenite has been struck and a concentration mill is nearly completed to work this product. The ore is said to be worth \$200 a ton as it comes from the mine. The management is considering a tram and reduction works, to be built on the Gila river at the P. & E. Railway. This will give them shipping facilities and necessitate only 3 miles of tram.

A. C. Sieboth, superintendent of the Lake Superior & Arizona C. Co. mines, near Florence, says a carload of ore a week is being shipped to the Val Verde smelter. The ore is from the Anderson stope and average value is \$1500 per car. Three six-horse teams are hauling ore to Florence, and fuel oil on return trip. Sinking is progressing and shaft is down 260 feet.

Manager Gordon of the Ray M. Co., at Kelvin, expects to start a three-compartment shaft this month which he intends to sink 800 feet. Other development work is also to be done and the mine will be equipped.

### Santa Cruz County.

W. H. Barnett, manager for the Happy Jack M. Co., owning properties in the Santa Rita mountains, near Nogales, says development work will be started by driving a tunnel.

W. E. Johnson of Pittsburg, Pa., interested in the Gladstone M. Co. which owns the Proto mines near Nogales, reports increase in production will be made. T. T. Harding is superintendent. Ore is being shipped to the smelter.

### Yavapai County.

An explosion of molten slag on the 24th inst. caused the total destruction of the Val Verde smelter at Val Verde, 20 miles east of Prescott. The smelter employees were drawing slag from the furnace and were unable to get a plug in to stop it. When the molten mass ran onto the wet floor an explosion occurred. The red-hot slag and matte were scattered all through the building, causing fire to break out in

several places. The building and machinery were destroyed. The plant was of 300 tons capacity and cost between \$150,000 and \$200,000, with insurance of \$60,000. The plant was erected by the Val Verde four years ago and bought by the Bradshaw Mountain C. M. & S. Co. three months ago. The latter company was planning to double the capacity of the plant. It will be rebuilt. The Bradshaw Mountain Co. has mines at Crown King. G. W. Middleton is vice-president and manager.

In Hassayampa district, near Prescott, the Mount Union Con. M. Co., E. E. Greenwood manager, has bought the Franklin-Penobscot group, the Lynx group, Yankee Blade, Sure Thing and Winfred Gould claims for \$50,000. The Mount Union Con. M. Co. is a consolidation of the Arizona and Mount Union M. Companies. The company has forty men at work and will double the number. R. Green of Appleton, Wis., is president.

## CALIFORNIA.

### Inyo County.

A. A. Hassan of New York City and J. B. Sperry have taken over the Rocky Point, Comstock and twelve other claims in Bishop Park section, 17 miles southwest of Bishop. Development work will be started and ore will be taken out for testing method of treatment.

First payment has been made on the Kearsarge mines, near Independence, sold to Murray et al. of Detroit, Mich. T. Evans is manager.

### Kern County.

The Peerless Oil Co., operating in Kern river field, near Bakersfield, reports the delivery of 631,583 barrels of oil for the four months ending August 31. Wells No. 34 and No. 35 are in operation and No. 36 is being drilled.

### Nevada County.

Manager J. Underwood of the Omega mine at Washington has men at work building a dam in front of the one erected last year and will be of logs and stone. It will be 79 feet high by 138 feet long. A hoist is being put in at the mine.

The Phelps Hill M. Co., operating near Nevada City, has been reorganized and the following are directors: W. P. Ketchum, president; W. T. Farrar of San Francisco, D. E. Morgan, W. H. Martin, F. Seales, J. C. Campbell and C. R. Quackenbush. It is intended operations will be resumed this month.

After prospecting for four years, the Coe mine at Grass Valley is being closed. The pumps will be packed against rust, but a large part of the portable machinery will be removed, says O. C. Turner, owner of the Coe. The shaft has been sunk from the 700 level to 1150 feet, and 3000 feet of drifts have been run. The mine has a 20-stamp mill.

The Great Dane G. M. Co. has been incorporated to operate the Round Mountain Champion group near Nevada City. The officers and directors are: N. C. Larsen, president; F. C. Anderson, M. C. Morgensen, treasurer; E. K. Peterson, M. Holm, C. W. Hansen, G. Sillesen, B. Pearson, J. E. Markley, all of San Francisco. The property is under management of G. Kartschoke of Nevada City. He has a shaft down 125 feet and expects to sink 100 feet farther. He has a steam hoist and pump at work. The Round Mountain and other locations comprising the group owned by the Great Dane G. M. Co. are 2 miles from Nevada City on the North Bloomfield road.

Water was turned into the pipe line of the Mountaineer mine at Nevada City last week. The line is 4800 feet in length and 15 inches in diameter. It is connected with the pipe line of the Summit mine, making a total length of 2 miles, and has a 780-foot pressure, says Superintendent Campbell. Hoisting has resumed.

### Plumas County.

The Blue Grizzly M. & D. Co. has been incorporated by C. H. Workan, E. G. Davis, C. B. Thompson of San Francisco, A. E. Paddock and F. L. Butterfield of Quincy, F. Blanchard and N. B. Frisbie. The company's mines are east of Quincy, near Greenhorn creek.

### San Diego County.

(Special Correspondence).—The Cuyamaca Co., S. H. Lucas superintendent, is unwatering the Stonewall mine and expects to have the workings opened by November 1st. The shaft will be sunk 400 feet more, making total depth of 1040 feet. The pumps are raising 400 gallons of water per minute, the inflow being estimated at 50 gallons per minute. Ore from the dump is being milled.

### Cuyamaca, Sept. 28.

### Shasta County.

(Special Correspondence).—The Midas mine at Harrison gulch is improving and the management reports it is assured ore can be easily mined and keep the mill and cyaniding plant in steady operation for several years to come. The main shaft is

down for a new level to be started below the 600-foot, where there is over 1000 feet of drifting. In the face of the drift shoots of ore 7 feet in width are showing and have been cut through several hundred feet. Development is also progressing on the upper workings and on the Trinity county side ore is blocked out ready for stopping. The company proposes building, 7 miles away, an electrical plant, which will furnish power and lights and do away with burning of over \$1000 worth of wood each month. Ore treated at present amounts to about 1000 tons per month.

### Redding, Sept. 28.

I. O. Jilison, manager of the Gladstone mine, near French Gulch, owned by the Hazel G. M. Co., reports average output of \$23,000 per month being made. The Midas mine at Harrison gulch, owned by members of the same company, is producing from \$22,000 to \$27,000 per month.

### Sierra County.

J. S. Wallace has a bond on the Wisconsin drift mine, near Downieville, and has started development work. The Wisconsin is west of the Ruby mine and is owned by J. L. Slattery, L. Kollegan and J. Kelly of Forest. The Ruby road has been repaired. H. J. Gould of Forest is superintendent.

### Siskiyou County.

(Special Correspondence).—The Advance group of claims on the divide at head of China gulch, in Sawyer Bar country, is showing free gold. The ledge is 5 feet in width between walls of slate and porphyry. The native gold comes in small seams in the sugary portion of the quartz. It is stated a mill run of 540 pounds of the quartz gave a return of sixteen pounds in gold. Development is by a 60-foot crosscut tunnel, tapping ledge 50 feet below surface, with drifting and raise on the ledge. A crosscut tunnel is being driven in 250 feet below the upper workings and by Oct. 1 is expected to cut the ledge. This group of claims is under bond to A. C. Brokaw of Fort Jones, A. Coolidge and A. F. McClaine of Seattle, Wash.

### Sawyer's Bar, Sept. 26.

(Special Correspondence).—Down the Klamath river from Hornbrook, near the Wolverine group of claims and in the same formation as the Jilison and Matern mines, J. Derry owns a group of five claims. The ledge is wide and has been exposed by open cuts for 4000 feet in length. The dip of the ledge is mostly 45°, but in places flatter. There are four tunnels aggregating 800 feet, the lower one being in 125 feet, with a depth below the surface of 140 feet. A depth of 1500 feet can be gained by driving the lower tunnel in 4500 feet.

In Quartz valley, near the Shores mine, H. Denour and R. H. Burton of Greenville are developing a free milling proposition carrying, with depth, iron sulphides. Development is being done in an incline shaft and a tunnel on the ledge.

The Wolverine group of six claims is 4 miles from Hornbrook, with W. H. Jones, D. & B. Wolf and G. B. Rymal as owners. A millsite is included. The main ledge is 35 feet between walls in places, although this and the smaller ledges are looked upon as being blanket veins. The ore is free milling quartz, with iron sulphurets, much of it being a ribbon quartz specked with free gold. There are 2000 feet of development, including a 650-foot tunnel. Superintendent G. B. Rymal intends putting on a stamp mill.

### Hornbrook, Sept. 26.

(Special Correspondence).—T. S. Fuller of Los Angeles, as president of the Ricarro G. M. Co., has during the summer months been superintending development and placing of improvements on the Classic Hill mine at head of Indian creek, near the Oregon State line and 13 miles above Happy Camp. He put in a saw mill and cut out in three days 20,000 feet of lumber which was used in building a flume.

H. J. Wood, owner of the Portuguese hydraulic mine, above Happy Camp, has refused to lease and will begin the winter season's work himself. He will open up on lower part of the bench.

The Oregon G. M. & W. Co., on the lower Klamath river, is driving two bed-rock tunnels, cutting through black slate to reach bottom of channels, also cutting the rim in order to place sluice boxes 80 to 100 feet deeper than previously. D. I. Jackson is resident manager.

The Pacific M. Co. of Chicago, Ill., J. W. Martin manager, has completed 3 miles of flume, the lumber being sawed at the company's mill. There are two ditches running to the mine. Martin will put in pipe to bring water from Fort Goff creek. This mine can be worked seven months in the year. The last clean-up after one month's run yielded \$2000.

### Happy Camp, Sept. 26.

(Special Correspondence).—The Golden Eagle mine, on Indian creek, in Scott valley, was virtually abandoned two years

ago, and now it is a paying proposition by the use of a 3-stamp mill and plates. The characteristics of the ore are similar to the New York mine, farther up the creek. The ledge is 3 feet wide at 150 feet depth and drifting is going both ways. The ore is free milling. An air compressor and machine drills are in use. A. C. Brokaw of Fort Jones and A. F. McClaine of Seattle, Wash., are owners and D. J. Sullivan superintendent.

### Fort Jones, Sept. 27.

(Special Correspondence).—The Railroad M. & M. Co. of Denver, Colo., is developing on the Klamath river the former holdings of the Minetta B. M. Co. of 2133 acres, including Williams Point and adjacent territory between Williams Point and the Minetta B. property, fronting on the Klamath river, formerly known as the Seattle mine. Of this latter portion only two-thirds of an acre was ever worked, and it is said yielded \$15,000 gold. The ditch of the company is 7 miles in length, running to Thompson creek, and this will be extended 6 miles farther during the coming season to capacity of 2500 inches. The water is conveyed across the river through a 22-inch pipe, a span of 340 feet, suspended by two 24-inch cables. The R. M. & M. Co. began its first operations July 10 of the present year, and made a run of twenty-three days, cleaning up \$2000 of gold. During the workings a "blue" channel was exposed, 40 feet in width and 400 feet in length, and it extends 600 feet farther on. The banks are about 60 feet deep, 35 feet of topplings being of no value, the pay gravel being 25 feet in depth. The winter season will begin about November 15th and twenty men be employed. The 22-inch pipe line is to be extended 500 feet and new ball-bearing giants put into use. The entire grounds are lighted by electricity. Headquarters of the company are in Denver, Colo. C. Tucker is president. T. J. Nolt, at the mine, superintendent.

### Nolt, Sept. 27.

(Special Correspondence).—The Morrison-Carlock G. M. Co. has been incorporated and has taken over the Morrison mines in Quartz valley, near Fort Jones. The greatest depth attained is 350 feet, and from this level extends 800 feet of drifting in high-grade ore, 18 inches in thickness along the wall. Sinking below this level is going on, and at 60 feet another level will be established. In all, there are five levels and over 800 feet of drifting from each. In sight are said to be 7000 tons of high-grade, free-milling ore. The mill has been overhauled and ten stamps added, with a Frue vanner and a Pinder concentrating table. A 40 H. P. air compressor and drills have been added. A dynamo furnishes light for the mine and mill. A feature in the mill is the sand pump, which raises the tailings from the plates to a large vat above the concentrating tables. J. M. Morrison is superintendent and manager.

The New York mine, on Indian creek, is owned by the Monarch M. Co. of Tacoma, Wash. Since April, 1901, this company has been in possession, under management of J. B. Scott. Development has opened up a paying proposition. The formation is an altered diorite and the ore largely free-milling quartz. The depth of the main incline shaft is 600 feet. On the 500-foot level is over 500 feet of drifting. On the 400-foot and 500-foot levels considerable prospecting was required to find the main shoot of ore after two faults. Equipment of the mine consists of a 40 H. P. air compressor to run seven machine drills, a 40 H. P. boiler for rock breaker and hoist and a 30 H. P. motor for the ten stamps and concentrators in the mill. About thirty-five men are on the payroll.

### Fort Jones, Sept. 27.

(Special Correspondence).—The Mount Vernon G. M. Co. of Spokane, Wash., owns the group of claims on the divide between Cherry creek and Greenhorn gulch, near Yreka. The company was organized last January and has increased developments and added improvements. The 1000-foot tunnel on the Cherry creek side has been driven in 280 feet farther, which makes 1280 feet directly on the ledge, and ore is being stopped. Manager H. W. Lane is driving No. 3 and No. 4 tunnels on the Greenhorn gulch side and is in 200 feet on each, they being 100 feet apart. The top of the hill will be 400 feet above the breast of the lower tunnel. Raises will connect all workings. So far the ore has been in porphyry formation. As depth is gained a slate foot wall comes in with a 4-foot ledge, there being next to it talc carrying values of \$7 to the ton in gold. Improvements being added on the Greenhorn gulch side consist of a sawmill, now sawing lumber for buildings and timbers for the mine, and run by power from the Siskiyou electric light and power plant. This will also run the 5-stamp mill, concentrator, crusher, and furnish lights for mine, mill and camp, and also an electric fan to ventilate the mine. Water is



obtained from a spring and from the mine. A force of twenty men will be employed during the coming winter. The main office of the company is at Spokane, Wash. M. Jacobs is president, C. D. Francis secretary, H. W. Lane, at the mine, vice-president and manager. Yreka, Sept. 28.

J. E. McBride, principal owner in the Headwaters quartz mine, near Yreka, says he will start operations again. The mine has been equipped with a quartz mill, sawmill and other improvements. A tunnel has been driven to the Lucky Jack ledge, which is 4 feet wide. Pumps will be put in and they will sink on the ledge.

#### Trinity County.

Development work on the Enterprise mine at East Forks, near Weaverville, is going ahead and ore will be opened up as soon as connection is made between the upper and lower tunnels. The mill will be started up. It is intended to put in an electric lighting plant. At the Yellowstone group of mines adjoining, which are under same management, the ledge is showing values. These two groups are amply supplied with wood and water and are equipped with stamp mills.

### COLORADO.

#### Clear Creek County.

(Special Correspondence).—During a period of eleven months' work done by S. A. Knowles, contractor in the Central tunnel at Idaho Springs, for his own information and as a matter of general interest to the mining fraternity, he concluded to keep a daily report of the work done by two water Leyner drills which he used in doing the work and which were not specially prepared for the undertaking, being machines taken from regular stock. The record extended over a period of about twelve months, during which time 245 shifts were worked. During this time the number of holes drilled per month varied from 143 to 533, depending on number of shifts worked and the number of feet drilled per month, from 900 to 4096. The total number of holes drilled was 4424, and the total feet drilled, 34,244. The cost for repairs per shift was \$0.383. Rock drilled through was hornblende schist, hard and tough. During the period through which the record was kept the tunnel was advanced from 5 feet 10 inches per shift to 9 feet 5 inches, the total distance driven being 1830 feet. The average number of feet driven per shaft was 7 feet 5 inches, and the average time drilling was five hours and fifteen minutes. The drill crew consisted of a runner for each machine and one helper for the two machines. The drills operated but one shift daily throughout the entire period. The air pressure maintained was 110 to 130 pounds, the altitude being about 8000 feet. Idaho Springs, Sept. 26.

The Democrat Mountain M. & M. Co., near Georgetown, under Manager Burt, reports progress in development on the Jordan lode, on which they have a bond and lease. They have been cleaning out and retimbering the shaft, and have found a streak of ore assaying \$80. They propose putting in a plant of machinery and sinking the shaft to a greater depth. The property is on Democrat mountain.

The Ninety-Four company at Alice has completed repairs in the mill, including overhauling of the engine, and is treating ore which has accumulated in the bins. The bridge being built over Clear creek at Idaho Springs by the Colorado & Southern R. R. Co. will facilitate handling of ore to the Jackson mill and will assist in shipping the product from the Jackson, Hudson and other mills on the south side of Clear creek.

#### Dolores County.

The Rio Dolores M. Co. is operating a group of mines at Burns station, 2½ miles north of Rico. Manager J. W. Burns says he will increase the number of men at work. The Herman group of mines, in Mount Wilson district, 15 miles from Rico, is being worked by J. D. Adams, S. Bryant, C. W. Herman and G. Leavel.

#### Eagle County.

Near Red Cliff the owners of the Ben Butler mine, on Battle mountain, Nihisr & Co. of Hagerstown, Md., report having struck a body of ore, the shoot showing 18 inches in width. It carries values of \$100 per ton in gold.

#### El Paso County.

Creditors of the General Metals Co., operating the Telluride mill at Colorado City, have taken possession of the ores in the property and have shut down the mill, pending settlement. The Telluride mill was built three years ago and has a capacity of 300 tons a day. The shutdown throws 125 men out of work.

#### Gilpin County.

H. R. McClelland of Denver has started up the Oro mill on North Clear creek below Black Hawk, which was erected to handle the slimes and the gulch dirt of

North Clear creek. Improvements are being made and concentrating tables added.—Fouts et al. of Russell Gulch, who have a lease and bond on the Grizzly mine in Russell district, have bought the shaft equipment on the Pocahontas mine on Quartz hill and will install it on the Grizzly mine. They have unwatered the property, are retimbering the shaft and cleaning out the levels and arranging to deepen the shaft 100 feet.—J. Laughran of Central City has started up the Buckley and Wood mines on Quartz hill. Unwatering the 600-foot shaft on the Buckley mine is under way. Some timbering and dead work will be necessary before development work can be started. It is also intended to open up the Wood mine and the two will be worked in conjunction.

The Golden Rod M. Co., J. Lillig president and manager, is developing a group on Silver creek, 4 miles northwest of Central City. The main shaft has been sunk 200 feet. The vein is 3 feet in width, carrying a sulphide ore said to average \$40 per ton. A crosscut tunnel to intersect the shaft and develop other claims in the group has been started, its objective point being 1000 feet distant. Machinery equipment consists of a steam hoist, air compressor and one drill. The shaft will be deepened. There are ten lode claims, three placer locations and a millsite.

Owing to action of the water in rapidly destroying the metal pipes at the Old Town mine, at Russell Gulch, Manager Kimball is putting in pipe lined with wood. The new water pipe will be 1600 feet long. Ore is being shipped to the Golden smelter, to be treated when the furnace is blown in, the first of next week. The Jackson mill at Idaho Springs is being run exclusively on ore from the above property, while all ore which can not be handled there is being treated at the Crow mill.

#### Hinsdale County.

The Contention group of mines on Hotchkiss mountain, near Lake City, owned by a Boston company, has completed a 90-ton concentrating plant. The Contention property embraces eighty acres, and is developed by a long drift on the main vein, with its opening near the mill.—M. Corwin, with Eastern associates, has bought the Leonard group of mining claims on Handy peak, in Burrows Park mining district, and is putting up buildings, etc. A 400-foot crosscut tunnel will be driven.—The Hidden Treasure mine and mill is turning out 100 tons of ore per month.—At the Pride of America mine on Henson creek, 7 miles from Lake City, the ore shoot has been opened up, showing 5 feet thick of lead-copper ore. Two feet of the vein are lead carbonates of high grade, report lessees Gannon & Kranicfeldt.

J. M. Miner, manager of the Big Casino mine, which joins the Pride of America mine on the west, near Lake City, will resume development work. The Casino is showing a continuous ore streak down the 125-foot shaft. It is intended to send the shaft to 300 feet.—The Adelia M. Co. has been incorporated and has bought the Waldron group of claims at Mineral point. The property is being equipped with a hoist and surface improvements.—The Silver Star mine, at Burrows Park, has been bonded and leased by Stover & Cartwright of Galveston, Tex., who are putting the property in shape for production.

#### Lake County.

The South London tunnel, near Leadville, on the east slope of Mosquito range, has been completed to connection with the North London workings. Connection has been made through a raise of 300 feet, that being the distance between the levels of the North and South London workings. Thirty feet from the South London level, the upraise passed through a vein of ore. All the work in the South London is at present development and no ore is being shipped. Near mouth of the South London, the tunnel passed through a body of fair-grade mineral. This will be developed. A compressor is being operated at mouth of South London, which supplies air for the mine, and power for the drills. The tunnel is 2300 feet long. It is intended to continue development through this tunnel, before beginning to stope out the ore which has been opened in the South London.—The Castle View shaft on the Big Chief lease is shipping twenty tons of lead ore and the same amount of iron a day. The property is being operated by M. Nicholson.

The Leadville District Mining Association, which takes in every mine manager in the district, has decided to issue working cards for carrying on the fight against the Western Federation of Miners. Notices have been posted at every mine in the camp to the effect that no person will be employed who shall not have deposited with the timekeeper his card of recommendation from the mining association.

Every applicant will be required to sign a statement that he is not a member of the Federation, or of any order controlled thereby, and if he is a member of the Federation he will be required to renounce his allegiance to it. The mine owners are said to believe that the Federation is seeking to secure a foothold in Leadville, a large number of Cripple Creek miners having gone there since the trouble in that district. The operators claim the men, both union and non-union, have expressed a willingness to sign up as soon as the formal order was issued, and that out of the 3000 miners in the camp not more than 200 are now in good standing with the Western Federation of Miners. The object of the order, it is further asserted, is not so much directed at the union men now at work at Leadville as to prevent men going there from Cripple Creek and Telluride and obtaining employment.

#### La Plata County.

(Special Correspondence).—The May Day tunnel has cut the vein at a depth of 500 feet and drifting and raising have begun, while considerable shipping ore is coming out of the upper levels through the shaft. Two carloads of high-grade ore were shipped last week.—Forty men are grading and building at the Bonney Girl and the manager expects to have the mill ready for operation before snow begins.

The Chief M. Co. is at work on the excavation for its mill, and grading a road and a line for the tramway from mine to mill. They have completed a bridge across La Plata river which connects the mine with the State road.

The Boren Gulch M. Co., operating 2 miles above La Plata, has opened a 3-foot vein of galena near the crest of Babcock Peak. The galena carries considerable silver glance, as well as several dollars' in gold, and a carload is being taken out for shipment to Durango. The vein has been traced down the mountain and men are at work opening it 500 feet lower.—Rich float was recently found and traced to the Little Kate property, where two shifts are drifting for the vein.

La Plata, Sept. 25.

#### Montezuma County.

(Special Correspondence).—Little is being done on the Mancos side of the range this season except in the way of prospecting. Doyle's suit with Burns has tied up his property, at the head of the East Mancos, which has been the center of activity during the past three years. But several other prospects are developing into mines and considerable good ore is in sight.—On the Silver Falls group work has developed good milling ore, with small pockets of high grade in which there is considerable free gold—many specimens containing large grains and wire gold.

The Old Kentucky is equipped with track and cars and drifting is being pushed. The breast is in 225 feet and at that depth crosscutting has shown the vein to be 20 feet in width, all milling ore. Streaks 6 to 12 inches wide run as high as 384 ounces in silver and 25% lead, with about half an ounce of gold.—Drifting continues on the Pike and the ore improves in quality. A considerable flow of water has been struck, but it is easily disposed of.

Mancos, Sept. 25.

#### Ourray County.

(Special Correspondence).—The Ouray Con. M. Co. has started operations on its tunnel which will be about 5100 feet in length when completed. In making this distance they expect to crosscut eighteen known veins already developed by twenty tunnels amounting to nearly 2000 feet of work. The tunnel is now in 145 feet and working three shifts. All the work is done by hand. A compressor and drills and power plant will be installed. The tunnel is 5x8 feet. Ore is gold and copper. The tunnel is about ¼ mile from the town. The entrance is near the Uncompahgre river which flows through a portion of the property and is within 300 yards of the Denver & Rio Grande Railroad. H. Ziegenheim of St. Louis is president; J. H. Turnbach, secretary, and J. W. Jones, superintendent.

Ouray, Sept. 25.

(Special Correspondence).—Four miles from Ouray is the American-Nettie mine in Gold Belt district. This mine is operated by the American G. M. Co. A. Riegels is superintendent. The mine is 1800 feet higher than the town of Ouray. A 4100-foot aerial tramway connects the mine and mill. The mill is not running at present. Over 71,000 feet of drifting and tunnel work has been done on the property. The high-grade ore is shipped direct to the smelter. The company is doing development work.

Ouray, Sept. 25.

(Special Correspondence).—Over the hill from the American-Nettie mine is the Bachelor M. Co.'s property, 4½ miles from Ouray. G. R. Hurlburt is manager. The

company is doing but little work, but several leasers are operating.

Ash, Sept. 25.

(Special Correspondence).—Certain sections of this county are in fairly good condition and improving slowly. While there has been no labor difficulties to contend with, yet the depression has been very keen. In the Red Mountain district the building of the 40-stamp mill on the Bars-tow, the erection of a mill at the Treasury tunnel and the starting up of the Yankee Girl property has awakened activity there.

In the Sneffles district, near the town of Sneffles, the Altoona M. Co. is operating the Morning Star mine. The company owns twelve claims on Stony mountain. They are driving a tunnel to strike the Altoona vein. The tunnel is in 850 feet and is being driven with an electric drill. J. D. Spaulding is superintendent and J. A. Johnson, foreman.

A few yards above the Altoona is the Governor mine. This company has been doing development work the past four years and has two tunnels each 700 feet in length, besides raises and stopes. They have opened up good ore, a large percentage of which is mill ore. A 10-stamp mill is being built and will be ready to handle ore about November 1. They are also installing a compressor plant and power drills. A surface tramway is being put in from the mine to the mill. About 1000 tons of ore are blocked out ready for the mill.

The Revenue Co. is running about half its normal force in mine and mill.

The Camp Bird, Ltd., at Camp Bird, is running full force at the mine and the 70-stamp mill is kept busy. Each day one can see the guards taking the bullion to town for shipment to the mint which has been caught on the plates.

Ouray, Sept. 26.

#### Park County.

F. Clancy, manager of the Hayman M. & T. Co., operating at Tarryall, says he is putting in machinery for his company. A No. 7 Cameron pump is included. He reports shipping copper glance and other high-grade copper sulphides. They also carry values in gold and silver. These ores, the manager states, are sorted before shipping. It is claimed that at depth of 200 feet a dike 24 feet in width has been crosscut which averages 4% copper, with values in gold and silver.

Two miners were suffocated to death on the 26th ult., by a fire which destroyed the surface works at the Almaden tunnel, near Tarryall, reports L. C. King, superintendent of the mine.

#### San Juan County.

(Special Correspondence).—At Gladstone, 9 miles north of Silverton, is the 80-stamp mill of the Gold King M. Co., W. Z. Kinney manager. To the mill is being added a slimes plant, which will be ready for operation about Nov. 1st. The old mill contains stamps, plates and thirty-eight Frue vanners and has a capacity of 200 tons per day. The concentrates are transported in a bucket from the mill to the cars. A track on which this bucket travels runs the entire length of the mill. Many improvements are being made in the mill by Superintendent M. O'Rourke. New guides are being put in which will make each stamp independent and separate. The ore is now put through 30-mesh screens, but when the tailings plant is in operation the ore will pass through 15 or 16-mesh screens.

In the tailings plant they are putting four roller tube mills (for regrinding) and thirty-six Wilfley slime tables. This plant will double the capacity of the mill. The machinery will be driven by electricity. A power plant is being set up at the mill, containing a large steam turbine and other machinery. The slimes plant is 165 feet long by 74 feet wide. A plant for drying the concentrates is also being erected.

From the mine to the mill is an aerial tramway over which the ore is transported, also timbers and other material sent up to the mine. A fire put this tramway out of commission, temporarily, during the summer, but it is now in running order. A 12-drill Rand compressor furnishes air for the mine.

Gladstone, Sept. 25.

The Mines Securities Co. of New York is developing and equipping the Ruby Basin mine and the Natalie-Occidental properties, near Gladstone, with T. J. Hurley, manager. The Ruby Basin properties consist of seventeen claims with millsite and timber claims. The new mill is receiving its machinery and is expected to start operations this month. The mill is designed to handle fifty to seventy-five tons of ore daily, and will contain Blake crusher, coarse and fine Cornish rolls, Wilfley concentrating tables and slimmers and canvas tables. The mines are being developed through a crosscut tunnel and ore has been blocked out in raises and intermediate levels. Mine Superintendent



J. C. Durye says the mining of ore, together with all tramming and milling, will not exceed \$2.50 per ton.

#### San Miguel County

(Special Correspondence).—A portion of the Smuggler mine and mill is under lease to Lindsley & King. They have a lease on the Smuggler mill and will keep thirty stamps dropping. Wagner Bros. have a lease on the Pandora mill of the Smuggler-Union Co. and the Smuggler mine, and they expect to keep forty stamps dropping. The cyanide plant will be operated by the company under direction of W. L. Reid. About 100 men are working in the mine.

An average of sixty stamps are dropping in the 80-stamp mill of the Liberty Bell G. M. Co., handling 200 tons per twenty-four hours. The mill has a capacity of 300 tons per day. If the experiments now being carried on at the mill prove satisfactory a number of changes will be made in the equipment and process. The canvas plant is 420 feet in length and contains 156 canvas tables. Cyanide is also used. A. G. Kirby is mill superintendent.

The Nellie Co. is operating twenty stamps on ore from the Nellie mine. Telluride, Sept. 25.

(Special Correspondence).—On the Rio Grande Southern Railway, 1 mile from Ophir Loop, is the Butterfly Terrible mine, J. F. Keating, manager. The company has three tunnels. No. 1 is in 2500 feet; No. 2, in 600 feet; No. 3, in 2900 feet. Most of the work is being done on No. 3. They are starting to drive tunnel No. 4 from the mill which will cut the vein several hundred feet deep. An aerial tramway connects the upper workings with the 30-stamp mill. When tunnel No. 4 is completed the ore will be taken through that tunnel direct to the mill, doing away with the tramway. They work forty to forty-five men. The mill is operated night and day. It has not been decided whether the compressor used for driving the No. 3 tunnel will be brought down and used for the new tunnel or whether a larger compressor will be installed. Seventy-five per cent of the values are caught on the plates. Bullion shipments have averaged \$10,000 to \$12,000 per month and concentrates \$1000 to \$1500 per month net. No. 4 tunnel will be driven 3000 feet and will take approximately two years to complete the work. During the summer months the mill is operated by water power, and considerable of the time during the winter months. They have a steam plant also.

Thirty stamps of the 50-stamp mill are dropping steadily on ore from the Ida vein of the Ophir Con. M. Co. at Ophir Loop. Ore is brought from the mine to the mill over the 1850-foot aerial tramway. J. McWilliams is superintendent of the mine and L. G. Hamfeld superintendent of the mill.

Ophir Loop (Ames P. O.), Sept. 25.

(Special Correspondence).—J. Real et al. have a lease on the Caribou dump and are running same through the Suffolk mill, on which they have a lease. They are also doing custom work through the mill for lessees in the district.

Ophir, Sept. 25.

(Special Correspondence).—The Alta M. Co.'s mill and tramway (see page 224) are on Silver mountain, 10 miles south of Telluride. The company is operating twenty stamps, and is handling eighty tons of ore per day through the mill. The tramway is 4000 feet in length. Ten more stamps and necessary tables will be added to the mill. The work in the mine is done through tunnels, two of which are 1200 feet long and one 1800 feet long. When they start work on the lower tunnel they propose putting in an air compressor and power drills. All work in the mine is at present done by hand. With the exception of some surface water seeping into the mine, the mine is practically dry. The concentrates are packed to the railroad at Ophir Loop, 2½ miles distant. A. C. Koch is manager of the company. Seventy-five men are employed.

The Tomboy mine is operating with about 300 men. Guards are stationed on the property and no one is allowed to enter the premises without a permit from the manager. Any one coming from the Ouray side must have a permit before he is allowed to cross the Tomboy ground. If he can get through without crossing their ground they have no objections. The management probably figures it is more economical to keep guards than it is to have strikes and run the risk of having their buildings blown up.

Members of the Western Federation of Miners are not employed by most of the mines in the district. Good miners are coming in a few at a time, and the mines are gradually getting back to their normal output. On the whole, considering the strenuous times of a few months ago, matters are shaping themselves satisfactorily to the operators and business men of the district.

Four miles below Telluride, on the San Miguel river, are the workings of the Keystone Hydraulic M. Co. They are putting in 1500 feet of 48-inch riveted steel pipe. They have a fall of 500 feet. The flume that supplies the pipe line is 12 feet wide, 3 feet deep and about ¼ mile in length. The tailings flume is 3000 feet long, 5 feet wide and 4 feet deep, with 4½-inch grade in 12 feet. The flume is lined with 56-pound T rails, which act as riffles. Over 200 tons of rails were used in constructing the flume. They have considerable coarse rock that goes through the flume and the iron rails make the best riffles and wear longer. Air drills are used for drilling holes for blasting the larger rocks. During the summer they had plenty of water, but it is getting scarce now and they are running only five hours per day. Twenty-five men are employed. Hydraulic giants are used. Everything will be gotten ready this fall so they can start work in the spring without delay. R. W. Hill is manager and T. D. Harris, superintendent.

Telluride, Sept. 26.

E. L. Davis, manager of the Mayflower group, in Bridal Veil basin, near Telluride, has put on men and resumed work, after an idleness of six months.

#### Summit County

The American Gold Dredging Co. has its dredger steadily at work on the placer bars of Swan valley, near Breckenridge. The High Bar placers, owned by the company in Gold Run, are being worked with hydraulic giants, and long lines of sluices, and the Gold Run ditch which supplies water for their operation is running bankful. The water supply for the placer mines of Summit county has been good this season and a large output of placer gold has resulted.—The Reliance Gold Dredging Co. is increasing work at its plant in French gulch. A reservoir is nearly completed, and a steam churn drill is prospecting the ground to bedrock, to locate the channel.—The New Mekka G. M. Co. reports progress with its open cut and bedrock sluice, which will be 2000 feet in length when completed. The sluice is designed to strike the bottom of the hydraulic elevator, bedrock pit, which furnished ground that ran \$1 per cubic yard from the bedrock stratum, and affords an exit for the water and washed gravel of the pit.

Breckenridge reports say the Hamilton group and stamp mill in Summit gulch are being operated under a lease and bond by Huntington, Pike, Stouffer and Bernatchie. A streak of smelting ore has been opened up and a sample carload shipped to the sampler. The lead ores of the Swan river watershed carry values in silver and gold. Besides the gold bullion made at the Hamilton mill, auriferous concentrates have been produced.

#### Teller County

The Gradin G. M. Co. has been incorporated by E. L. Vill of New Rochelle, N. Y., G. F. Kerrin of Providence, R. I., and H. W. Barton of Greenwich, Conn., to operate at Cripple Creek.

The Stratton's Independence Co. is increasing work of building additional ore house capacity to accommodate the ore that the lessees are hoisting through four different shafts. The lessees are employing a total of 235 men on development, and raising ore. An increased tonnage will be made. It is averaging 100 tons per day at present.

Another producer has been added to the list of shippers in Cripple Creek district, the Four Brothers claim of the Cyrencoy Co., at the Beacon hill station of the Florence & Cripple Creek Railroad. Howard & Murbach, at a depth of 110 feet and south of the shaft, have opened a vein that shows sylvanite.—The Golden Cycle Co. is unwatering the shaft and lower workings and a greater tonnage of ore will be shipped.—The Tunnel M. & L. Co., operating the Abe Lincoln mine, on Gold hill, is handling eighty tons of the dump each day, washing it.—Lessees are operating the Arcadia mine, on Gold hill, and shipping ore.

The first consignment of ore shipped from Cripple Creek district, in which silver was the chief basis of valuation, was made last week from the Red Spruce mine on Gold hill, says the Times. The shipment contained fifty ounces of silver per ton and gold \$5 per ton. The ore is being broken in a vein that shows 12 inches across.

The Coriolanus Mines Co. has been incorporated, being a reorganization of the Coriolanus G. M. Co. R. S. Ellison and A. I. Ashe of Denver and K. T. Schuyler are incorporators, with J. P. Pomeroy, T. F. Poole, T. B. Burbridge and G. Fry as directors.

President C. C. Chapin of the Cripple Creek G. Exp. Co., says he will resume operations on the C. C. G. Exploration

tunnel. The breast of the tunnel penetrates Gold and Raven hills and has been driven for 6000 feet. Its destination is the Victor mine on Gold Cliffs, Cripple Creek.

The Strong mine, near Stratton's Independence mine, located on Battle mountain at Independence, is sending out 1500 tons of ore per month which returns satisfactory values. The ore is being broken in the seventh, eighth and ninth levels. Manager McDonald has started sinking the shaft another lift, which will give depth of 1025 feet.

Production at the W. P. H. mine of the United G. M. Co. is being increased and heavier hoisting machinery is being put in by Lessees Harrison & Seaver. The output from the W. P. H. has been a carload a day, having average value of \$1000 to \$1200 a car.

#### IDAHO.

##### Ada County.

The Boise Exp. & Dev. Co., Ltd., has been incorporated to operate Idaho mines, capital \$500,000 in \$1 shares; principal place of business, Boise; S. S. Horner, S. L. Tipton, H. S. Worthman, H. E. Neal, C. C. Anderson, J. H. Brown, J. N. Louder, J. Wright and W. R. Kinett.

##### Blaine County.

The mill on the Red Elephant group of mines at Hailey has been put in operation after several years of idleness.—A strike is reported in the Clipper mine, near Hailey. A vein of galena was struck in the lowest tunnel, 14 inches wide, of shipping value. The Clipper is opposite the Virginia group of the Alturas M. Co. J. and A. Richardson et al. are owners. They have 150 feet of backs.

##### Boise County.

The Checkmate mine, at Pearl, has been closed down by Manager E. H. Dewey, and the pumps pulled. The Lincoln mill has been receiving its water supply from the Checkmate.

The Mountainview mines in the Pine Grove district have been bought by Irvin and Lebar of Douglas, Wyo.

##### Elmore County.

At Mountain Home surveys have been made for a 3000-foot tunnel and a tramway route for the Monarch mines.

##### Idaho County.

The Belle of Thunder Mountain M. Co., at Sunnyside, near Roosevelt, is hauling machinery and other materials to its mines, says Assistant Manager P. W. Duffes.

##### Idaho County.

G. S. Losie, president of the McKinley G. M. Co., operating in the Salmon river district near Grangeville, says a 400-foot crosscut has been completed and also a drift of 200 feet on the lead. Mill tests show the ore to carry values of \$18 per ton. The company will build a 10-stamp mill.

P. R. Kelsey, manager of the Sacajawae Exploitation Co., operating placer mines on Newsome creek, near Newsome, says he will put in pipe and machinery to enlarge the plant. He reports a successful season, so that the company has decided to work three streams next season instead of one. A ditch brings the water 2½ miles. A new ditch is being built 2½ miles long. The company is controlled by Lewiston, Idaho, and Spokane, Wash., men. The ground is an old river channel which has been worked to a small extent for fifty years. The bank runs 220 feet deep and the pay gravel from 40 to 140 feet in depth. The company owns 360 acres of pay ground, the entire holdings covering 775 acres. Figuring only the active running time this season, Kelsey says they have taken out from \$240 to \$260 a day at a cost of \$23 a day. The pay gravel runs 8 to 30 cents a cubic yard, and with one stream they handle 1200 cubic yards a day. J. T. Graham of Lewiston is president.

President Smith of the Twentieth Century M. Co., operating Thunder Mountain properties near Roosevelt, says it has added sixteen claims to its holdings, making sixty in all. Of these, six are placer claims. Contracts were let for running three tunnels. The first tunnel will be driven 400 feet and gain depth of 250 feet. The foundation for the 10-stamp mill is completed, and it is expected the machinery will be put up this fall.

G. L. Hedges and G. S. Bailey, at Buffalo Hump, have started work on the Liberty Bell group, which has been idle for two months. Two shifts of men will continue the main tunnel, following the vein.—The Missouri-Idaho M. & M. Co. has been incorporated by G. L. Hedges, J. W. Blacker, T. Williams, A. Gordon and I. M. Bellett. The company owns four claims in the Four Mile district, near Hump, and will start development work next week.

The Portland & Idaho M. Co. has been incorporated at Portland, Or., to operate placers covering 1440 acres of deeded ground and 300 acres additional. It is intended to equip three dredgers that will

handle a total of 6000 yards of gravel a day. The officers of the company are C. A. Alisky, president; M. L. Pipes, A. E. Rocky, C. L. Hathaway and D. S. Cohen. C. A. Hathaway is manager. The property to be worked is on Secesh creek, near Warren.

##### Latah County.

At the White Cross mine, on Moscow mountain near Moscow, more men have been put to work. An air compressor and a cyanide plant will be put in. Assays of the tailings from the mill operated last season showed them to contain \$12 per ton, and the mill had only saved an average of \$8 per ton. Many tons of ore lie on the dump. The company has been driving a tunnel to tap the ledge 300 feet deeper. The mine is 9 miles east of Moscow.

##### Lemhi County.

Manager R. A. Hasbrouck of the Gold Dust M. Co., whose properties are at Leesbust, says the mill will begin turning out bullion. Superintendent Harker has development work on the vein showing \$10 ore blocked out. They will enlarge the plant to a daily capacity of 250 tons.

##### Shoshone County.

Wallace reports say the silver-lead mines of the Cœur d'Alenes during August produced 22,500 tons of concentrates and shipping ore, sent to the smelters. In the preceding month 20,500 tons were shipped. The largest output in history of the section was June, 1904, when 23,500 tons were forwarded. The average monthly output in 1901 was approximately 12,500 tons; in 1902, for the first eight months of the present year, 20,000 tons. The Bunker Hill & Sullivan mine, at Wardner, is making 4500 tons. The mines which approached this output were the Morning, at Mullan, and the Empire State, the Federal M. & S. Co.'s Wardner property. Each shipped about 3500 tons. The Standard and Mammoth mines together sent 4000 tons of concentrates to the smelters, a gain of 500 tons. The Hecla produced 1200 tons and the Hercules shipped approximately 1000 tons of ore. The output of the Tiger-Poorman was about 2000 tons.—The Snowstorm mine, at Mullan, the only copper producing property in the Cœur d'Alenes, consigned 1500 tons of ore to the smelters. The production for September will fall somewhat lower than for the previous month on account of the low stage of water. The Morning, the Standard and the Mammoth have been troubled considerably.

In the Pierce City district, near Greer, it is estimated 300 men are at work.—S. B. Miller, superintendent of the Red Cloud mine, has 25 men building a wagon road for moving of the Pioneer mill to the Red Cloud property.—Work on the Musselshell placers is expected to start this week with 125 men. The company will drive a tunnel 400 feet long to furnish an outlet for the tailings. The placer property, consisting of 1100 acres, is in the forest reserve 10 miles southeast of Pierce and before work can start it is necessary to secure permits from the Bureau of Forestry, Department of Interior.

#### MICHIGAN.

##### Houghton County.

The Calumet & Hecla at Calumet reports doing much new work this season. The remodeling of the second section of the Calumet mill is progressing. At the same mine a little rock is being supplied from the southernmost amygdaloid shafts on the Osceola lode, and two shafts are sinking on the Kearsarge lode, both showing well in copper. Two diamond drills are also working west of the Tamarack, to locate the Tomahawk lode, said to carry payable values.

#### MONTANA.

The report of the United States assay office in Helena for month of August shows increase of the gold production of Lewis & Clarke county, as compared with previous years. For August, 1903, the receipts for that county were \$23,000, while for the past month the receipts were \$61,298. The total receipts of the assay office for the month of August were \$263,235, as against \$257,945 for same month of 1903. The receipts from Montana for the month were \$239,326, as compared with \$212,138 for August, 1903.

##### Broadwater County.

A lease and bond has been closed to A. C. Mason on the Park, New Era, East Last Chance and other mining properties, near Hassell. Development work has been started, and an air compressor and drills are being put in. Plans are being made for a 100-ton concentrator.

##### Lewis and Clarke County.

The Jay Gould mine, near Helena, is employing 100 men, running the mill steadily with satisfactory results. The Montana company, owner of the Drum Lummon mine at Marysville, is developing the Silver Bell and Stuart in the Poor-



man district.—R. A. Bell, owner of the East Pacific, is operating his mine and shipping regularly.

The Whitlatch M. Co., controlled by Canol & Martin of Helena, are down 300 feet on the two-compartment working shaft on the Whitlatch-Union mine, 4 miles south of Helena. They intend to sink 425 feet, when crosscuts will be run.

#### Madison County.

A. C. Mason of Helena, president of the Black Hawk M. Co., will put in a stamp mill at the property of the company, near Pony. The mill will be operated by water power, with stamps, plates and concentrators. The main ore shoot is 75 feet long, smelter returns from which run \$21 per ton in gold and silver.

#### Park County.

The Cooke City smelter has been organized to do a mining and smelting business at Cooke City, with principal branch office at Seattle, Wash. The directors are H. Christensen, O. B. Olsen and O. Christensen of Cooke City, G. Allison, V. E. Bennett and T. Mason of Seattle, Wash.

The Conrad-Stanford company of Helena has resumed work on the Crevasse group, near the Bear Gulch mines, near Jardine. A mill will be put in operation.

#### Silver Bow County.

The Butte M. & Dev. Co., which has been operating the Emma mine at Butte under lease and bond, has closed down.

The Reins Copper Co., which owns the Combination mine in Meaderville, has struck a body of copper ore and is drifting. The vein was first cut at depth of 700 feet, the shaft passing through it. At 800 feet a crosscut was driven and the vein cut 7 feet wide. It is copper-silver ore.

### NEVADA.

#### Esmeralda County.

The Homestake group of seven claims, adjoining on the south the Silver Peak mine at Silver Peak, has been bought by the Mohawk-Alpine M. Co., which has temporarily suspended work on its Lone Mountain properties that it may give the more attention to its new holdings. The Homestake vein is reported 2 to 20 feet wide, between walls of granite and schist, averaging \$12 per ton in gold. The vein has been opened to a depth of 700 feet from the outcrop by two tunnels which are connected by raises and other workings from which ore has been mined and milled of average value of \$40 per ton. The ore is said to readily yield to treatment by amalgamation, concentration and cyanide at a total cost of \$6 per ton. President C. Y. Fuller of Utica, N. Y., says he will put in a 5-stamp mill. The property is 18 miles from the Tonopah Railroad and ample water for milling purposes has been secured.

#### Lincoln County.

The Venus M. Co. has been incorporated by I. D. Gresh, president; C. E. L. Gresh, E. Lyons, C. A. DeBerry and L. J. Kaiser at Searchlight. The company's mines are at Eldorado Canyon.

H. J. Cullen, owner of the Black Flag group of silver-lead claims, 43 miles west of Caliente, says he has crosscut a 4-foot vein of manganese ore.—Work will be started this week on a 24-foot body of gypsum on the St. Louis claim, 3 miles east of Caliente and 1/2 mile south of the San Pedro track. The property is owned by F. A. Foster and W. Lee.—A 28-foot body of gypsum has been sunk on by an incline shaft by J. Whalen on his Fourth of July mine, 4 miles north of Caliente.—A lease and bond for \$10,000 have been given to Blar & Seaforth of Reno, on the Gysy Queen group of eight gold-copper claims, 26 miles northwest of Moapa. Men will be put to work developing these claims next week.

#### Washoe County.

E. Olinghouse has struck 30 inches of \$40 gold-bearing quartz in the Butte mine at Olinghouse, near Wadsworth.—D. M. Henry and G. Nicholls have cut the lead from their crosscut tunnel on the Ora, showing 4 feet wide and \$20 per ton.—The Springfield Nevada Co. is taking out ore.

### NEW MEXICO.

#### Sierra County.

The placer camp of Shandon during August produced \$1000 in gold dust, reports C. Clark of Shandon.

### OREGON.

#### Baker County.

Manager Field of the United Elkhorn mine, near Baker City, reports a strike. The ore body was cut while drifting from the main working shaft. The shoot is 3 feet in width and a says \$60. The United Elkhorn is 16 miles northwest of Baker City. Work has begun on a double track tunnel, 3500 feet in length, to tap the veins at 3000 feet deep. The mines, drills and mill machinery will be lighted and run by electricity. Manager Field says that he will add twenty men.

#### Columbia County.

The Clifftown Coal Co., developing coal veins at Bunker Hill, several miles from St. Helens, is increasing work. The property is owned by J. Good, H. R. Cliff of St. Helens, C. E. Dalton of Chicago, Ill., and others.

#### Douglas County.

Bohemia reports say work is progressing on the Utopian group, on Elephant mountain. The group of five claims is owned by F. J. Hard of Portland. Several tunnels and open cuts have been run on the veins, showing bodies of ore. The main working tunnel is in 200 feet in milling ore.

The Jordan Creek M. & W. P. Co. of Portland, which owns a group of quartz and placer claims on Jordan creek, between Riddles and Canyonville, expects to begin development work this month. A Rowley, manager of the company, states that several tunnels have been run.

#### Grant County.

Work will be resumed on the Bull of the Woods group, adjacent to the Badger mine, near Susanville. The mines are owned by allied companies, with F. W. Bradley of San Francisco, Cal., manager. Last year a shaft was sunk to 250 feet on the Bull of the Woods and drifts run from two levels. Treatment of ore will be at the Badger plant, to which end, it is said, more stamps will be installed. The Bull of the Woods shaft is sufficiently near the Badger mill to connect economically by means of an aerial tram. A compressor plant is also being put in to be operated by water power. From this, compressed air will be piped to the Badger or Bull of the Woods, as required.

A. P. Jones et al., owners of the Magnolia group of eight claims, near Granite, are shipping ore to the smelter. The property is equipped with a 10-stamp mill and the main drift is in 900 feet. The Buffalo, a near-by property, which has been idle for several years, has been opened again and is producing high-grade ore. That group is owned by Pendleton people.

#### Jackson County.

(Special Correspondence).—The Braden mine, near Gold Hill, is being worked by G. Patrick and J. B. McGee, lessees. Tunnels on this property have been run to extent of 1400 feet. In the main tunnel a shaft is being sunk to 300 feet. The ore at 100 feet in depth is free milling, with high-grade sulphurets. The ledge is from 1 to 4 feet wide. On the property is a 10-stamp mill, with a Wilfey concentrator plant.

The Little Alice mine, 5 miles from Gold Hill, is in slate and developed by four tunnels, the longest 200 feet in, tapping the ledge 150 feet below the surface. The others are connected with raises and bodies of ore blocked out. On the property is a 2-stamp mill and cyanide plant. Gold Hill, Sept. 27.

(Special Correspondence).—The Opp mining group, near Jacksonville, has been under development for several years. The general formation in this locality is porphyry, diorite and slate, with ledges 3 to 10 feet in width and the ore free milling, with about \$7 per ton values. The longest tunnel is in 200 feet with a 200-foot raise to the surface. There are 300 feet of drifting. In the strongest ledge the pay shoot is over 5 feet wide. During development of the mine it has produced \$100,000 from its oxidized ores. J. H. Reddy of Spokane, Wash., is associated with J. W. Opp in management and development, and the 3-stamp mill is being replaced by a new building containing ten 1000-pound stamps, with space to add ten more.

Jacksonville, Sept. 27.

(Special Correspondence).—W. H. Jackson and I. L. Hamilton of Medford are developing at 30 miles from Medford a quarter section of land bought from the railroad grant and report opening up of cinnabar values. The breast of the 140-foot tunnel is 100 feet below the surface and in vein matter 10 feet in width. Development will be carried on during the winter months.

Milwaukee, Wis., men are negotiating with J. J. Honck of Gold Hill for his holdings consisting of a 2-stamp mill and the water of the river to the extent of 8000 H. P., and a ditch of 2000 feet and other appurtenances. The company is to build an electric plant to supply power and lights to mining and other properties and to the towns from Ashland to Grants Pass, a distance of nearly 50 miles. H. Schaeffer is manager.

Medford, Sept. 27.

(Special Correspondence).—Operations are progressing on the Shorty Hope mine, near Ashland. In the 2000 feet of tunnel work eight ore shoots have been cut, the ledges being 3 to 8 feet in width and the ore 50% free milling, the balance high-grade sulphurets. They will sink a 500-foot shaft in the main tunnel, which point will admit of drifting and stoping ore 700

feet below the surface. On the property is a 10-stamp mill with two Frue vanners. While the property is equipped with 500 H. P. of water, it is proposed to contract with one of the Gold Hill electrical power plants to furnish power for using electrical drills and lighting.

Ashland, Sept. 28.

(Special Correspondence).—Two miles from Gold Hill, E. T. Staples and C. E. McChesney are developing their holdings by a tunnel to crosscut the ledge. There are four ledges within 480 feet which are expected to unite. After striking the ledge a raise will be cut to the surface.

One of the well developed properties in the district is the Lucky Bart on Sardine creek, 6 miles from Gold Hill. The ledge is 40 feet in width, between diorite and serpentine, with payable ore, free milling, with 4% sulphurets. Development consists of 550 feet of work in the three tunnels and over 3000 feet of drifting at 170 feet below the surface. The ore from the Rita ledge averages \$15 in gold to the ton. Shipments have been made to the Tacoma smelter. On the property is a 5-stamp mill and a Johnson concentrator. The mill is run by steam. J. H. Beeman is owner.

Gold Hill, Sept. 27.

J. A. Whitman et al. of Medford have incorporated a company to develop and operate 2000 acres of placer ground in Jackson county. They are equipping the property.

#### Josephine County.

(Special Correspondence).—The Seeley mine on Murphy creek, 9 miles from Grants Pass, is being worked by C. Clark of Kirbyville and A. Fetsch of Grants Pass. There are two tunnels, one following in on a 12-foot ledge of free-milling quartz of \$12 value per ton in gold. Other development consists of several shafts down 30 to 40 feet. Development will be increased.

The Old Dick mine of three claims on Jump-Off-Joe creek is being developed by S. W. Richards of Port Townsend, Wash. The 2000-foot tunnel is at its face 150 feet below the surface on a 4-foot ledge of free-milling quartz of the value of \$12 per ton in gold.

Grants Pass, Sept. 28.

#### Lane County.

(Special Correspondence).—The Gold Zone M. Co., with headquarters at Corvallis, Or., is prospecting and opening up a group of claims in the North mining district, Cascade range. This mineral district, while having been known since 1859, has been but little prospected. Values are found in quartz ledges assaying from \$4 to \$40 in gold. The developments are principally surface prospecting, with a 100-foot tunnel. The officials of the Gold Zone M. Co. are: E. J. Dunn, president; B. J. Thatcher, secretary, and H. Hopkins, manager.

Eugene, Sept. 27.

#### Malheur County.

In Mormon Basin the Morning Star group, owned by W. S. Newbury of Sumpter, has finished milling tests and Newbury says a 10-stamp mill will be added. Four ledges, all carrying milling ore, have been opened up. Three are being drifted on. These ledges parallel each other. The ore carries gold.

### SOUTH DAKOTA.

#### Lawrence County.

The Gilt Edge-Maid M. Co.'s mill, 2 miles from Galena, will make its initial run this month. The machinery is being set up. Reduction of the ore will be by grinding process, Chilean mills being used, the ore being amenable to cyanide process after coarse grinding. The motive power will be electricity.

### TEXAS.

The aggregate length of all pipe line systems in southeast Texas fields (principally Jefferson and Hardin counties) for transportation of oil is said to be 444 1/2 miles, divided among the principal companies as follows: J. M. Guffey Petroleum Co., total of 110 miles; The Texas Co., 113 miles; Security O. Co., 107 miles; United O. & R. Co., 58 miles; Sun Co., 38 1/2 miles; National O. & P. L. Co., 18 miles.

### UTAH.

#### Beaver County.

Milford reports say work of putting up the stamp mill of the Estella M. Co. is progressing and the plant will be ready for operation next week. Stamps to crush forty tons of ore daily will be provided. The Estella is under management of S. A. Tarbet.

#### Summit County.

At Park City the mill at the Comstock mine has been started up again and is turning out concentrates assaying \$35 per ton. The management is hoisting all ore by hand, but a steam hoist is being placed.

#### Tooele County.

The Stockton G. M. & M. Co. at Stockton has bought the plant of the West Argent and its removal to the company's ground has begun. The plant will have a capacity of seventy-five tons of ore per day. A 4-inch pipe line has been completed from Soldier canyon to the mine, a distance of 4 1/2 miles, and an abundance of water is available with which to run the mill, says Manager J. J. Trenam.

#### Uinta County.

H. Sanger, in charge of operations at the Uinta Copper Summit Co., north of Vernal, reports blowing in of the smelter.

### WASHINGTON.

#### Ferry County.

J. L. Harper has bought for the Belcher M. Co. 260 acres and also located 40 acres of land at West Fork, 16 miles south of Republic, and has secured water rights on west fork and main stream of the San Poll river. He says that men will be put to work breaking ground for erection of a smelter, the initial part of which will consist of a copper matting blast furnace and a lead stack. A road will be built between West Fork and Park City by Ferry county and by the mine owners who are interested. The Belcher mine at Belcher camp, at Republic, is reported showing improvement, and ore has been put on the dump which runs \$60 a ton, mostly in gold.

#### Okanogan County.

Near Chesaw, at the Buckeye mine, buildings are going up and more men are being put on. Seven hundred feet of flume have been built leading to the mill-site, and the mill is expected to be in operation before snow begins. Ore will be taken from the mine at a point where the ledge breaks off in a vertical bluff, 30 feet high, and will be hauled half a mile to the mill. The ore is free milling and the mill will be ten stamps, with plates and tables. Power will be steam. The Buckeye is owned by Ohio men, with H. Thompson and M. A. Smalley of Chesaw, the former being manager.

### WYOMING.

#### Carbon County.

The main Congo vein has been cut in the Congo mine, 2 miles north of Dillon. The tunnel is in 200 feet, opening a large area of stoping ground below the old workings. The ore carries copper, gold and silver. The vein was crosscut in the old workings for 40 feet without striking the hanging wall. The property is owned by Dillon and Rawlins men, including I. C. Miller, C. R. Ferris, E. W. Hanchena and C. L. Flamme.

#### Laramie County.

The mill of the Hecla C. & G. M. Co. at Hecla, 20 miles west of Cheyenne, is closed down temporarily pending increase of equipment. The process being installed is intended to save a number of by-products that have been heretofore wasted by the mill.

### FOREIGN.

#### AUSTRALIA.

##### New South Wales.

At its half-yearly meeting, Aug. 26, the Broken Hill Proprietary Co. at Broken Hill reported explorations in the lower levels have increased. The 1000-foot level is opened 640 feet, showing sulphide ore, while the 800-foot level is opened between Delprat shaft and Broken Hill Proprietary block 10 company's boundary, showing similar ore bodies for 1300 feet. From the 500-foot level to 650-foot level a small portion of the lode has been worked, while from the 650-foot to 1000-foot level none extracted. The 800-foot level is opened for 2200 feet, while the total length from south to the northern boundary of the property is 3900 feet. Direct expenditure on account of development, £23,000. All haulage is carried on by Delprat shaft, which has depth of 1020 feet. The salt-cake process plant requires a few adjustments to complete. This plant is a series of small tubs to hold one cubic yard of material, yet has capacity for treating ninety tons in twenty-four hours, recovering 90% zinc. Limitation of zinc concentrates output at Broken Hill is under consideration with other companies.

#### Victoria.

Another gold sluicing dredge has been placed on the leases held by the Wattle Gully Sluicing Co. at Chewton.

### BRITISH COLUMBIA.

#### Boundary District.

Four mining transactions, involving in the aggregate \$200,000, are reported put through at Greenwood last week. D. McIntosh and North Dakota men have bonded the E. P. U. mines. The Montreal & Boston M. & S. Co. has secured the Lancashire Lass mine, in Summit camp, and the Sudbury group at Deadwood. S. Curtis of Rossland and others



have taken a working bond on the Strathmore mine, while three Greenwood miners have bonded the Combination, in Providence camp.—The Lake and the Last Chance claims, east of Greenwood, have been bonded to W. A. Harkins et al. of Grand Forks.—The Bonnie Belle mine, west of Greenwood, has been bonded to F. L. Johnson et al. of Chicago, Ill.

Greenwood reports say E. H. Thurston, owner of the Carmi mine at Carmi, on west fork of Kettle river, has put up a stamp mill and concentrator at his mine. The plant is under superintendence of R. C. Longley.

East Kootenay District.

At Windemere, the Paradise mine continues working a large number of men, and several teams are hauling ore to the river landing. H. C. Hammond is manager of the mine. It is understood they have a 4-mile tram from the mine to Pinehurst and a concentrator under consideration, to be built this fall.—P. Farnham, manager of the Ptarmigan mines, is expected to operate the mines again this winter.—Six properties are working. The Delphine, leased by Stoddard & Beatty, is shipping eighty tons of high-grade ore. P. Mickelson is working the Tilbury (B. C.) mine. Forty tons of ore are on the way to the smelter. The Pretty Girl, the Tecumseh, the Charlemont and the Bunyan are shipping. Other properties are doing development work.

West Kootenay District.

From the Old Gold mine on the Duncan road, near Ferguson, owned by the Consolidated M. & S. Co., ore is being shipped by pack train to smelter. More men will be put on.

Yale District.

The Trethewey & Beatty lease from the Canadian Government of 15 miles of the Fraser river has been sold to I. B. Hammond of Portland, Or., and H. B. Plummer of Dallas, Or., who will build a dredger and work the ground. Plummer has a prospecting drill at work. The lease covers the river bed and bars between banks from a point 1 mile from Yale to within 1 mile of Hope, on the Canadian Pacific Railroad. The lower end of the ground is 80 miles above Vancouver. There are bars in the main stream of from 300 to 800 acres in extent. Pits sunk for prospecting purposes have shown the bedrock to be at an average depth of about 37 feet. Dominion Government reports estimate the average values of the dirt at 30 cents per yard. The Government lease requires work of \$50 per mile per year. Hammond & Plummer will put in an endless chain dredger of 1500 to 2000 yards daily capacity. By a provision of Canadian law there is no duty charged on mining machinery built in the United States brought in for operation of Canadian mines.

JAPAN.

Gold-bearing deposits have been found at Iwato and examinations made by Government engineers. The Finance Department will conduct mining operations on the fields for the Government, as the deposits have been reserved from private location.

MEXICO.

Chihuahua.

R. J. Coleman and H. E. Cary of Salt Lake City, Utah, are increasing development of the Lluvia de Oro (shower of gold) mines in western Chihuahua, near Choix, Sinaloa, and are putting in a 20-stamp mill. On account of the rainy season, there has been delay in securing timbers for the mill.

G. Gillett of Parral, with W. J. Parker et al. of New York, has organized a company to take over and operate the Quebradillas, Grenadena and the Iguana mines in Parral district.—W. P. Guthridge et al. of San Francisco, Cal., are developing a group of gold properties northwest of Guadalupe y Calvo.

Durango.

At the Luster M. Co. mines at El Oro, 60 miles south from Rosario, terminus of the Parral branch of the Mexican Central, the 150-ton smelter has been blown in. Two gas engines of 200 H. P. were put in to work the blowers. The Luster company's mines are of copper and gold. They will make a copper matte, the principal value of which will be in gold. W. E. Kock is manager of the Luster company.

Sonora.

At Klondyke camp, beyond the Santo Domingo river, east of Magdalena, the Loraine G. M. Co., having completed repairs on its mill and machinery, has resumed production of bullion. The mine has considerable water, and in controlling it the pumps raise 500 gallons per minute. La Libertad, an antigua mine in Prietas canyon, near San Antonio de la Huerta, has been bought by a company of Chi-

cago, Ill., men, including R. C. Coy and brother. A 60 H. P. pumping engine is in operation unwatering the mine. H. L. Miller is superintendent and J. Cleaver foreman.

NICARAGUA.

The Nicaragua G. M. & M. Co., operating at Gracias a Dios, has its 20-stamp mill in full operation. Manager G. W. Maybee says he will cyanide the tailings and will also put in an electric lighting plant.

Commercial Paragraphs.

THE Denver, Colo., office of the Denver Ore Testing & Sampling Co. has been changed from 17 Jacobson Building to 527 Seventeenth street.

BOOKLET NO. 41, from the Northern Electrical Manufacturing Co., Madison, Wis., graphically portrays their exhibit in Section 14, Palace of Electricity, Louisiana Purchase Exposition.

THOMAS STEWART CHALMERS AND NORMAN WILLIAMS, JR., have organized under the firm name of Chalmers & Williams, with offices in the Railway Exchange, Chicago. They will deal in supplies for mines, mills and smelters. Mr. Chalmers is a son of W. J. Chalmers, who has long been identified with the mining machinery business. Mr. Williams is a son of Norman Williams, who is identified with the Pullman Co. and the Western Electric Co. The personality and training of the sons of these well known men should warrant the belief that the new firm will be a success.

JAMES S. BROWNELL, western manager Frue Vanning Machine Co., 132 Market street, San Francisco, Cal., reports the following sales since July 1, 1904: Sixteen 6-foot Frue vanners to the Kennedy mine, Jackson, Cal., completing an equipment of forty of this style of machines for the new mill of 100 stamps; eight 6-foot Frue vanners to the South Eureka mine, Sutter Creek, Cal.; four 6-foot Frue vanners to the Central Eureka mine, Sutter Creek, Cal.; two 6-foot Frue vanners to the Keystone mine, Amador City, Cal.; four 4-foot Frue vanners to the Hurrah Quartz mine, Nome, Alaska; three 4-foot Frue vanners to the Gold Dike M. & M. Co., Summerville, on Salmon river, Siskiyou county, Cal.; one 4-foot Frue vanner to C. Richter, Fresno, Cal. All of the above machines furnished with the Brownell patent lip flange belts. "In addition to the above sales of Frue vanners we have shipped twenty-nine 6-foot and thirty-two 4-foot Brownell patent lip flange belts for supplies, shipments being made to Chinnampo, Korea; Douglas Island, Alaska; Eagle-Shawmut mine, Chinese, Cal.; Oneida mine, Jackson, and numerous other well-known mines on the Pacific coast."

Obituary.

I. H. SEVIER of Eureka, Cal., assayer and cyanide operator for the King of Arizona mines at Kofa, Yuma county, Ariz., died at Kofa on Sept. 26.

L. C. SNYDER, a Colorado pioneer miner, died at Denver, Colo., Sept. 19. Deceased went to Colorado forty-five years ago, settling at Black Hawk, where he engaged in mining. He served twice as county commissioner of Gilpin county and was several times mayor of Black Hawk.

NORMAN MCGEE of Denver, Colo., died at Colorado Springs, Colo., September 28. Deceased was thirty years old. He was appointed to the chair of engineering at Colorado College, but had to resign after acceptance. He was professor of civil engineering several years at the Imperial University in Tientsin, China, and at one time was division engineer of the Southern Pacific. He was a graduate of Stanford University, 1898.

Books Received.

Under the head of Mineral Resources for 1903, the United States Geological Survey has issued: "Production of Abrasive Materials;" "Production of Gypsum;" "Production of Flint and Feldspar."

Under the head of Mineral Resources of the United States for 1903, the United States Geological Survey has issued: "Production of Graphite;" "Production of Borax;" "Production of Antimony;" "Production of Arsenic;" "Production of Glass Sand;" "Production of Lead."

Personal.

R. C. LONGLEY is superintendent of the Carmi mine and mill at Carmi, B. C.

E. K. COPE is chief chemist at the mines of the Oliver M. Co. at Eveleth, Minn.

H. E. WOODS has returned to Denver, Colo., from Grants Pass, Or., via San Francisco.

J. W. BURNS is manager of the Rio Dolores M. Co. at Burns Station, north of Rico, Colo.

E. C. TRETHEWAY of Nelson, B. C., is superintendent of the Mollie Gibson mine, near Nelson.

S. W. TRAYLOR, of the Traylor Engineering Works of New York City, is in Denver, Colo.

J. H. MCGILL is president and manager of the New York Bonanza M. Co. of Salt Lake City, Utah.

H. J. GOULD of Forest City, Cal., is superintendent of the Wisconsin drift mine in Sierra county, Cal.

R. O. JONES, chief engineer Jeanesville Iron Works Co., Hazleton, Pa., is visiting San Francisco, Cal.

T. MORGAN is superintendent of the New York copper mines at Park City, Utah, vice D. Ferguson, resigned.

C. F. DE PUY is manager of the Old Roman M. Co. operating at Newberry mountain, near Searchlight, Nev.

E. M. CLARK, owner of the Chicago mine at Groom Creek, Ariz., is in New Haven, Conn., on mining business.

D. FERGUSON has resigned as superintendent of the New York mines at Park City, Utah, and will go to Nevada.

J. CRONIN of Spokane, Wash., is conducting cyaniding tests on the C. R. M. & M. Co. mine at Oro Grande, Idaho.

G. KARTSCHKE of Nevada City, Cal., is manager of the mines of the Great Dane G. M. Co. near Nevada City, Cal.

E. E. GREENWOOD is manager of the Mount Union Con M. Co., operating in Hassayampa district, near Prescott, Ariz.

D. KAUL has been appointed a mining engineer on the staff of the Cerro de Pasco C. M. Co. at Cerro de Pasco, Peru.

S. J. SPEAK of London, England, is resident manager of the Ymir G. M., Ltd., at Ymir, B. C., vice G. H. Barnhart, resigned.

F. KLEPETKO of New York City, N. Y., is consulting engineer for the Hermina M. Co., operating near Sudbury, Ontario, Canada.

B. M. CORNISH, manager of the Pioche-Nevada M. Co., operating mines at Pioche, Nev., is in London, England, on company business.

G. H. BARNHART has resigned as manager of the Ymir G. M., Ltd., at Ymir, B. C., to operate the Porto Rico mine and mill at Nelson, B. C.

SUPERINTENDENT HARKER of the Gold Dust M. Co. at Leesburg, Lemhi county, Idaho, has returned there from Salt Lake City, Utah.

W. P. MCPHERSON is superintendent of the Gold Giant M. Co., whose mines are at Silver creek, near Acme, southwest of Kingman, Ariz.

T. D. MERTON, principal owner of the Spottiswoode R. & M. Works at Melbourne, Victoria, Australia, is inspecting reduction works in British Columbia.

CHAS. GUNN, of the Union Iron Works of San Francisco, goes East next week, and on his return takes charge at the Columbian Engineering Works, Portland, Or.

LINDSAY DUNCAN has resigned as professor of civil engineering in the University of Colorado at Boulder, Colo., to engage in engineering work, with offices in Denver, Colo.

H. L. MILLER, formerly superintendent of the Mina Grande mine in Sonora, Mexico, is superintendent of La Libertad mine, near San Antonio de la Huerta, Sonora, Mexico.

MANAGER G. D. B. TURNER of the South Quincy M. Co. of Park City, Utah, who has been to Europe for several months in the interest of his company, returned last week.

W. P. GUTHRIDGE, manager of the Cherokee Proprietary mines, will have management of the mines near Parral, Chihuahua, Mexico, of the Premier Exp. & Dev. Co. of London, England.

G. CLARKE, superintendent of the

graphite mines of the United States Graphite Co. at La Lapid, southeast from Torree, Sonora, Mexico, returned there last week from San Francisco, Cal.

H. SANGER, recently managing gold properties in Siskiyou county, Cal., is again manager of the Uintah Copper Summit Co. mines and smelter near Vernal, Utah, with which he was formerly connected.

L. J. HARTZELL, recently chief assayer at the Washoe copper smelters at Anaconda, Mont., has resigned to take professorship of analytical chemistry at the State School of Mines, Butte, Mont.

R. HEATH, who has been superintendent of the Lower Mammoth mine at Mammoth, Utah, for several years, has gone to the De Lamar mine at De Lamar, Nev., where he will have charge of underground work.

N. J. MARTIN has resigned as general superintendent of the mines of the North American C. Co., near Encampment, Wyo., and will go to Copiapo, Chile, as constructing engineer for the Sociedad Industrial de Atacama. He is succeeded at Encampment, Wyo., by S. S. Raymond.

Latest Market Reports.

SAN FRANCISCO, September 30, 1904.

METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58c, refined (1000 fine); San Francisco, 58c; Mexican dollars, 47c San Francisco, 45½c New York.

COPPER.—New York: Standard, \$12.75; Lake, 1 to 3 casks, \$13.00; Electrolytic, 1 to 3 casks, \$12.75; Casting, 1 to 3 casks, \$12.50; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18¢@24c. London: £58 7s 6d spot per ton.

LEAD.—New York, \$4.30; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 7s 6d long ton.

SPELTER.—New York, \$5.20; St. Louis, \$5.00; London, £22 5s 3d ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$27.85@28.12½; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, \$32½@35c. London, £127 15s spot.

PLATINUM.—San Francisco, crude, \$18.50 ½ oz.; New York, ingot, \$19.00 ½ Troy oz. Platinum ware, 75¢@82c ½ gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 ½ flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 16c.

ZINC.—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

NICKEL.—New York, 40¢@47c ½ lb.; ton lots, 40¢@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31¢@34c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.75 @12.85; gray forge, \$12.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c ½ lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½ c ½ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½ c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city bbl.

CEMENT.—Imported, \$2.15@2.65 ½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 ½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less



than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50@7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 1½¢ set; 14 oz., 40s., 10c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24¢ lb.; carloads, 23@23½¢; in tins, 30c; soda ash, \$2.00 lb. 100 lbs.; hyposulphite of soda, 3@3½¢ per lb.; caustic soda, in drums, 3@3½¢ lb.; Cal. s. soda, bbls., \$1.20@1.40 lb. 100 lbs.; sks., \$1.05; chlorate of potash, 12@13¢; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½¢; powdered sulphur, 2@3¢; flour sulphur, French, 3½@3½¢; alum, \$2.00@2.25; California refined, 1½@2¢; sulphide of iron, 8¢ lb.; copper sulphate, 5½@5½¢; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1½@2¢ lb.; nitric acid, carboys, 8¢ lb.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½¢; Astral, 19½¢; Star, 19½¢; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20c; cs., 24c; Mineral Sperm, cs., 26½¢; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½¢; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½¢; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37¢ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburgh. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburgh.

BORAX.—Concentrated, 6@7¢ lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6¢ lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9¢ lb.

MOLYBDENUM.—Best, \$2.00 lb.

CHROMIUM.—90% and over, 80c.

PHOSPHORUS.—American, 70c.

SILVER.—Chloride, 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride, 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—Metal, 60c.

SODIUM.—Metal, 60c.

BISMUTH.—Subnitrate, 82.10.

URANIUM.—Oxide, 83.50.

FIRE BRICK.—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

NOTICES OF RECENT PATENTS.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

CUTTER FOR BUTTER, ETC.—No. 770,476. Sept. 20, 1904. Romeo Pozzi, Marysville, Cal. This invention consists in the combination of mechanism and devices by which the article to be cut is intermittently advanced between the movements of the cutting device and means by which the rate of advance and the thickness of the slices cut may be varied. It is especially designed for cutting butter from the block or roll into sheets of any desired thickness and subdividing said sheets to make the smaller divisions or parts designed for table use.

STEAM DOME AND BREACHING.—No. 770,465. Sept. 20, 1904. C. A. Huffmaster, San Leandro, Cal. This invention consists especially in the novel arrangement of the steam dome and an internally disposed breaching and connections whereby the hot products of combustion after passing through the boiler flues are carried through the breaching to the stack so as to heat the steam contained within the dome, while the effect of the surrounding steam is to prevent the burning out of the breaching. The invention comprises a means for diverting the upwardly moving gases and throw-

ing them more directly against the interior surface of the breaching before said gases escape from the stack and other details of construction.

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING SEPTEMBER 20, 1904.

770,250.—COLLAR—Alkus, Sinclair & Krizbaum, Oakland, Cal.  
770,669.—BOOK CLAMP.—J. N. Bos'ick, Fresno, Cal.  
770,672.—CULTIVATOR.—J. L. Buckingham, Laton, Cal.  
770,662.—WEARING APPAREL—Alice H. Dessart, Nogales, Ariz.  
770,428.—SMUDGE—E. J. Griffiths, Los Angeles, Cal.  
770,309.—GAS METER.—A. Henning, S. F.  
770,465.—STEAM DOME—C. A. Huffmaster, San Leandro, Cal.  
770,338.—HAND BRAKE—Maguire & Young, Reno, Nev.  
770,378.—ELECTRIC SWITCH—Mehrtens & Howard, Exeter, Cal.  
770,474.—SPOKE PULLER—A. K. Olsen, Hubbard, Or.  
770,476.—BUTTER CUTTER—R. Pozzi, Marysville, Cal.  
770,508.—INTERLACING MACHINE—A. E. Sexton, Los Angeles, Cal.  
770,446.—ADDING MACHINE—A. P. Simpson, Sacramento, Cal.  
770,328.—DISK HARROW—G. Smith, Colfax, Wash.  
770,401.—CHURN—H. A. Thomasson, Whatcom, Wash.  
770,518.—PUMP PISTON—P. J. Waller, Los Angeles, Cal.  
770,514.—SNATCH BLOCK—Walters & Prichard, Goldbar, Wash.  
770,344.—OVERFLOW VALVE—G. M. Weigel, Ballard, Wash.  
770,548.—TANK CAR—A. D. Whittemore, Redlands, Cal.

## ASSESSMENT NOTICES.

GOLDEN WEST MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of September, 1904, an assessment (No. 2) of one (1) cent per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 307 Battery street, Room 15, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of October, 1904, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of November, 1904, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
CHAS. BOVONE, Secretary.  
Office—307 Battery street, Room 15, San Francisco, California.

TESTS HAVE PROVEN.—Leading plant operators the world over have tested the BURT EXHAUST HEAD and their verdict is that it is PERFECTION.



It stops the dripping and spraying of water and oil that comes from the exhaust pipe—it allows nothing but dry steam to escape, hence it saves roofs and walls from damaging effects of steam.

"The Burt Exhaust Head is giving satisfaction." American Sewer Pipe Co., Pittsburg, Pa.

THE BURT MFG. CO.,  
Largest Manufacturers of Oil Pumps in the World,  
221 Main St., Akron, Ohio, U. S. A.  
Supplied also by Engine Builders,  
Dealers and Power Contractors.

THE CALIFORNIA DEBRIS COMMISSION having received application to mine by hydraulic process from E. J. Gordon and P. McElroy, in Messer Mine, near Mountain House, Plumas County, Cal., draining into Spanish Creek, which reaches Feather River, gives notice that a meeting to receive any protests will be held at Room 96 Flood Building, San Francisco, Cal., Oct. 17, 1904, at 1:30 P. M.

## WANTED TO BUY FOR CASH. TUNGSTEN ORES (Wolframite, Huebnerite and Scheelite.)

Molybdenum, Bismuth and Vanadium Ore.

PRIMOS CHEMICAL CO.

Telegraphic address: Philadelphia, Pa

PRIMOS, DELAWARE CO., PA

## ORE TESTING

We have the most complete Ore Testing Plant in the United States for the testing of ores of all characters by any of the modern methods of ore treatment. We determine the best and most economical method of treating ores and contract to design, erect and turn over in complete working order Ore Milling Plants of any description, and guarantee efficiency and capacity. Our Catalogue No. 39 describes this department fully.

Office & Works, 8th & Larimer Sts.  
Metallurgical Dep't., 1729 Champa St.

THE F. M. DAVIS IRON WORKS CO.  
DENVER, COLOR. U. S. A.

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Industrial Publishers, Booksellers and Importers,  
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Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo.; a Catalogue of Books on Metallurgy, Mining, Prospecting, Mineralogy, Geology, Assaying, Analysis, etc.; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc.; and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address

### SITUATIONS WANTED.

A CAPABLE MINING ENGINEER AND MINE manager desires position as manager or superintendent; 18 years' experience. Speaks Spanish. Good references. Address H. A., this office.

A FOREMANSHIP OR SUPERINTENDENCY. Twelve years' experience, practical mining. Possesses technical knowledge necessary for economical ore extraction. Address Edward W. Ralph, 602 W. Broadway, Butte, Montana.

AN EXPERIENCED MAN DESIRES A CHANCE to hunt for lost mines—gold, quartz and copper—or to do field work. Would go on salary and expenses paid, or for a percentage on value of discovery. Address R. M. Gill, What Cheer House, San Francisco, Cal.

COMPETENT MINING ENGINEER WANTS opening with city firm or individual to do expert mining, mill or cyanide work. Moderate salary to start. Address R. B., care of this office.

CYANIDE CHEMIST DESIRES POSITION AS Cyanide Superintendent; 8 years' experience; understands milling; good assayer; best of references. Address "Cyanide," Box 1323, Denver, Colo.

CYANIDE MAN, ASSAYER, SURVEYOR AND Draftsman, competent to keep mine books. Young man, unmarried, good habits, and worker; thorough, systematic and progressive. No objections to anything new. Address "Buckeye," care of Mining and Scientific Press.

DETECTIVE AND PEACE OFFICER OF 27, with seven years' experience on Pacific coast, desires position with mining company as watchman or special officer. Best of references. Address Lock Box 71, Redding, Cal.

EXPERIENCED CYANIDE MAN AND ASSAYER wants opportunity to learn milling. Unhindered. Address "H. W. Metallurg," care of Mining and Scientific Press.

EXPERT MINE FOREMAN WANTS POSITION. Competent to handle extra difficult conditions underground. Address "Limestone," Room 602, 380 Market St., S. F.

MINE SUPERINTENDENT WANTS POSITION. Capable miner, mill man, cyanide man and assayer. Address R. P., this office.

MINING COMPANIES AND MINING ENGINEERS installing steel cyanide tanks and desiring a first-class boiler maker familiar with class of work to do the erecting and riveting for them, address Box 25, this office. Best of references.

POSITION DESIRED BY AN ELECTRICAL and Gas Engineer; technical graduate; three years' experience in electrical work, eight years' experience in the operation of gas engines; will accept position in either line, but prefer to combine the two. Address R. W. Shoemaker, 613 E. Sixth St., Los Angeles, Cal.

WANTED—POSITION AS SUPERINTENDENT or assistant sup't by a practical man; first-class chemist and assayer. Specialty: Reduction work, milling and smelting. Address X, this office.

WANTED—POSITION BY EXPERIENCED Mining Stenographer, Bookkeeper and Assayer, with reliable mining company. Address A. R. Wistrand, Wrangell, Alaska.

### HELP WANTED.

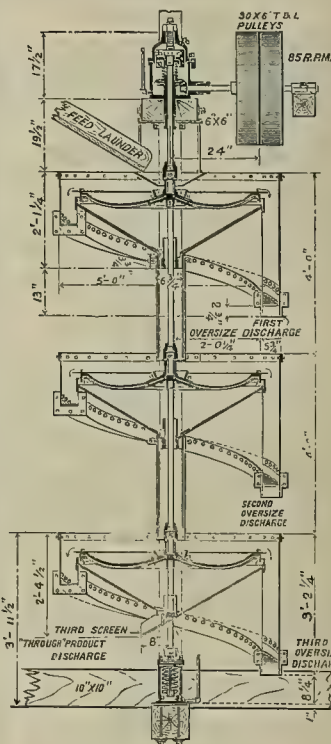
COMPETENT APPLICANTS FOR ANY ENGINEERING positions furnished to employers without charge. Experienced men wanting such positions should write for terms. Cleveland Engineering Agency, Rose Building, Cleveland, O.

WANTED—SALESMAN TO SELL PUMPS, Engines, Boilers, Motors, etc. Preference given engineering education or experience. State terms. Address Box 28, care of this office.

# TRAYLOR CENTRIPACT SCREEN.

Its classification of pulp by size of particles is admittedly superior to hydraulic classification.

Centrifugal force and upward impact does it.



In wet screening no spray or additional water is required, that coming with any pulp being amply sufficient.

Only ten square feet of screen cloth to be renewed in place of eighty to one hundred square feet, as on the revolving screen.

No "balling up" of wet pulp is possible on the Centripact Screen.

The head movement is enclosed in a dust-proof case containing oil, all working parts thus operating in oil.

Traylor Engineering Co.,  
118 Liberty St.,  
New York, N. Y.



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## What Is Meant by Mineral.

At times serious disputes arise between the adverse claimants of a mining location as to the sufficiency of the discovery. As to the character of rock in a discovery the statutes are silent, the only requirement being "mineral-bearing rock in place." The mineral-bearing rock need not necessarily be a vein or deposit of definite shape, size or form, but must be mineral bearing. Not infrequently valuable mineral—gold or silver, or copper, lead or zinc sulphide—may occur in payable quantity in one portion of a rock when another portion of the same rock mass, a short distance away, may be commercially worthless or actually destitute of metallic minerals, of their sulphides, or of the secondary products of their oxidation.

The words of the Statute are, "veins or lodes of quartz or other rock in place." What constitutes a lode is a somewhat indefinite proposition, but it is as often determined by commercial as by geological considerations. By "in place" is meant in its original position and not in detached pieces in the alluvial, or in a rock slide on the side of the mountain.

Payable mineral is not confined in its occurrence to quartz. It is often found in limestone, in shale, sandstone and various eruptive and intrusive and metamorphic rocks. Not infrequently the mineral-bearing rock or ore is similar in appearance to the barren



Quartz Mountain and App Mine, Mother Lode of California. (See page 237.)



Head Frame and Mill, Harvard Mining Co., Whisky Hill, Jamestown, Cal. (See page 237.)



The Dutch Mine, Quartz Mountain, Mother Lode of California. (See page 237.)

rock which surrounds it, and the rock only ceases to be considered ore when it no longer pays for its extraction and treatment.

It is for this reason that the phrase, "or other rock in place," was introduced into the statute. There is nothing ambiguous in the expression "rock in place." Every class of claims that may be classed as a vein, or lode, may be patented under the laws as a vein or lode of rock in place. This class of mineral lands contemplates all of those wherein the mineral is contained in veins, whether fissure or gash veins, or any of the several other forms of mineral deposition. Miners not infrequently claim that a newly discovered vein is not "in place," but has slipped down the mountain or hillside from some other claim. This is rarely the case, and usually there would be no difficulty for a geologist to prove to the satisfaction of the most skeptical that nothing of the sort had ever occurred there.

The word "mineral" as applied to veins in the statutes has a somewhat different significance than when used otherwise—for all rocks, whether metal bearing or not, are recognized as being composed of one or more minerals. Mineral, in the mining statutes, has a more restricted meaning, and is understood to imply an ore or mineral substance having a commercial value. A gold-bearing rock is properly mineral, and granite has been determined by the courts to be mineral. A valid "discovery of mineral-bearing rock in place" may be made and a claim taken wherever mineral can be found on the unoccupied public lands of the United States, and the courts have never insisted that mineral must be found having a commercial value, in either quality or quantity. This is left to the judgment of the locator, who is presumed to know whether or not the "prospect" is sufficiently good to locate and develop under the requirements of the law. A statute that required payable ore in sight before a valid location could be made would make many mining locations impossible.

Judge Hawley, in the case of Brook vs. Justice M. Co., 58 Fed., 106, 124, said: "Logically carried out, it would prohibit a miner from making any valid location until he had fully demonstrated that the vein or lode, of quartz, or other rock in place, bearing gold or silver, which he had discovered, would pay all the expenses of removing, extracting, crushing and reducing the ore and leave a profit to the owner. If this view should be sustained, it would lead to absurd, injurious and unjust results."



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J. F. HALLORAN.....Publisher

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THE annual estimate of gold and silver production of the United States for 1903 has been made public by G. D. Roberts, Director of the Mint. It shows a total production of over \$100,000,000, being about \$6,000,000 less than that of the fiscal year 1902, due chiefly to the suspension of mining operations in several of the most important producing camps in Colorado for a period of several months. The total production of the world for 1903 is estimated at about \$320,000,000 gold and \$88,290,000 silver, the latter being figured at 54 cents per ounce. The figures indicate a gain of more than \$30,000,000 over the production of gold and silver in 1902. These figures are estimates and the exact figures cannot be obtained before the latter part of the year. Detailed figures of production by States and counties are given elsewhere herein.

SOME interesting statements have recently come from the Transvaal Chamber of Mines relative to the work of the Chinese laborers now employed in the mines of the Rand. Out of 1182 men at the Van Ryn mine 1018 were reported working, of whom 556 were underground and 462 on the surface. On August 2 an average of 15 inches per shift was made in drilling by 130 coolies and on the 16th of the month the average made by 300 men was 22 inches, showing either an improvement, or more favorable conditions for work. This is about one-fourth to one-fifth of what a skilled white miner would accomplish in the same time. In another mine the average was about 14 inches, some of the men doing nearly 36 inches. The mine managers appear well pleased with their experiment, and anticipate a material improvement in the amount of work accomplished per man when they become more experienced. In the work of mucking they make a better relative

showing than in the more skilled work of drilling, but in this as well as drilling they are no match for the white miners and not even as good as Kaffirs. The labor problem appears nevertheless to have been solved by the Chinese on the Transvaal, and 5000 more have gone in since Sept. 15. The difficulty at first experienced with Chinese officials in recruiting seems to have been satisfactorily settled.

## Keeping Records.

Every careful business man recognizes the value and the necessity of keeping systematic records of all operations; and this is not more true of any single line of activity than it is of engineering and mining works. The mine superintendent who is driving a tunnel or other opening in under former and flooded workings is not operating "in the dark" if he has reliable and carefully kept records and surveys of work done above him. He can drive ahead intelligently, without delay, and without fear of unexpectedly opening into the thousands of tons of water above, and flooding out his men, possibly with a loss of life. In case connection is to be made between different sections of a mine, without the surveyor's records, one would have to guess his way and would likely do much unnecessary work. Then, too, in drifting or other work in the mineralized formations, if samples are taken systematically, and distances and values recorded as driving progresses, the mine owner or manager can tell at any time just what quantities and values of ore he has available. If a written account of diamond-drill-hole prospecting were not kept, showing the character of every foot (even of inches) traversed and its value or lack of value—if such data are not on paper, the drill hole is useless to the superintendent or manager who may succeed the man under whose direction the work was done, and even useless to the one who did the work, unless he has a remarkable memory. Equally sensible and useful would be the prospecting by well-boring apparatus of auriferous gravels for dredging purposes without a carefully kept account of the same. The lack of just this sort of data and information is, according to reports, being felt at the present time by a number of operators in the Beaumont, Texas, oil fields. In the boom days of a year or so ago all were intent on striking a "gusher." Many wells were put down hurriedly and without thought of keeping a "log" recording the location and thickness of the various strata passed through. Not even the minor oil-bearing sands pierced were accurately noted. The oil sand yielding the gushers was the one sought for. Now that the excitement has subsided those who kept careful records are profiting by their foresight and are perforating the casings of many of their abandoned wells at depth of the several oil sands and are getting a substantial yield therefrom. Without an accurate log of the well, they are as likely to strike a flow of artesian water by cutting the casing at the wrong place and thereby damage, or eventually destroy, the usefulness of the well.

## The Greatest Gold Mine.

The last annual report of the Homestake Mining Co. for the year ending June 1, 1904, which was recently issued, shows that about 1,300,000 tons of ore were mined and milled, the value of which was within a fraction of \$3.70 per ton, the bullion returns being \$4,800,558.40. This shows an increased tonnage, due to enlarging one of the mills, and it also indicates an increase in the value of ore milled by \$0.156 per ton, an interesting and important fact in consideration of the growing depth of the mines. Among the expenses for the year, \$194,769.69 were spent on the six shafts of the company; on mining, over \$2,100,000; on candles alone, \$19,833, and on dead work, but \$18,689. It is said the ore reserves are sufficient to last for twenty years without dead work, with the present capacity over 4000 tons daily, so that the relatively small amount of dead work is unimportant. The deepest shaft, the Ellison, is now down 1250 feet, the lowest level being at 1100 feet, where the vein is still of enormous width, stated to be about 500 feet. The company now operates 1000 stamps, which are in six mills. Although the Homestake owns the greater part of a strip of land 2 miles long and 2000 feet wide, the company paid out over \$200,000 the past year for new property.

## Modern Innovation.

The daily application of modern science to practical utilities has become so commonplace that we have ceased to wonder at anything. For years aerial navigation was a problem which presented so many difficulties that success was not looked for by any except the optimistic inventors of flying machines, but each experiment developed the weaknesses of the last effort and now it seems that there is a probability that aerial navigation is about to be solved to the satisfaction of those who desire to fly. Wireless telegraphy has become an established and accepted fact, but the field open to the application of electricity is still almost boundless. Metallurgical methods are constantly undergoing a change—newer and better ideas and practice supplanting the old. Undertakings which even a decade ago would have been considered inexpedient, if not impossible, are now accomplished daily and no longer attract unusual attention. Among recent innovations is the suggestion by a French engineer that a coal mine may be converted into a natural gas well and the gas used in various ways in the industries. His proposal is to sink two shafts in the Rouchamp coal field in France and to then set fire to the bed of coal, employing the gas generated which would rise through one of the "wells," the other being a down cast supplying the oxygen necessary for combustion from the air. The coal mines of the district are already very deep and the profit of their operation small, due to the expense of mining there under existing conditions. It is the idea of this enthusiastic engineer that the coal bed could be made more profitable in the manner indicated than by the usual methods of extracting the coal from the vein at great depth and raising it to the surface for use as fuel. This novel suggestion is merely indicative of the trend of thought in these days of progress and innovation. No branch of scientific investigation offers greater opportunities than the field of metallurgical engineering and the adaptation of known chemical reactions to the solution of problems in ore treatment. In many instances it is desirable to extract a higher percentage of values from ores than are being obtained, and in other cases it is desirable to reduce the cost of treatment where the percentage of extraction is already high. The experimentation now in progress is mostly being done by scientific investigators who patiently work along definite lines with a fixed purpose in view. There are few new processes offered to-day which can be successfully and satisfactorily applied to ore treatment that have not been arrived at by a long series of intelligently conducted experiments.

IN Mexico the country is generally prosperous, and an important factor in this connection is the recent completion and the present extension of a number of important railroads. Some years ago there was a large and influential element opposed to railway building in that republic, but the progressive people have secured the railroads and the conservative element, noting the prompt and direct benefits resulting following their completion, are now also favoring railroads wherever they may be needed. The policy of the Government has been favorable to railroad extension, but it is evidently the intention—for the time being at least—to subsidize no more new enterprises of this character. As the development of the country's resources progresses the need for subsidies becomes less urgent, and in the future it is probable that railroads must be built in Mexico without Government aid, depending solely upon the commerce of the section of the country through which the road passes for its reward and financial success.

EVIDENTLY in anticipation of industrial strife, the mine managers of Leadville have decided to issue working cards to all employees, presumably to resist the growing strength of the Western Federation of Miners in that district, as a large number of those who left Cripple Creek district are said to be in Leadville. Under the new arrangements, no man will be given employment at any mine who does not deposit with the timekeeper the association card. What effect this order will have has not yet become apparent, but as this action has been taken before any trouble appeared on the surface, it is probable that it will meet with little if any opposition from those already in the district and who are employed.



## CONCENTRATES.

THE sound of the voice can be distinctly conveyed in a straight pipe a distance of 1600 feet.

\*\*\*\*\*

AN alloy of nine parts of lead, two parts antimony and one part bismuth will expand in cooling.

\*\*\*\*\*

A BRASS casting will weigh eighteen pounds to each pound of the pattern's weight; an iron casting sixteen to one.

\*\*\*\*\*

IN figuring the size of the steam pipe, its diameter in inches equals the square root of one-sixth of the engine's horse power.

\*\*\*\*\*

AN ordinary burn from an electric current may be relieved by applying a solution of one part picric acid and seventy-five parts water.

\*\*\*\*\*

"SALT GLAZE" on bricks and certain kinds of tiles, pottery, etc., is obtained by introducing salt into the fire boxes while the articles are being burned.

\*\*\*\*\*

PUMICE is a spongy, frothy condition of lava. The name is also applied commercially to volcanic ash, used as a polishing agent. The principal supply is obtained from the island of Lipari, north of Sicily.

\*\*\*\*\*

THE construction and maintenance of lead-lined chambers in a sulphuric acid plant is usually expensive. Men called "lead burners" are employed constantly in looking after and repairing the lead sheets and joints.

\*\*\*\*\*

GOLD is associated with lead almost as often as with iron sulphide. Gold may frequently be seen in crystals of galena, though it is more commonly observed with pyrite. It also occurs with zincblende and often with mispickel.

\*\*\*\*\*

THE appearance of pure gold is often imparted to alloyed gold ornaments, by heating until the copper in the outer layer is oxidized; followed by dipping into nitric or sulphuric acid. The acid dissolves out the copper oxide, leaving a film of pure gold as the outer layer.

\*\*\*\*\*

GOLD LEAF generally contains 96.25% gold, 2.5% silver, 1.25% copper. After repeated rolling, cutting into squares, and beating with a heavy hammer, the final hammering is done between layers of gold-beater's skin. An ounce of gold may be spread out to cover an area of 100 square feet, and having a thickness of 235,000 of an inch.

\*\*\*\*\*

THE system of development usually applied to the opening of coal mines may be applied to metal mines as well; but such a system is not usually demanded by conditions obtaining in a metal mine. Fire damp is of rare occurrence in metal mines, and the cost of shaft sinking being generally much greater at metal mines, owing to harder rock, further discourages any attempt at sinking the extra ventilating shafts commonly found in coal mines.

\*\*\*\*\*

IT requires sixteen sacks of regulation size of iron sulphide to make one ton. The concentrates may contain from a fraction of 1% to 20% moisture. For very rich sulphides canvas sacks are better than burlap, as the fine sulphides sift through the coarse fabric of the latter, and in a long haul considerable loss results. There is less loss in transporting wet concentrates than in dry, though there is an increase in transportation charges due to moisture.

\*\*\*\*\*

BRIQUETTES for metallurgical purposes are usually made with from 5% to 10% of lime as a binder. Clay is also sometimes used, but its presence is often undesirable in the furnace or elsewhere. In some instances dilute sulphuric acid is employed, and the use of sugar-molasses is covered by patent. Other common binders used in the manufacture of artificial stone are water glass, magnesia cement, zinc chloride, gum arabic, glue, caseine and glycerine.

\*\*\*\*\*

THE impression which many have that certain kinds of rock or formation are indicative of the presence of gold, silver or other metals is erroneous. The kind of rock has no bearing on this important matter, but the condition of the rock is often an index of mineralization, if not of value. Almost invariably the rocks along the walls of veins and in their vicinity will be found greatly altered—sometimes silicified, sometimes much mineralized and decayed—but poor veins have these conditions as well as rich ones, though few of the latter are without such indications.

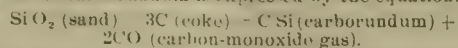
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CRUSHED STEEL is used principally in cutting and polishing stone (marble, onyx, granite, etc.) for ornamental purposes, also in grinding lenses, beveling glass, and by lithographers. Crushed steel is manufactured from high-grade crucible steel, heated to 2500° F. (nearly white heat) and quenched in cold water, giving it a granular structure. It is then crushed by hammers and classified into sizes from No. 6 mesh to No. 200. Sizes 6 to 60 are tempered to straw color, and sizes 60 to 200 still harder. Though crushed steel oxidizes readily, this

can be prevented by adding a little quicklime. The production of crushed steel in the United States in 1903 amounted to 755,000 pounds, of average value of 7 cents per pound.

\*\*\*\*\*

THE reaction which takes place in the electrical manufacture of carborundum is expressed by the equation:



While the principal use of carborundum is as an abrasive, it is, because of its refractory qualities, also being used as a furnace lining, both in the form of mortar and of bricks. Production in 1903 was 4,759,890 pounds—an increase of 1,018,390 pounds over 1902. In the process of manufacture the electric current has a pressure of about 100 volts, with 7500 amperes, and the current is kept on for thirty-six hours.

\*\*\*\*\*

FOR short electric power lines delivering a small amount of power at voltages of 40,000 or over, aluminum is preferred to copper wire, since it is found at these voltages a wire less than 1/2 inch diameter will discharge through the air, and this discharge may result in a considerable loss of energy. Consequently it is not advisable to use wire of less than 0.3 inch diameter no matter what the amount of energy or the distance is. Aluminum is preferable for the reason that at a definite size it is materially cheaper than copper. The action of salt sea fog is greater on aluminum wire than upon copper. Aluminum must be strung with reference to temperature at the time of erection, as its coefficient of expansion is about three times that of copper.

\*\*\*\*\*

ASSESSMENT work may be done on one of a number of contiguous claims in a group whether these several claims be all on one vein or on a number of veins, if the work so performed is manifestly for the benefit of all the claims of the group, \$100 worth being done for each of the claims of the group. The several claims must be contiguous, and not separated by other claims owned by other persons. The assessment work may even be done on ground entirely outside of the group of claims if on the public domain, such as running a crosscut tunnel to develop the several veins of the group. It is better, however, to do the work, if possible, within the boundary lines of the property, thus avoiding future possible complications.

\*\*\*\*\*

THE distance between levels in a mine is usually influenced by the conditions existing in the mine. In narrow veins of low dip—less than 40°—levels should not be more than 60 to 75 feet apart. In large veins of the same inclination a greater distance is permissible. In some mines levels are all established at 100 feet or over, because of the expense of drifting through hard rock at such short intervals. In good standing ground, where the vein is near the vertical, the levels may be made from 150 to 200 feet apart. If the ore passes are to be timbered, it has been found that timbers placed with their ends next the mill hole will wear longer than if their sides are exposed to the falling rock. Experience in each mine will soon demonstrate the proper distance to separate levels.

\*\*\*\*\*

THE relative merit of blowers and exhaust fans for mine ventilation is still a mooted question, some engineers favoring one system and others the other. The blowing fan sends a greater or less volume of fresh air from the surface into the mine workings, where it mingles with and dilutes the foul air present, which slowly passes out through the mine openings. The exhaust fan draws the foul air from the workings, and fresh air passes in from the surface through shafts or other openings, but on its way to the distant faces of the mine gathers up more or less foul gas, which is being constantly generated by decaying timber, or gas which results from the exhalations of the men. Carbonic acid gas also finds its way into the mine through crevices in the rocks. In some instances so strong is the inflow of this deadly gas that the work has had to be abandoned, as in at least one drift in the New Almaden mine, Santa Clara county, Cal. On the whole, the exhaust fan seems preferable to the blower, as it is calculated to withdraw the foul air, and fresh air may be expected to take its place. All old timbers should be removed to the surface as soon as taken down in repairing, and not thrown into some disused workings to rot and there create more foul gas. Decaying mine timbers generate a large amount of carbon dioxide, which is particularly noticeable in damp mines.

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THE advisability of changing the method of hoisting in a mine from cages to skips must be determined by the existing conditions. If there still remains a large amount of ore to be stoped and hoisted from levels already opened up, it may be advantageous to substitute skips for cages, and in new levels to be opened below the present lowest level it would be advisable to provide ore pockets beneath the stations to hold the waste and ore. At stations already established it may be considered too expensive to cut these pockets, usually at a cost of \$300 to \$500 for rock work, timbers, gates, labor, etc., together with a division of the pocket into two or more compartments. The cost will be determined by the hardness of the ground, its "good standing" quality or the reverse, and by the labor and repairs incident to blasting in a station already cut and timbered. Ore pockets can be cut at less cost when opening the station at the time of sinking than at any other time. The particular advantages of ore pockets and skips is in the bin

capacity afforded; the saving of time by dumping the car trammed from the stope to the station immediately upon its arrival. The saving of time in hoisting several skips in succession from any given level, the ore being taken from the accumulated supply, enabling the engineer to daily do all of his hoisting promptly between stated hours (except in very large mines where hoisting is constantly in progress day and night) and also in the fact that water as well as ore or waste may be hoisted by skips. In shafts sunk at any angle other than 90°, skips are undoubtedly preferable to cages. Where cages are used no expensive ore pockets are necessary. The cars go from the ore shoots in the stopes to the cage and are hoisted to the surface and trammed directly to the mill or wherever required. Materials may be handled somewhat more conveniently on cages, but there is a growing tendency to substitute skips for cages in large mining operations.

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THE water level in the Comstock mines of Virginia City, Nev., is an interesting problem. The great lode is drained by the Sutro tunnel to the 1750 level of the Savage mine, and this is approximately the level of all of the mines along the lode, those at Gold Hill being at a somewhat higher level at the collar of some of the shafts. The pumping operations at the Con. C. & C. shaft have lowered the water a few feet below the 2350 level of that shaft, and neighboring mines are drained to nearly that level, the "zone of saturation being approximately that of a concave oval," the outer rim of which grows higher with distance from the point of drainage. The lowering of water at any shaft along the lode to a point below this zone of saturation will create a second area of drainage similar to that now centering about the C. & C. shaft. Should pumping operations be undertaken at the Alta shaft, near Gold Hill, the result would be the formation of such a basin of drainage depressed to an extent dependent upon the lowest point of drainage. It is said to be the intention to drain the south end mines to the 3000-foot level. The best works on the Comstock mines are "The Comstock Lode," by John A. Church; "The Comstock Lode," by Clarence King, being a portion of the United States Geological Survey of the fortieth parallel; "Geology of the Comstock Lode," by Geo. F. Becker, Monograph No. III of the United States Geological Survey, Washington, D. C. (an abstract of this latter was published in the Second Annual Report of the Survey); "Comstock Mines and Miners," by Elliot Lord, Monograph No. IV of the United States Geological Survey, is a descriptive, historical and non-technical work on the lode. Probably the best work of the above with geological maps, etc., is Becker's report in Monograph No. III, to be obtained from the Director of the United States Geological Survey, Washington, D. C. Price \$11. It is difficult to purchase any of the above volumes at present from the Survey, as they are mostly out of print, but they may usually be found in any public library in the larger cities, and occasionally may be obtained in second-hand book stores.

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AMONG the mines of California that have been reopened after a long idleness and are again paying dividends are the Gwin mine, near Valley Spring, in Calaveras county. Formerly worked to a depth of 1540 feet, work suspended in 1882, owing to the capacity of the surface plant being overtaxed, and short-sighted "economy" of the management. Reopened in 1894, it is now down 1950 feet, with good paying ore in the lower levels. The Rawhide mine in Tuolumne county was successfully worked for years to a depth of several hundred feet. After a long idleness due to exhaustion of known ore bodies and no development work ahead, the mine was reopened in 1891 and has since been worked almost constantly and profitably to 1200 feet. The Soulsby mine in Tuolumne county produced \$6,000,000 but was shut down for years, cause unknown; now reopened and paying well. The Kennedy mine at Jackson was successfully worked to 750 feet from the surface in early days. After idleness of years it was reopened in 1885 and is now over 2600 feet deep. It has paid continuously since rediscovering the ore at 950 feet. The Oneida mine in Amador county was worked to a depth of 1000 feet. Remaining idle for years, it is now 2200 feet deep and said to be profitable. The Central Eureka mine, near Sutter Creek, Amador county (originally known as the Summit), was worked to a depth of 700 feet—ore lost. Reopening after many years of idleness, it has been paying dividends for several years and is now down over 2000 feet. The Bunker Hill, near Amador City, was idle for years, being worked down to 800 feet. It is now about 1500 feet deep, and is developing a large and valuable property, paying dividends. The Champion mine, near Nevada City, Nevada county, once pronounced "played out," is paying more largely than ever before. The Princeton mine, in Mariposa county, after twenty-five years of idleness is again a bullion producer and has been successfully working the past four years. It is down 1000 feet. The App-Heslep mine at Quartz, a producer in early days, was closed for years, but has been successfully working the past seven years. Several mines at Angels, Cal., have been successfully reopened after a long idleness. In this latter camp, the reasons for shutting down were various, but a change in existing conditions, improved milling processes and mining methods and in management has made producers out of idle mines. There are many other examples of similar conditions. The reopening of an old mine does not always meet with success, but the result can rarely be predicted. The only way to ascertain is by trial.



## The Mother Lode in Tuolumne County, California.\*

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

The largest operations at present being conducted on Whisky hill are those under the direction and ownership of the Harvard Gold Mining Co. The mines are near the south end of the ridge and  $\frac{1}{2}$  mile west of Jamestown. The dolomitic zone is wide in this property, and, as is usual elsewhere on the lode, contains several large lens-like sheets of quartz, carrying auriferous iron sulphides. The pay zone in this property has been chiefly developed, however, in the greenstone schists which form the hanging wall country of the great vein of dolomite and ankerite. The shafts are vertical and, although started in the hanging wall country at some distance from the outcrop of the main lode, which dips to the eastward at about 60°, they have passed through the intervening schists and the lode itself, passing into the serpentine foot wall. No pay shoots of more than nominal value have been developed in the main vein of this property, but in the greenstone schists silicified zones carrying auriferous pyrite and free gold have been found and extracted by the usual mining methods, and milled in the company's 60-stamp mill. The accompanying engraving shows the head frame of the South shaft, and the mill. The occurrence of pay rock in the hanging wall schists of this mine might have been anticipated, for at the surface these schists—soft and decomposed to yellowish brown slaty masses—had been honeycombed by the early-day miners, who are reported to have taken out a large amount of gold from this zone of schists. These pay zones are variable in size, the largest being 30 to 40 feet in width. There are some unusual and interesting intrusions of diabase dikes exposed in the workings of this mine. The hanging wall of the mineralized schists is barren, hard, greenstone schist. Crosscuts extended into this rock have failed to discover values in that direction.

The mill is run by two 75 H. P. electric motors, thirty stamps being connected with each motor. The mill is well equipped to do good work amalgamating and concentrating the class of ores found in that property.

The main lode extends several hundred feet to the southward from the Harvard mine, the usual characteristics being well developed and exposed by erosion and shallow mine excavations. No large developing has been done here, though some good ore is known to exist. The lode disappears beneath the surface just before reaching Woods creek, and is not again recognizable for a distance of  $\frac{1}{2}$  mile. In place of the large vein of ankerite or dolomite, with its prominent quartz lenses forming a ridge line of outcrop, only the usual varieties of amphibolite schist are seen, and the surface of the ground along the line which the vein would occupy if present, and its vicinity, is low and rolling, a physical condition characteristic of the more readily eroded schists. Upon the first reappearance of the lode proper, however, the ground rises once more in a ridge, and on this is situated the Dutch mine, one of the most extensively developed mines of the lode.

The Dutch mine at Quartz has the usual characteristics of the mother lode in this county. Its broad iron-stained croppings, with included white quartz veins, were prominent features of the landscape before they were cut down by grading and the outcrop covered with buildings. In grading for the surface works at this mine several thousand dollars were found in pockets of gold within a few inches of the surface. One of the peculiar characteristics of the lode in the Dutch mine is the formation of pay shoots which cross the vein diagonally from the foot to the hanging wall side. The principal development of this mine, unlike its neighbor, the Harvard, is in the ankerite vein and not in the hanging wall amphibolite schists. The ankerite zone in the Dutch mine is about 60 feet wide, and within it occur many veins and lenses of quartz carrying gold and auriferous pyrite, which is distributed erratically—some of the quartz lenses being richer than others in gold, and also containing a higher percentage of pyrite. The better pay shoots are found usually on or near the foot wall of the ankerite zone. The foot wall of the lode is chiefly amphibolite schist, although diabase, clay slate, gabbro, tufaceous slates and serpentine also occur. The hanging wall country is chiefly amphibolite schist, in which are found occasional silicified zones which in some instances are gold bearing. Since the formation of the lode there have been earth movements which have resulted in creating a number of reverse faults. None of these displacements are of great magnitude, but indicate the comparatively recent stresses to which the lode has been subjected.

The Dutch mine is illustrated in the engraving on the front page. A few hundred feet south from the Dutch mine is the eminence known as Quartz mountain, caused by the superior resistance to erosion of the harder quartz and vein material of the lode.

One of the engravings on the front page gives a good view of Quartz mountain, its peculiar topography being due to geological conditions, and this is characteristic of these occurrences in this county, though the hills usually occur as long ridges rather than as isolated peaks. Quartz mountain is not really an exception to this, however, as its main axis is several times longer than its width. On this hill are the mines of the App company at the north end and those of the Santa Ysabel company at the south end.

(TO BE CONTINUED.)

## Purple of Cassius Test for Cyanide Works.

Rapid and exact as is the colorimetric method for the determination of the gold in cyanide solutions, I thought that a quicker and simpler method might be desired and I therefore propose the following, which has so far given me satisfactory results, writes A. Prister in the Journal of the Chemical and Metallurgical Society of South Africa.

This method is based on the same principles as those in my colorimetric method, namely, precipitate the gold from a cyanide solution with zinc fume or dust, dissolve the excess of zinc with dilute sulphuric acid, dissolve the gold in aqua regia and add few drops of tin chloride. Compare the color obtained with a standard as described in my colorimetric method.

The cyanide solution to be tested must be strengthened by the addition of a few drops of a strong cyanide solution, say of 15% KCy, so that the solution to be assayed may contain 1% free KCy. To 200 cubic centimeters of the solution add about 1 gram of zinc dust. Heat the solution to boiling point. Filter off the cyanide solution. Add to the remaining zinc dust about 20 cubic centimeters of dilute (10%) sulphuric acid and dissolve all the zinc by gently warming. Filter off through the same filter the solution of zinc sulphate formed. Dissolve the residual metals in 10 cubic centimeters of aqua regia and pass while boiling repeatedly through the same filter and collect the gold solution in a test tube.

To the gold solution a few drops of stannous chloride are added, after the solution has been cooled by holding the test tube in water.

If the solution is rich on gold, the purple of Cassius coloration will appear directly; if it is poor, the color will require a few minutes to become evident. The aqua regia used can be made by mixing six parts of strong hydrochloric acid, two parts of strong nitric acid and six parts of distilled water.

## An Alum Deposit in Nevada.

About 10 miles north of Silver Peak, in Esmeralda county, Nev., is a deposit of alum and sulphur which has been many times located and prospected as a sulphur mine. Not until recently, however, has the relatively important amount of alum in it been recognized. During the last year the deposit was examined by J. E. Spurr of the United States Geological Survey, who has written an account of it which has been published in the Survey's bulletin (No. 225) entitled "Contributions to Economic Geology, 1903."

At the locality mentioned there is an elongated, neck-like mass of rhyolite which is decomposed in parts to a white, powdery variety. This is especially true of the two portions examined, which are about 600 feet apart, one about 200 feet in diameter, the other about 30 feet. The former, at the south end of the area under consideration, contains the chief alum and sulphur deposits. The latter contains sulphur, but no alum. In the larger area the decomposed rhyolite shows sulphur throughout, in all cracks and crevices, but never, so far as seen, in coatings over a fraction of an inch thick. Analysis of the alum by the chemist of the Survey shows it to be an ordinary potassium alum. It forms veins, some of them several inches thick, that split and ramify irregularly through the broken masses of altered rhyolite. There are also occasional gypsum seams, of the same habit as the alum, but much less abundant; also bright red spots thought to be cinnabar.

When exposed to the air the alum rapidly crumbles to a white powder, so that it is not conspicuous in the outcrop, and the real amount of it present is visible only when it has been taken out. The decomposed rhyolite within the productive area is so friable that the material could easily be worked on a large scale. The rhyolite itself in the alum locality has been found by analysis to contain a large percentage of alum. The whole deposit, therefore, would have to be worked, and the sulphur could be collected as a by-product.

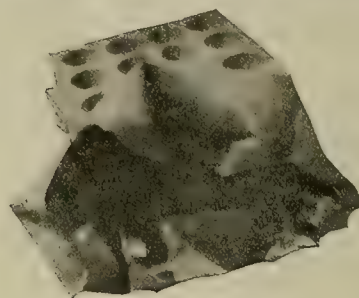
No more expeditious or economical method of prospecting could be adopted in the glacial drift-covered area of Leadville, Colo., district than that of sinking bore holes. It is now the intention to sink other shafts on Rock hill to explore extensively the strata known to exist beneath the glacial drift. The ore discovered in these explorations will give a decided impetus to prospecting in the entire region south of California gulch, south and southwest of Leadville, not already explored.

## Peculiar Explosion of a Powder Thawer.

Written for the MINING AND SCIENTIFIC PRESS by  
MATT. W. ALDERSON.

Once upon a time I was working in a crosscut in a mine all by myself. Knowing I would need powder for blasts at the noon hour I put two candle ends under my thawer, as I went to work in the morning, so that the powder would be warming while I was working. Half an hour after I had commenced drilling I was startled by an explosion. I knew there was no one but myself in the mine and it seemed almost impossible that the powder in my thawer should have exploded. I had remembered that I had seen that there was plenty of water in it but a few days before. Even if the water had all been out it didn't seem possible that the powder could have been raised to such a degree of heat as to cause an explosion in the short time the candles had been under it.

I was using a good thawer and keeping it in a crosscut about 200 feet away from where I was at work, so I walked out to see what was the matter. Some smoke was coming out of the crosscut and I postponed going in for awhile. When I went in I found the upper part of the thawer intact except a few holes in the bottom. I lifted the lid and the five sticks of dynamite the thawer contained were there hard and cold. The ground upon which the thawer had stood was all wet from the water which had run out of the thawer through holes made by the explosion. The lower part of the thawer was twisted out of shape, as shown by accompanying illustration, and



The Thawer After the Explosion.

it was evident that the explosion had taken place under the thawer. What could have caused it?

I was using No. 1 Hercules dynamite and the thawer had stood in one position for several months. I had noticed sometime previous that in the thawing of the powder the paraffine used in wrappers had run a little down one side of the thawer (which was slightly lower than the other) and that on the ground along the edge of the thawer on that side was a white coating of paraffine, perhaps a quarter of an inch thick in places. I had questioned if I wouldn't better wipe the thawer and move it to new ground, but I had not done so. It was evident that the force of the explosion had come from the side of the thawer where this paraffine deposit had formed. I was in the habit of using but one piece of candle at a time in warming the powder, as that would get it sufficiently warm by the time it would be needed. But this morning I had in my pocket a little piece about half an inch long and, setting a longer piece near the center, I had also used the shorter piece, setting it out near the edge, so that the heat from it would not affect the longer piece. The explosion had occurred about the time this short piece would have burned down, so the probabilities are that the paraffine—containing more or less nitro-glycerine—had been fired in some way from the blaze or heat of the wick from this candle end, thus causing the explosion.

Some years ago a prospector in Fergus county, Mont., carried the powder he needed to a prospect near the top of the Judith mountains in a can of warm water. After using the powder he emptied the water into a pail in which he tempered his picks. One day as his pick touched the surface of the water there was an explosion, from the effects of which he lost an eye.

A miner in Jefferson county, Mont., was in the habit of warming his powder by an open fire. When warmed he would carry it into the mine rolled in a piece of blanket. One day as he was warming the blanket before the fire preparatory to wrapping it around the powder the blanket exploded and one of his hands was ruined for life.

All these explosions belong to the same class and it is possible to explain some explosions elsewhere considered more or less mysterious. They emphasize the need of greater care in one particular. The Rundle thawer is an excellent one, especially for the prospector and small operator—where not to exceed twenty-four sticks will be needed at one time. I know of no other thawer where the powder can be warmed with so little "candle power." But in light of the experience given above, I think the sides should be wiped occasionally when it is warm and that one should keep a plate or pan under the thawer in which to set the candles. Then by no possibility could the flame reach the drippings.

\* See illustrations on front page.



## Observations on Tonopah and Goldfield.

Written for the MINING AND SCIENTIFIC PRESS by S. C. WIEL.

The mineral wealth of the hills throughout Nevada has been largely silver, contained in argentite, the sulphide, as on the Comstock and at Eureka. This has, with other evidences, given ground for calling the great basin a geological province, distinct in structure as well as topography from the regions east and west of it. The discovery of Tonopah, with its silver deposits, was only another instance confirming this. But the free gold deposits of Goldfield, 26 miles south of Tonopah, are a decided exception.

The physiography of the country about Goldfield appears as follows: At the eastern horizon lies a long mesa, rising gradually and near the middle of the view, giving place to a series of irregular hills. Next to these hills stands a group of jagged peaks closely resembling eroded volcanic pipes. These pipe-like hills slope down to a gulch and just above the gulch, on that slope, lie the mines. In the gulch itself lies the camp. Turning now to the west, the side of the camp gulch rises suddenly in a perpendicular scarp-like cliff, 200 feet or more high. Its sides

and Goldfield are simple. At the start the richest claims were divided usually into 100 feet lengths and leased. The lessees each sank a vertical shaft reaching sometimes 300 feet deep, but usually less, and crosscut to the vein if it was not itself vertical; then drifted and stoped. Many of the lessees became rich in this way, and although the leases expired long ago at Tonopah, they are now much in demand at Goldfield. The country rock being volcanic lava (at Tonopah E. J. Spurr says it is mostly andesite) is hard and compact, and stands almost everywhere without timbering. In the Valley View mine at Tonopah stulls have been put in the stopes from side to side of the empty spaces, and found sufficient for thousands of square feet of stopes. The shaft stations are usually timbered. Ventilation is usually supplied by small blowers; in the Mizpah mine they have put a large pipe down an old prospect shaft which then was filled in, leaving a horn on the surface, like a funnel for furnace draft on a steamer. The ore taken out in the drifts and stopes, and waste from the crosscuts, is loaded into buckets on trucks, which are then sent along rails to the shaft, where the cable is hooked to the bucket. A cross-head above the bucket keeps the bucket steady.

The shafts are vertical, usually two-compartment, though the New Mizpah is three-compartment. They

flat cars with unsacked ore from its dump by a self-acting tramway.

So far the scarcity of water has interfered with the milling on a large scale. But a new water plant is now being installed by the Rye Patch Water Co. It is expected that this will lower rates about one-half and permit the milling of gold ores running \$15 to \$20 a ton, which are found within 5 miles or so of camp and are at present commercially unavailable. The water is secured from wells arranged in series, with a central pump station, and is to be sent to camp through 16 miles of 1-foot diameter pipe. It will have a capacity of 2,000,000 gallons in twenty-four hours.

The largest mine, the Mizpah, owned by the Tonopah Mining Co., is opened by three connected shafts, all vertical. The main shaft—the Mizpah or Siebert shaft—is equipped with an extensive surface plant, having a steel gallows frame, and is wired for electric lights. It will hoist cages instead of buckets, as at the other mines, and has three compartments—the largest shaft at Tonopah. It is down 900 feet, but not yet in active use, as the railroad cannot yet handle the ore now on the dumps on the surface. The ore lies in defined veins in this mine, as in the others. Values are said to run as high as \$300 a ton, though the average is between \$60 and \$80.



Fault Scarp at Goldfield, Nev.



The Jumbo Mine at Goldfield, Nev.



McNamara Mine, Tonopah, Nev.



Tonopah Extension, Tonopah, Nev.

show exposed strata of lava; and at its top is a layer that causes the surface to continue westward in a mesa, dipping slightly in that direction to the foot of another scarp, like the first, rising out of it, and topped by another mesa. This is repeated westward to the hills at the horizon, so that in looking westward from the camp, it seems like a series of broad steps, entirely different from the pipes and jagged hills to the east. The general appearance of the mesas suggests a series of faults. This appearance is supported by the repeating in the scarps of the layers of lava exposed on the cliff that bounds the gulch. That the lava beds lie also under the gulch and that the gulch is merely the surface of another mesa abutting on the hills to the east is suggested by its form, like the long side of a distorted V, of which the west scarp is the abrupt short side, more of a V trough than a rounded out gulch; and, also, by the fact that water is struck in wells within 50 feet anywhere in the camp, indicating an impervious lava bed near the surface. The mines occur where this series of step-like mesas abut upon the pipe hills.

It is suggested that the scarp of each mesa represents a fault line, and that the mines occur in a faulted region, at the contact of this mesa field with the pipe field; that the mesas represent an extensive westward lava flow from these pipes, divided by step faulting.

The methods of mining employed both at Tonopah

are usually lagged all the way, and, though the mines carry no water, there is a 15 to 20-foot sump to facilitate sinking. At the surface the bucket is dumped by hand (not automatically) into cars and thrown upon mounds, one for waste and one for ore. By this time all the Tonopah mines of consequence have considerable ore on the dumps, waiting for the railroad to take it to the smelter.

The ore in Tonopah is usually argentite. Some of it is treated in a local mill, in charge of W. J. Douglas, manager of the Tonopah-Midway Mining Co. There are ten stamps in this mill, from which the ore passes to eight Huntington mills. Copper sulphate ( $\text{CuSO}_4$ ) and salt ( $\text{NaCl}$ ) are added in a heated solution. As the mill revolves, amalgamation takes place, and the amalgam is drawn off at the bottom, yielding between \$1000 and \$1500 a day. Power is supplied by a three-cylinder engine, run by direct combustion of crude oil mixed with compressed air, furnishing 80 H. P.

This mill is treating ore from the Valley View claim of the Tonopah Mining Co. It is not expected that the mill will handle all the ores of the district, since some of it carries manganese, which interferes with amalgamation, and some carries sulphurets, which would have to be roasted. At the McNamara they carry stephanite, an antimonial silver ore. The bulk of the ore is shipped to Salt Lake City smelters. During August the Tonopah Mining Co. was loading

There is no water in the mine, and very little timbering is required. The accompanying illustrations are of mines at Tonopah and Goldfield.

At the Midway mine, down 635 feet, they are under a 450-foot capping of greenish lava, known as the later andesite, which forms a blanket over the veins in most mines of the district. They have cut three veins underground, none of which cropped out on the surface, but were prospected for by sinking through the capping, having first chosen a place that seemed likely, calculating on the trend of the veins in neighboring ground, for most of the veins strike regularly east and west, dipping a little north. The capping above mentioned is absent in the Mizpah, having been removed by erosion, thus giving that mine more backs than most of the others at a corresponding depth. The values in most of the mines are not uniform. Bunches of rich ore are found here and there, which have been followed in short crosscuts or small stopes.

As the mines develop and extraction of the ore begins in earnest, the camp is likely to become a good-sized town, owing partly to the number of men likely to be employed, and partly to the fact that many districts opened near by, such as the Ray district and Goldfield, look to Tonopah at present as their headquarters. There is a plan on foot to move the county seat from Belmont to Tonopah, which, however, would be of doubtful advantage, as it would facilitate



suits at law, where now the distance of the court across a dreary desert forces most to settle their disputes out of court. One of the strong influences in building up a mining town—a smelter—is not likely to be realized, owing to existing conditions, and at present everything is being planned to ship to Salt Lake. At present the camp is an irregular gathering of wooden and adobe cabins, with tents here and there on the outskirts. Through the middle runs a broad street along which an occasional stone house of one or two stories will be found. The ground on which the camp is built is owned by the mining companies, held by possessory rights, none of the mines being yet patented, though the Tonopah Mining Co. is now proceeding to patent. Some of the companies have promised deeds to the men who have built on their claims—others refuse to make any such promise.

The camp is quiet now. The railroad is not sufficiently yet equipped to handle all the ore and the mines are doing very little work. Hundreds of cars loaded with supplies for camp are strung along the railroad, partly owing to lack of rolling stock, and much, at present, to delays caused by disastrous washouts. For weeks there have been thunderstorms almost every afternoon. On August 14 one of these was followed by a rush of water a foot deep down the main street. A visit to the mines next day showed that this cloudburst had practically no effect underground, but it washed out the fills on the railroad for miles.

### Milling of Auriferous Ores in New Zealand.\*

NUMBER III.—CONCLUDED.

Written by H. A. GORDON.

A strong solution is first used, and after it has been on for two or three hours the cock in the pipe at the bottom of vat is slightly opened and the filtrate run into the zinc precipitating boxes. Afterwards a weak solution is used, and finally wash water, after which the gangue in the vat is removed by sluicing it out, if water is available; if not, it is removed by manual labor in the ordinary manner. At the Kauri Freehold Co.'s plant at Opitonui there were two sets of vats one above the other; the pulp was first treated in the top vat and then emptied into the other one below. This mixes up the ore and makes it more amenable to percolation, especially if it is mixed with slimes.

At some of the mills the cyanide precipitation vats discharge at the center of the bottom. The bottom of the vats is slightly conical, with a circular door in the center, which is opened from the outside, and when water is available the gangue is sluiced out. The vats at the Waihi Co.'s mill at Waihi are circular, made of kauri timber and held together with round iron hoops fastened with screw buckles; but all the most recent vats are made of steel plates  $\frac{1}{2}$  inch and  $\frac{3}{8}$  inch thick, with angle iron bars to strengthen them.

The cyanide solution treatment extracts from 80% to 95% of the gold in the ore, and from 30% to 45% of the silver. If the ore were roasted and chloridized, the chloride of silver would be as amenable to extraction as the gold; but the value of the silver lost is much less than the extra cost of roasting the ore.

In pulverizing ores, especially with a stamp mill, there is always a large percentage of slimes. Some classes of ore produce more than others. If it is mixed with a clay substance the percentage of slimes will be very great. It might be found that in using a 40-mesh screen 40% of crushed ore would go through an 80-mesh and 10% would be sufficiently fine to go through a 300-mesh, or even finer. When the gold occurs in minute particles through the matrix the finer it is pulverized the better it is for cyanide treatment, as far as getting the bullion in a soluble condition; but when in an extremely fine state it lies so close and compact when saturated with either water or cyanide solution that it forms an impervious bed that does not allow filtration to take place.

If the ore is coarsely pulverized where the bullion is in minute particles through it, the silica surrounding these particles prevents the metallic contents being subjected to the action of the cyanide solutions. Hence the necessity of crushing fine. There are two difficulties to overcome—(1) to pulverize the ore so that the whole of its metallic contents is left free from silica or other matrix; (2) to get the slimy ore in such a condition that the whole of the bullion it contains is easily made soluble, and when in solution to extract the metallic substances. The latter has been the great difficulty the millman has in the past had to contend with. The slimy ore set so compact in the vats that it formed an impervious bed through which a powerful vacuum pump could not extract the solutions. Several devices were tried to get over this difficulty, and at present the most successful is by agitation and forcing the agitated pulp—which consists of one part of slimes to about two or even three parts of solution—by compressed air of about

sixty pounds to the square inch, or by force pumps, into filter presses and through the filter cloths with which these presses are provided. The liquor coming through these cloths is quite clear and is run into the zinc precipitation boxes. These filter presses were first introduced by a firm of engineers in Hamburg, who constructed a large plant for Hannan's Brown Hill Co. in Western Australia. Since then several plants have been erected, two of which are in New Zealand—one at the Waihi Co.'s Waikino mill and one at the Kauri Freehold Co.'s mill at Opitonui.

The agitators are circular vats of from 18 to 20 feet in diameter and from 5 to 8 feet in depth, having a shaft with arms revolving inside. At some of the mills where filter presses are not used, as, for instance, the Waitekauri Extended Co.'s mill at Maratoto, the crushed ore passes through a 40-mesh screen and over amalgamating tables into a spitkasten. The coarse sands from the lower portions of the pyramidal section go into the sand vats to be treated with cyanide solutions in the ordinary manner, while the overflow from the spitkasten is run in on one side of the slime-agitating vat and the clarified water out at the other. When there is a sufficient quantity of slimes in the vat the overflow from the spitkasten is run into another agitating vat, the slimes in the full one being allowed to settle, after which the water is drained off by a siphon hose until the slimes form about 50% of the bulk in the vat. The agitators are then set to work. They consist of a central revolving shaft fixed so that it can be lowered or raised as required. On this shaft there are two parallel arms which come within 4 inches of the inside perimeter of the vat. These arms are about 3 feet apart vertically, and have a series of holes bored about 6 inches apart horizontally, through which a piece of damaged wire rope  $2\frac{1}{2}$  inches in circumference is rove, the bottom ends frayed out so as to act like a broom on the bottom of the agitating vat. The lower arms when down come within 9 inches of the bottom. When the slime vat is full, and the necessary quantity of cyanide solution on, the agitators are started and agitation carried on for about three hours with a depth of about 3 feet 6 inches of pulp in the vat. The solution used up to this time contains 0.16% KCy; a further quantity is then pumped up from the strongest solution sump until the vat is filled to within 6 inches of the top. The agitation is then continued for about two hours, when the agitators are raised and the slimes allowed to settle. It may be stated that about fourteen pounds of lime to the ton of dry slimes is added on the starting of the agitators. This has not only the effect of neutralizing the free acid in the ore, but also assists in a more rapid settlement of the slimes. On the settlement of the slimes the cyanide liquor is drawn off by a hose siphon into the solution pipe leading to the zinc precipitating boxes. The writer is of opinion that this system has the defect of slightly muddy liquor being at times carried into the zinc extractors, and that the cyanide liquor ought to be drawn off from the agitating vat into a long settlement vat, the liquor being run in at one end and drawn off at the other, thus allowing a better settlement of the slimes. Several washes are required to get the cyanide solution out of the slimes, the whole of which are put through the zinc extractors. After drawing off the first solution additional lime is sometimes used to effect more rapid settlement in the different washes. The rate of flow through the extractors is regulated to about 440 gallons of solution to every cubic foot of zinc in the zinc precipitating boxes. The loss in cyanide by this process is said to be about three-fourth pound per ton of dry slimes.

Before commencing to clear up the precipitating boxes water is passed through them for some time to get the zinc free from most of the cyanide solution; the zinc slimes are then allowed to pass into the slime launder and run into the vacuum filter, which has a cloth fastened to the sides. The zinc is washed in a box with a false bottom on which rests a wire tray made of 30 mesh. This prevents any of the coarse particles of zinc being carried away with the slimes. The cleanup is commenced at the top compartment, and each compartment is cleaned out one after another until the bottom end is reached. There are generally twelve compartments, having a zinc tray in each of the precipitating boxes. The vacuum pump is kept going until the slimes are as clear of moisture as possible. The slimes are then removed and the cloth in the filter chamber burned.

The slimes are now put into an oxidizing furnace, care being taken not to heat it too quickly. The roasting process takes about three hours, the temperature never exceeding a dull heat. When the volatilization of the zinc is complete, which one can generally tell by the appearance of the slimes and by the absence of any fumes arising when stirred, the slimes are allowed to cool, and, if clean, will contain from 50% to 60% of bullion.

The slimes are now placed in a plumbago crucible and melted along with the necessary flux. To every five pounds of slimes is added about twenty-five pounds borax glass and eight pounds carbonate of soda. The heat is at first carried on at a low temperature and gradually raised until the whole contents are in a perfectly fluid state, the slag ladled off and the metallic contents poured into a bullion mould.

### An Arizona Coal Field.

The Deer Creek coal fields of Arizona was studied during the season of 1903 by M. R. Campbell of the United States Geological Survey. The results of his investigations are embodied in a paper contained in the Survey's recent bulletin (No. 225), "Contributions to Economic Geology, 1903." Although the quality of the Deer creek coal is inferior to that of coals of many other fields, it has particular economic importance, as the field is situated in a timberless and arid portion of the country, in the center of a great copper-producing territory which is comparatively rich also in deposits of gold and silver. The great mining centers of Bisbee, Globe, Clifton and Morenci are the hope of this region. The local value of this coal is, therefore, considerably beyond that which is indicated by its chemical analysis.

Mr. Campbell finds that there are two important beds of coal that extend throughout the larger part of this basin. These beds are thin, ranging probably from 24 to 30 inches in thickness, but this is within the limits of workable coal. The tonnage of the field, based upon an estimate of 24 inches of coal throughout a basin 3 by 10 miles in extent, is about 60,000,000 tons. Probably 50% of this may be available.

The coal is fairly well disposed for mining, except where it is subject to local disturbances and where it has been cut by igneous dikes. These disturbances are usually apparent at the surface and may be avoided in locating commercial mines.

The coal is of two qualities. The first is a hard, block coal, which is adapted to transportation and commercial use, and may also be manufactured into coke. The second grade is a soft, badly crushed coal, which carries a heavy percentage of ash. It is doubtful if it can be marketed for general purposes. It carries, however, a large percentage of volatile matter, and may be manufactured into gas and the gas piped to the place of consumption, or it may be used to generate electricity in the field and the power carried then by wire to the place where it is needed. The first plan seems the better one, as the modern methods of manufacturing producer or water gas permit the utilization of the entire fuel value of the coal, an economy that would be impossible if the coal were employed in generating electricity. This bulletin is published for gratuitous distribution.

### Electric Power for Colorado.

A company was organized some time ago for the purpose of furnishing cheap electric power to southwestern Colorado, says Electricity. The undertaking involves a rather novel engineering feat. Two or three rivers are to be diverted to canals, which will feed an immense reservoir. From this reservoir the water will be carried through another canal and dropped through great pipes over the edge of a precipice 1000 feet high. The power house in which the current will be generated will be situated at the foot of the precipice. Ultimately it will have a capacity of about 40,000 horse power.

The site of the power house is about 24 miles from Silverton.

The initial cost of the undertaking, it is claimed, will approximate \$1,000,000, while the ultimate plan will involve an expenditure of about \$3,000,000. When the project is completed it is expected to revolutionize things in southern Colorado. With an abundant supply of cheap power many enterprises can be carried through successfully which hitherto have been blocked by the high cost of power when obtained from steam. From the power house at the foot of the precipice current will be carried to the surrounding country. If the results come up to expectations a second power house will be established a few miles to the south.

The generators will be of the three-phase type and will operate at 300 revolutions per minute. The current will be transmitted at a pressure of 50,000 volts and will be transformed down at the towns and mining centers to whatever voltage is required.

Surveys have been completed for the rights of way for the transmission lines, which will reach all of the principal mining sections in the San Juan district. These lines will extend into San Juan, Ouray, Hinsdale, La Plata and Montezuma counties. In addition to mining purposes, the company expects to furnish current for lighting all the principal towns in the district, and also to the large smelter of the American Smelting & Refining Co. at Durango.

An unusual mining risk is reported to have been taken by a New York company which recently bought the sulphur deposits in the crater of the volcano Popocatepetl in Mexico. The great volcano, although at present quiescent, still gives abundant evidence that the internal fires are only slumbering and not by any means extinct, there being numerous vents from which pour scalding water, great volumes of steam and hot mud. The volcano may become active again at a moment's notice, when mining would cease indefinitely. It is said to be the intention of the new owners of the volcanic mountain to build a cog-railroad from a point on the lower slope of the mountain to the rim of the crater to handle the brimstone.

\*Abstract from Trans. Australasian Inst. Min. Engrs.



# Geology of the Treadwell Ore Deposits, Douglas Island, Alaska.\*

Written by ARTHUR C. SPENCER.

The object of the following paper is a description of the Treadwell gold deposits in their geological aspects, quite apart from any consideration of the economical methods of mining and milling which have been developed and successfully applied to the working of ores having an average value of little over \$2 per ton. The studies upon which it is based were made in the course of a general official survey of the Juneau gold belt during the summer of 1903, under

miles to the northwest, and Sitka about the same distance in a southwesterly direction.

The four mines of the Treadwell group are located near the inland shore of Douglas island. From the Ready Bullion mine (Fig. 1), which is the most southeasterly one, it is 3000 feet to the nearest workings of the Alaska-Mexican mine, and the intervening ground is supposed to be practically barren. The Mexican workings extend, however, almost to those of the Seven Hundred Foot property, and the latter connect at several levels with the tunnels of the Alaska Treadwell mine, showing an almost continuously developed ore body for a distance of about 3500 feet. Although the workings have revealed several separate ore bodies, and certain distinctions are made in this character and occurrence of the ores,

and Triassic strata, and Dawson regarded the slates occurring near Juneau as equivalent to the Triassic part of the series. Fossils discovered during the field season of 1903 now show that at least part of the stratified rocks of the Juneau region are of Paleozoic age.

The strike of the stratification, and of the most omnipresent secondary schistosity, and also the courses of nearly all intrusive contacts, vary between north 20° west and north 40° west. The prevailing dips are away from the sea, that is, toward the northeast, the inclination of the rocks varying, as a rule, from 20° to 70°, but with local instances of vertical or slightly overturned position.

The attitude of the formations occurring in this mainland portion of southeastern Alaska points to

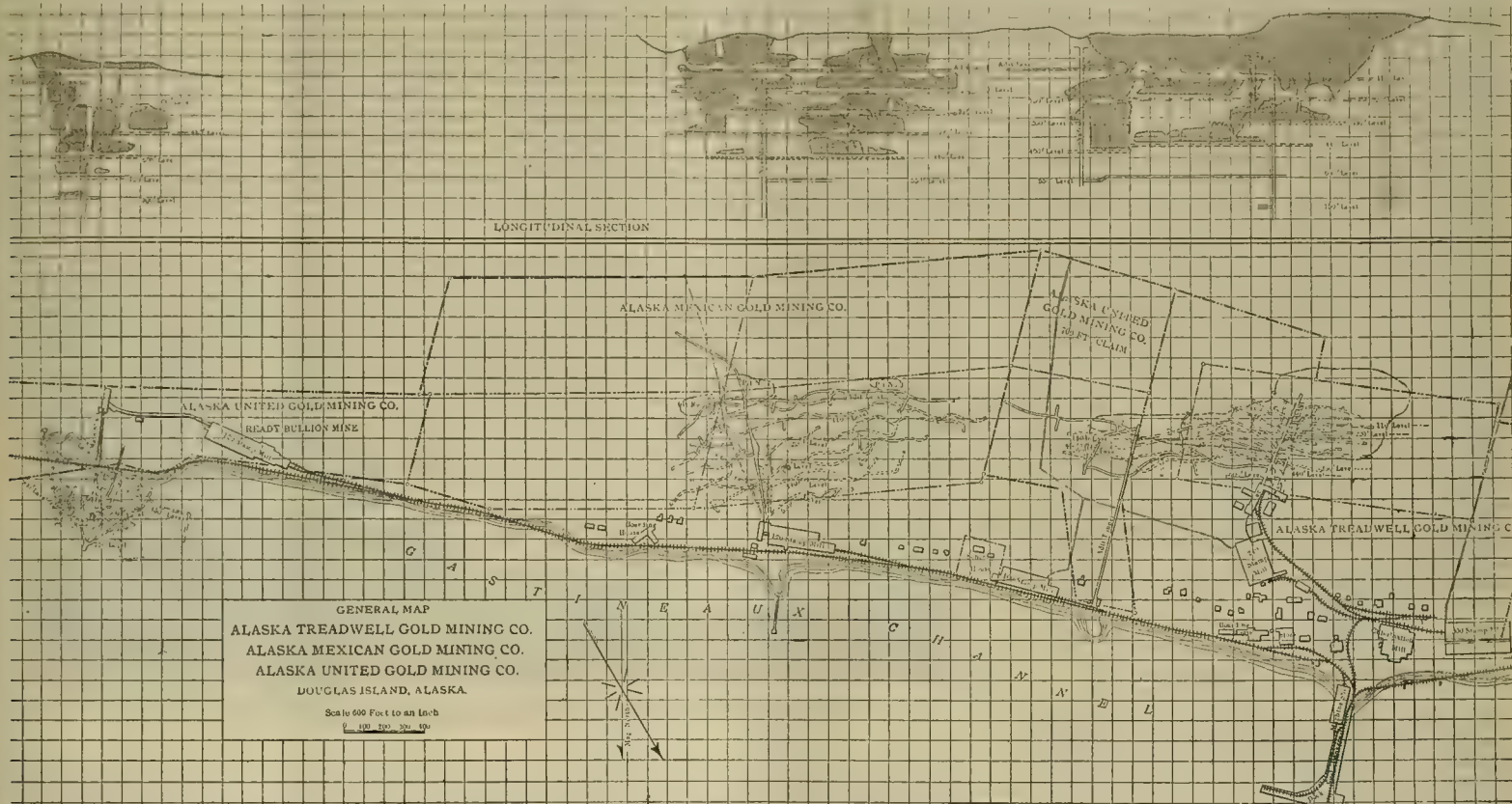


Fig. 1.



Fig. 2

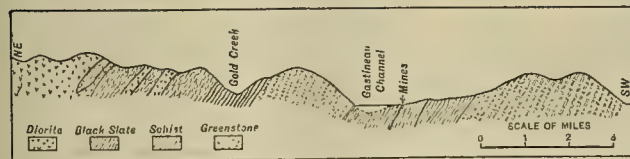


Fig. 4.—Geological Section Douglas Island and Mainland Near Juneau, Alaska.

the instructions of A. H. Brooks, geologist in charge of the division of Alaskan mineral resources, United States Geological Survey.

Douglas island, upon which these mines are situated, is one of the smaller islands of the Alexander archipelago, separated from the mainland of southeastern Alaska by a narrow fiord known as Gastineau channel. On the island two towns, Douglas and Treadwell, owe their 2000 inhabitants to the activity of the mining operations, while Juneau, with its somewhat greater population, lies on the adjacent mainland, about 2.5 miles northwest of Treadwell. The distance by steamer from Seattle, Wash., to Juneau slightly exceeds 900 miles, while Skagway, the terminus of the Yukon & White Pass Railroad, lies 95

the mines are all located on the same lead, and the ore material is practically of one nature and of identical origin throughout. As a whole, therefore, the deposits may be conveniently designated under the name of the first discovered and largest mine.

GEOLOGY OF THE REGION. — South-eastern Alaska, sometimes called the Panhandle, is the portion of the Territory lying between the Pacific ocean and British Columbia. It comprises the islands of the Alexander archipelago and a mainland strip about 30 miles wide. In this relatively narrow mountainous belt the geological formations are disposed in bands parallel with the general northwest trend of the mainland coast and the longer dimensions of the many islands which dot the archipelago. On the mainland three easily distinguishable groups of rocks can be traced from Windham bay on the south to Berners bay,

simple structure like monoclinical tilting, and though this would require a very thick succession of sedimentary rocks, no duplication of beds, either upon a small or grand scale, has yet been discovered to suggest the existence of a system of isoclinal folds or of a series of block faults, either of which would greatly reduce the apparent thickness.

The general character of the topography near

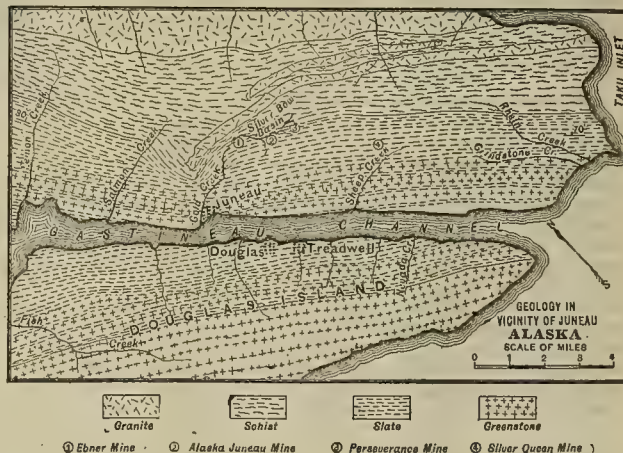


Fig. 3.

Juneau is shown in the sketch map, Fig. 2. The distribution of the formations in the same area is given in Fig. 3, while the cross-section (Fig. 4) drawn through Douglas island and the adjacent mainland illustrates the general structural relations of the formations.

The geology of the Juneau region and of southeastern Alaska as a whole resembles, in many ways, that of the gold belt of California. The rocks of both regions are in large part of identical character, and some of them correspond in age and in the nature of their metamorphism. There is also a marked similarity in the occurrence of the gold veins and in the general effects of mineralization, and some of the broader facts suggest that the dates of vein and ore deposition also correspond closely, though more

\* Abstract Am. Inst. Min. Engs.



extended and further detailed studies must be made before definite proof of this can be obtained.

**INTRUSIVE ROCKS OF THE COAST RANGE.**—The main mass of the mountainous belt from 50 to 80 miles wide, which separates the waters of the Pacific from the plateau region of British Columbia, is composed of coarse-grained intrusive rocks, which have been designated the Coast range granites by Dr. Dawson of the Canadian Geological Survey. In the Juneau belt true granite rarely occurs, and while the black and white granular rocks of the region often pass under this designation and are undoubtedly part of, or closely connected with, the intrusives of the whole Coast range, as a rule they are really diorites or related rocks, many of them being similar in composition and appearance to the diorites and granodiorites of the Sierra Nevada in California.

Within the diorite zone of the Coast range there are various minor bands of included metamorphic rocks similar to those which form its bounding formations, and there are also some basic dikes of later origin than the diorites.

Along the border of the main diorite there are found outlying arms, usually running parallel with the structure of the enclosing rocks, but sometimes slightly crosscutting. Occasionally, also, there are outlying stock-like intrusions which are not greatly lengthened in the direction of the general trend of the country. Some of these outside masses are connected with the main area by surface outcrops, while others are not visibly joined to the central mass.

Within an area of about 50 square miles adjacent to Juneau the diorites show several distinct though related types, and these range from rocks composed almost entirely of hornblende to mica diorite, quartz diorite and granodiorite. In the Coast range near Skagway true granites are found associated with the more common diorites.

The intrusive rocks in which the ore of the Treadwell mines occur is one of the extreme differentiation phases of the diorite. It has been described by Dr. Becker as sodium-syenite, or albite-diorite.

The areal relations of the main diorite and the outlying masses in the vicinity of Juneau are shown in the accompanying sketch map, Fig. 3. Each separate intrusion appears in the field to have a distinct mineralogical composition.

(TO BE CONTINUED.)

## New Carbon Compound.

At a recent meeting of the Academy of Sciences of France in Paris, H. Moissan presented a paper concerning the preparation and characteristics of a new carbon compound containing molybdenum. This compound is obtained by heating charcoal with melted molybdenum and aluminum in an electric furnace. The resultant metallic mass is treated with a concentrated solution of potash, and needles of well-defined crystals of the new carbon compound are obtained. The substance is very hard, is scarcely attacked by acids other than nitric, and is not decomposed by water or steam at a temperature below 600° C. It resembles the carburet of tungsten, already known, which is not surprising, as the metals tungsten and molybdenum are much alike. It is thought that this new compound may play a role in molybdenum steels. The method of preparation shows that even at a rather high temperature (that of boiling aluminum) a molybdenum compound is obtained which contains twice as much carbon as the compounds formed at the highest heat obtainable in the electric furnace.

THE general inclination of decisions in the courts is toward a vein or zone of mineralization, and yet large mines have been opened on bodies of "mineral" which were almost indistinguishable from the surrounding barren country rock. There is, however, a great difference between a miner being justified in spending his time and money in the development of a location and in being willing to do so, and the courts are generally satisfied to accept the substantial evidence of the locator's faith and judgment by the work performed. There are many examples of work having been done on mines which were commercially worthless at the time the work was done, but which subsequently became valuable by reason of material change in conditions, cheapening of transportation or rise in price of the mineral contained in the rock.

In 1903 the production of manganese ore in the United States was only 2825 tons, though 146,056 tons were imported. There is abundance of manganese in the Western States, but the low price which the ore brings in Eastern steel markets—less than \$9 per ton—renders the mining of Western ores unprofitable. There are large deposits of manganese known in Montana, Nevada, Utah and California, but these deposits are not at present available for commercial purposes. In Colorado, in the Lake Superior iron region, in Virginia, and a few other Eastern localities, there are large amounts of manganese iron ores mined, but the manganese is incidental.

ALTHOUGH cinnabar occurs in rocks of many kinds and of many geological ages, all of the large and important deposits throughout the world are found at or near the contact of sandstone and serpentine.

## The Desert Dry Lakes of California.

NUMBER VII.

Written for the MINING AND SCIENTIFIC PRESS by  
G. E. BAILEY, E. M.

Increased consumption and lower prices have been met by improvements in the processes, until to-day low-grade muds carrying only 7% of boric acid are found profitable. In speaking of the borax works of W. T. Bartlett at Daggett, San Bernardino county, Cal., Bulletin No. 24, in calling attention to the working of low-grade borax muds, says:

The Western Mineral Company's works are located a short distance west of Marion, on the flat. Their character is well shown in the accompanying engraving. The works consist of tanks for boiling the crude borates with sulphur and vats for evaporating the solutions and crystallizing the boric acid. W. T. Bartlett, the owner and manager, is one of the pioneers in this district in the manufacture of boric acid, and it is due to his ability and indomitable perseverance that the problems connected with the working of low-grade borax muds have been solved. The ore used at these works is a low-grade bluish-black, gray or red clayish mud, that looks something like a fine-grained shale or sandstone. It is evidently a portion of heavily-bedded deep-water deposits, carrying from 7% to 20% boric acid.

Since Bulletin No. 24 was written, the processes

what thirty years ago was an expensive luxury, is to-day so cheap that it is an ordinary household adjunct. What is procured at an outlay of so much physical discomfort and at so great a cost in money is one of our greatest labor-saving and health-preserving agents."—E. S. Marshall, in *The Traveller*.

"Borax finds many and varied uses. It is employed as a flux in welding metals and is an important ingredient in the enamel used on iron ware and in various glazes for china, in which its property of forming fusible salts with many metallic oxides is of great service. It is used also in dyeing and is of service in the manufacture of many drugs and chemicals. It is employed in soap making, while its varied domestic uses are well known. These uses are constantly extending, and there is no prospect that the demand will diminish in the future. \* \* \* \* \*

Commercial borax is a white crystalline substance or powder, with a sweetish taste, and of manifold uses. One of the chief employments is in welding and in other metallurgical operations, its office being to afford a convenient flux. It forms fusible salts with almost all metallic oxides. It is the basis of enamel so much applied to iron utensils, glazed brick and much china earthenware and tiling. It dissolves the glutinous matter from the raw silk and aids the dyer as a mordant. It is employed in the laundry with starch to give glossy linen. The meat packers use



A Pyramid of Salt Ready for Market, Alvarado Marshes, Alameda County, Cal.



Bartlett's Borax Works, on a Dry Lake South of Calico, San Bernardino County, Cal.

have been so far improved that muds carrying only 5% are sent to the vats. It was only a few years ago that only material running over 20% boric acid could be used profitably. This, by improved technology, has been reduced to 5% raw material. When the by-products are utilized, this percentage will again be lowered. It was only a few years ago that miners sneered at low-grade gold ores, and predicted that they would not be worked for "ages to come;" but the success of such mines as the Homestake of the Black Hills, Dakota, and the Treadwell of Alaska have made large bodies of low-grade gold ores the preferred choice of capitalists. A few years ago "rebellious ores" were condemned. To-day the cyanide process and improved concentrating and smelting have set the prospector hunting for this class. Those who think that the value of the dry lakes consists wholly in the richer crusts of borax or soda as worked at first, should study the history of the borax, brief as it is, and they should remember the progress in gold mining. A little study and a little reflection will convince the most skeptical that "history will again repeat itself," and in time every foot of the muds of the dry lakes will be worked to extract their rare, unique and valuable salines.

**USES OF BORAX.**—"It may be interesting while discussing the history of borax to note that over fifty classes of artisans use this salt in some of its forms in the industries which they follow. In this connection, also, it is worthy of remark that while almost the entire home product is consumed in this country, the price has decreased in an astonishing ratio, and thus,

over 1000 tons yearly as an antiseptic, while in soap it is very serviceable in hard waters. A large number of drugs contain it and its uses are many and annually increasing. \* \* \* \* \*

The packing industries are now using larger quantities of borax than ever; tanners have been induced to use it in softening the water for the soaks, cleansing and preserving the hides and skins and preventing the withdrawing of their gelatine, and the household use is largely increased."—Mineral Industries.

The following are some of the more common uses of borax: It is extensively used in assaying, in the metallurgy of ores and in the smelting of copper, and it is said to be an excellent insecticide, being especially obnoxious to cockroaches. Borax has the property of dissolving the metallic oxides, which makes it useful in soldering metals. It renders the surface to be joined clean, so that the solder "runs" and fills the joint between them. World-wide attention has been called to the use of borax in preserving meats, the first use being in 1878, when Smith Bros. sold 20,000 pounds of borax to Chicago consumers, to be used in preserving and canning beef. Its use during the wars in Cuba and the Philippines was so extensive as to lead to national investigations of its effect. Germany made a long series of tests, and the United States is now making an elaborate series of tests of the effect of borax upon the human system by actual experiment upon a number of young men. There is no question but that borax is a great preserver of meat and milk, and these tests show the intense interest taken in the subject and a full appre-



ciation of the value of such a preservative.

Boric acid is used in the manufacture of "strass," which is the base of artificial gems. It is used as a mordant in calico printing and in dyeing, and as a substitute for soap in dissolving gum out of silk. It is used in the manufacture of "Guignet green," a beautiful pigment used in calico printing which is really a borate of chromium. A varnish made by boiling one part of borax with five parts of shellac is used in stiffening hats. With caseine borax forms a substance which is used as a substitute for gum. A solution of borax in water may be mixed with linseed oil and used for cheap painting. The borate of manganese has been found to be a most excellent drier for paints, oils and varnishes and is coming into general use in the arts for that purpose. As manganese and borax are abundant and cheap in California, there seems to be no reason why it should not be extensively manufactured in that state.

The use of borax and various borates in chemistry would make a longer list than that of its use in medicine; and in metallurgy its use is large and steadily increasing. It will be noted that the use of borax is mainly in the household and in household articles. In fact, its range of usefulness is far wider and greater than that of salt. This fact alone, without taking into consideration its use in the arts and sciences, should be a warning to the effect that the demands of the future generations will be enormous—so enormous as to be difficult to realize now; and that it is the duty of those in authority to see that every step is taken necessary to conserve the natural supplies which are in the dry lakes of the desert on each side of the line that separates California and Nevada; and which are the only natural deposits in North America; and which are the main deposits of the civilized world.

(TO BE CONTINUED.)

## The Genesis of the Diamond.\*

Written by GARDNER F. WILLIAMS.

Chemically, the diamond is composed of the element carbon in its pure crystallized state. The diamond crystallizes in the isometric system, and the most common forms are the octahedron and dodecahedron, while the (24-sided) tetrakis-hexahedron is not uncommon. Cube diamonds with beveled edges representing the combination  $\infty 0 \infty$  and  $\infty 02$  are occasionally

found. It is not always possible to determine the source of each individual diamond, for similar stones are occasionally found in different mines; but these are exceptions to the rule. There is a difference in the luster, shape or crystalline form of the diamonds from the various mines that gives each mine some distinctive characteristic. In one mine nearly all the crystals are sharp-edged octahedrons, while in another dodecahedrons with rounded faces predominate. One might give no end of peculiarities of the diamonds from the various mines; but it will suffice for the purposes of this paper to state the fact that such distinctive characteristics do occur.

From this observation it may be concluded that the diamonds in the mines of the Kimberley district, which occupies a small area (see Fig. 1), did not have a common origin.

The diamond is the most impenetrable of all known substances, and will scratch any other stone, or the hardest steel. It is a very strong reflector of light, and refracts incident rays more than any other substance except crocoite.

While crocoite is the only mineral that exceeds the dispersive power of diamond to dissolve white light into rainbow tints, the powers of reflection, refraction and dispersion possessed by the diamond are unmatched. It is highly phosphorescent, and even the blackest diamond is transparent to the X-ray. It is insoluble in all acids, and can easily be burned and converted into carbon dioxide. However, it is noteworthy that the diamond is a non-conductor of electricity, while graphite and charcoal, substances so closely allied to it in chemical composition, are excellent electrical conductors. By the application of friction, the diamond can be positively electrified, but it very soon loses its electricity. The diamond is easily cleaved in planes parallel to the octahedral faces. Pieces may be easily broken from the facets of a cut stone by striking it with a hard substance.

So much, it may be claimed, is known about the physical properties of the diamond, but how the diamond has been formed or crystallized is a question still debated by scientists.

Upon the information at hand, it may be assumed that all diamonds found prior to the discovery of the Kimberley pipes, or craters, came from alluvial deposits, and had been washed down by the disintegration of the original matrix. Such was the character of the formation in which the noted diamonds of India were found, which is described as a layer of broken sandstone, quartz, jasper, flint and granite, interspersed with masses of calcareous conglomerate, the whole being about 20 feet thick and covered with a few feet of black "cotton soil." Here were the great mines of Gani-Coulour and Gani-Partaal, whence came the Koh-i-noor (793 carats), the Great Mogul (787.5 carats), the Regent (410 carats), and many other historical stones.

The Indian mines were noted more for the size and purity than for the quantity of the gems they produced. There had been no considerable production of diamonds outside of the Deccan fields until the discovery of diamonds in Brazil in the year 1728. Here in the province of Minas Geraes rich beds were opened in an alluvial deposit of clay, quartz pebbles and sand charged with iron oxide. In many places the diamond-bearing strata were buried under 30 feet or more of alluvial detritus. These deposits occurred along the rivers, up the ravines to the ridges and plateaus, where conglomerate beds were reached from which the deposits in the rivers had been washed. The conglomerate was chiefly itacolumite, a micaceous sandstone. The sandstone being a fragmental sedimentary rock was not the original matrix of the diamond. Probably, when the sandstone was being formed, the diamonds were washed down with the detritus, and became imbedded in it.

Diamonds have also been found in Borneo, New South Wales, British Guiana, in the gold deposits of the Ural mountains, Australia and California, along the Vaal river in South Africa, and in many other localities, but always in alluvial deposits.

Before the discovery of the mines at Jagersfontein and Kimberley, which occurred between August, 1870, and July, 1871, there is no record that diamonds had been discovered in volcanic pipes or craters—their occurrence had

or else, that a diamond-bearing dike penetrated the conglomerate strata, and its contents were mined and sent to the mill along with the gold ore. The finding of these diamonds, as above described, is well authenticated. The diamonds were of a greenish color. It is a well-known fact that a dike, carrying diamonds in small quantities, and situate only about 50 miles from Klerksdorp, was prospected a few years ago. This tends to bear out the dike theory.

Coming now to the occurrence of diamonds at Kimberley, I may preface my remarks by saying that my experience with the mines at Kimberley dates back nearly twenty years, seventeen of which have been passed in the management of them.

The diamonds occur in a rock commonly known as "blue ground," filling the craters of extinct volcanoes. This rock was described by Professor H. C. Lewis as a porphyritic volcanic peridotite of basaltic structure, which he named "Kimberlite." It must be designated as a breccia. There is no doubt that the blue ground is of volcanic origin, and was forced up from below; it consists of olivine with fragments of other rocks. I am of the opinion that the craters were filled by aqueous rather than igneous agencies, possibly something in the nature of mud volcanoes.

It is a noteworthy fact that all the craters were filled just even with the surface of the surrounding country. Would this have been the case if the pipes were of igneous origin? I think not.

It may be claimed that the surface of the country, as it existed when the craters were filled with the diamond-bearing breccia, was not the same as at present, but that has been denuded or washed away, or has been removed by glacial action. There is, however, not the least particle of evidence to bear out such a contention. If the country rock and diamond-bearing ground had become decomposed and then washed away, then diamonds would have been found in the "wash," or in ravines and water courses in the vicinity of the mines. Such is not the case; no diamonds have been found in alluvial soil nearer than the Vaal river, some 20 miles distant; and these diamonds are totally different in character than the "mine" stones.

The Vaal river diamonds did not have their origin in the Kimberley mines. The occurrence of well-rounded and, at times, polished boulders and small pieces of rock, is proof that other than igneous action was necessary to produce them.

Professor Bonney says that "the idea that they have been rounded by a sort of cup-and-ball game played by a volcano may be dismissed as practically impossible." He refers to the Dwyka conglomerate bed as a possible source of these boulders. A conglomerate bed exists in the Kimberley strata between the shale and the melaphyre (or olivine-diorite of Stelzner), and is between 300 and 400 feet below the surface. This conglomerate is from 3 to 10 feet thick, as determined in the various shafts in the Kimberley mines. The rounded stones in the mines did not come from this bed, and are wholly unlike the stones in the conglomerate. Personally, I do not favor the cup-and-ball theory, and would not give it a second thought were it not for the fact that the diamond-bearing ground as it is found in the mines shows such a mixture with the country rock that some process of nature must have stirred up and thoroughly mixed the contents of these great craters. I cannot comprehend how this result could have been brought about in an igneous volcano. There would have been overflows of the diamond-bearing rock which would have been found in the vicinity of the mines. No such deposits have been found, and I do not believe that they exist.

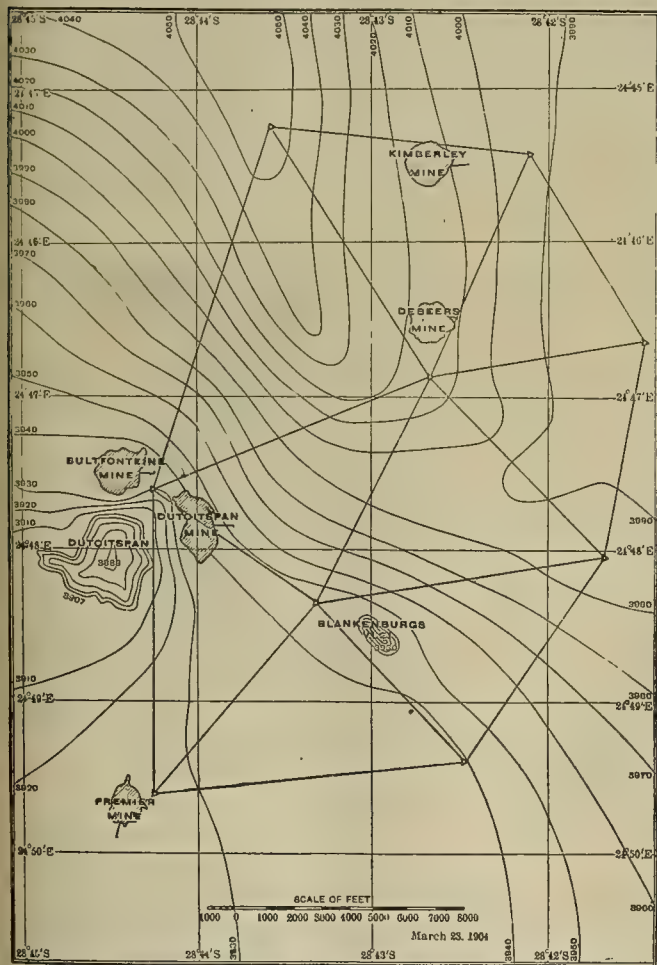
It is much easier to reconcile existing conditions to the aqueous or mud volcano theory (especially if the mud was accompanied by large quantities of gases which on nearing the surface escaped while the mud receded) than to an igneous theory.

There must have been innumerable eruptions and explosions to account for the inclusion of the surface shales and fragments of the country rock in the diamond-bearing peridotite. The frequent occurrence of these eruptions would, in a measure, solve the problem as to the manner in which the fragments of rocks varying in size from pebbles to boulders, some with polished surfaces, became, as it were, water worn.

The evidence of the movement of the diamond-bearing rock after solidifying is indicated by the slickensides and striated surfaces of the country rocks at their junctions or contacts with kimberlite. Large sheets of calcite are frequently found at the junction of these rocks, which have taken the form of the striae. Beautiful calcite crystals and transparent pieces of doubly refracting, or Iceland spar, are of frequent occurrence.

(TO BE CONTINUED.)

THERE is a growing tendency to equip mines with electricity, where the means of motive power can be cheaply applied. One of the most recent installations of this character is at the Wolverine copper mines in the Lake Superior region, where an electric plant has been installed at a cost of \$40,000. Its chief use will be in underground haulage.



Diamond Mines, Kimberly District, South Africa.

found in the Bultfontein and Premier (Wesseltown) mines at Kimberley, South Africa. The diamonds from various mines have distinctive forms of crystallization, or variations of the same forms, so characteristic that those familiar with South African diamond mines and their products can determine positively from which mine any given parcel of dia-

monds has been obtained.

A few years ago diamonds were found in the battery mortar of a mill at Klerksdorp in the Transvaal, which was crushing gold ore from a conglomerate reef, similar to the Witwatersrand reef. This remarkable occurrence of diamonds may be explained in two ways: Either that, during the formation of these conglomerate beds, the wash from a diamond-bearing pipe or dike was mixed with the detritus;

\*Trans. Am. Inst. Min. Eng.



## Crushing in Cyanide Solution as Carried on in the Black Hills, S. D.\*

NUMBER III.

Written by C. H. FULTON.

THE SEPARATION OF THE SANDS FROM THE SLIMES BY MEANS OF CONE CLASSIFIERS—This is now done in the district almost entirely by means of simple sheet iron cones. These cones are the outer cones of ordinary hydraulic classifiers, the inner cones having been removed. It may be stated at the outset that the problem of removing the sands from the slimes when crushing in cyanide solution with considerable lime is a more difficult problem than when crushing in water with practically no lime. The lime causes much trouble—first, by its coagulating effect on the slimes, causing them to settle with the sands and coat sand particles with slimes, and, second, by causing the formation of an excessive amount of froth or foam, which is certainly a great nuisance about the mill. Figs. 3 and 4 show the general arrangement of the classifying cones.

The batteries discharge their sludge by launder

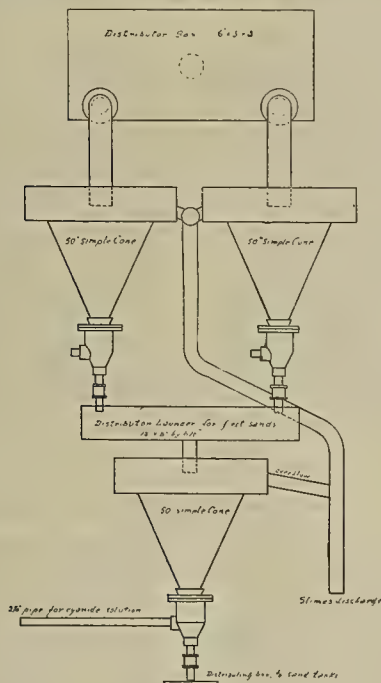


FIG. 3.

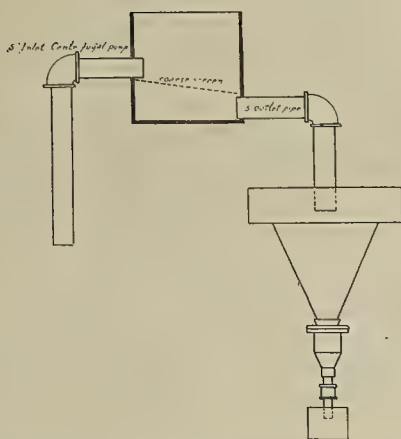


FIG. 4.

into a central sump, from which it is raised to the cones. The raising pump at three of the mills is a spiral sand pump, and at one of the mills a centrifugal pump. For the raising of the battery sludge, consisting of sands and slimes, the spiral pump is preferred to a centrifugal on account of less wear. For the transference of slimes, and for their agitation, a centrifugal pump is generally used. The usual size of the spiral sand pump employed is the 54 by 10 inches. These pumps are run at nineteen to twenty revolutions per minute, raising the pulp 15 to 20 feet. Twenty feet is about the practical maximum lift of these pumps, and for greater lifts they are placed tandem. A pump of the above size will readily handle from 350 to 450 tons of sludge per day.

The discharge of these sand pumps is intermittent, so that at all of the mills a distributor box is used to steady the flow and give a uniform feed to the cones. These distributing boxes have different forms at the various mills. At the Horseshoe mill a pyramidal box is used 4 by 4 feet in cross section at the top, the sides sloping at 60° to meet at a point. The inverted pyramid is topped by a box 12 inches high, through

which the two 4-inch pipes from the sand pumps enter. About 12 inches from the bottom of the pyramid four 3-inch pipes emerge, one at each side, which feed into four 50-inch cones. The distributor is placed centrally over the four cones, and as low as possible, so that the head under which the discharge takes place will be small. A screen placed in the distributor box serves to keep out foreign matter from the cones. At the Maitland mill a plate steel box 6 by 3 feet in cross section and 3 feet deep is used as a distributor. On one side, 21 inches from the top, two 5-inch pipes enter from the sand pumps and discharge upon an inclined screen. The two discharge pipes—5 inches in diameter—which feed the two 50-inch cones have their centers placed 4 inches above the bottom of the distributor box. As at the Horseshoe mill, the distributor is set as closely as possible to the cones. At the Dakota mill a similar box made of wood is used.

The upper cones are simple cones of sheet iron from 40 to 50 inches in diameter, having vertical sides at the top 12 inches high. The slope of the cones is 60°, ending in a 6-inch sorting column, which has a 2-inch discharge controlled by an iron cock. The charging pipe feeds at the center of the cone, just below the pulp level. In most of the mills the top cones are covered closely by either a wood or an iron cover to confine the foam. This has the disadvantage—not very serious—of preventing ready inspection of the cones.

The upper cones are practically simple settling cones. The sludge going to the cones contains from 14% to 19% of solids, of which 30% to 50% is slimes and the rest sands. Just what constitutes sands and slimes is somewhat difficult to define. It is generally accepted by the men in charge of the plants crushing siliceous ores that material finer than 150 mesh is a slime, and coarser than 150 mesh a sand, and classification is made largely on this basis. It has also been defined as that portion of the crushed ore that will make water muddy, sand, no matter how fine, settling practically at once, and not remaining suspended.

The overflow from the upper cones contains practically no sands, even very fine, and goes to the slimes tanks by the overflow launder. The sands discharged at the bottom of the cones contain from 20% to 35% of slimes and are distributed by a short box to the lower cones. These lower cones are of the same construction as the upper ones, but have introduced into the sorting column an upward current of cyanide solution, either battery solution or barren solution (solution that has been precipitated), but generally battery solution. This solution is introduced through a 2-inch pipe, with a cock to regulate the flow. The amount of solution introduced in this way amounts to from 60 to 80 tons per twenty-four hours for a 42 to 50-inch cone. These figures vary somewhat, those given representing the limits. The number of lower cones is always one-half that of the upper cones. The solution pipes entering the sorting column of the lower cones do not come directly from the stock tanks, but from a special box provided with an overflow at a definite height, so that the head of the entering solution is always constant.

The final sand discharge, containing 25% to 30% of solids and from 1% to 5% of slimes, goes to the Butters distributors over the sand vats, battery solution being added in the carrying launder so as to have five parts of solution to one part of sand. The mills endeavor to make a fairly close separation of sands from slimes in order to get a good leaching rate in the sand tanks, usually from 2.5 to 3.5 inches per hour, although at one plant it is but 1.5 to 1.75 inch per hour, and also to prevent trouble which the sands give in the slimes tanks, that of settling to the bottom and remaining there during the greater part of the treatment practically unacted upon.

(TO BE CONTINUED.)

## THE PROSPECTOR.

It is not the purpose of this column to give the assay value of samples sent for examination, nor to give analysis of ores or rocks of any kind, but simply to indicate in a general way the character of minerals and rocks, and to give such other information to prospectors and others as may be of practical value to them.

The rock specimens from Tombstone, Ariz., have been classified as: 1. Fragmental rock composed of grains of quartz, cemented by reddish mud, presumably of volcanic origin. 2. Altered limestone, in which has been developed much diopside. 3. Felsite, greenish in color, due to the presence of iron mineral of some description, presumably silicate. A small amount of very fine pyrite is also present.

THE Mount Lyell Mining & Railway Co. intends to try to treat some of the siliceous ores of the Lyell district by magnetic separation, says the Australasian. A series of experiments had been conducted by the owners of a magnetic separator, with a view to finding if it was possible to get the copper pyrites away from the gangue. No progress was made until

it was discovered that by subjecting the ore to a slight roast it became converted into magnetic pyrites. Continuous experiments were then carried on, and recoveries of over 90% were achieved. The problem is an exceedingly nice one, for the ore will have to be crushed fine, and it will have to be prevented from packing in the hopper, from which it is fed wet to the magnets. If the 100-ton plant does its work efficiently the destiny of the Mount Lyell field may be changed. The company intend to try the separator first on the South Tharsis and Royal Tharsis mines.

The rock samples from Table Rock, Sierra county, Cal., are identified as follows: No. 1, quartz coated in the seams with talc, iron sulphide (pyrite) in cubes; No. 2, decomposed vein material containing much iron oxide (limonite) with scales of secondary white silvery mica. It may contain gold; No. 3, a ferruginous dike rock much altered—iron oxide is hematite. May contain gold; No. 4, an ore (largely limonite and quartz), a few scales of mica similar to that in No. 2 present green patches of talc. The brown crystals are limonite from alteration of pyrite, probably gold bearing; No. 5, serpentine; No. 6, quartz rock containing much limonite, evidently from a vein; No. 7, a dolomitic mineral with some quartz and scales of mariposite. No. 6 is probably altered from a rock like No. 7. This rock is characteristic of some portions of the Mother Lode in California, notably in Mariposa and Tuolumne counties; No. 8, also a dolomitic rock, similar to No. 7, but containing no mariposite; No. 9, a quartzose talc schist, containing oxidized pyrite; may be gold bearing; No. 10 is very similar to No. 2; No. 11, quartz with iron oxide (limonite) and pyrite; may contain gold; No. 12, quartz with green scales of mariposite; also contains pyrite and gray copper, the latter in small crystals; No. 13 is the same as Nos. 6 and 7, containing both the unaltered and altered mineral; No. 14, quartz with considerable disseminated pyrite; No. 15, quartz with mariposite and pyrite; No. 16, an altered eruptive rock, probably greenstone; No. 17 is apparently also an altered dike rock. As these rocks are from the gold belt of California, it is probable that all may contain gold, and some of them look like payable rock.

The rocks from Matehula, San Luis Potosi, Mexico, are classed as follows: No. 1, a metamorphic rock consisting largely of garnet, silica, and calcium carbonate, apparently an altered limestone; No. 2, granite, with also some plagioclase feldspar; No. 3 same as No. 2, but somewhat fresher and contains a small amount of chalcopryite (copper-iron sulphide); No. 4, also the result of contact metamorphism, consists principally of garnet, and carries both iron and copper sulphides in small amount; No. 5, garnet, with a little quartz and about 3% or 4% copper in the form of chalcopryite; No. 6 is a metamorphic, schistose rock produced by crushing and shearing of the country rock (possibly the granite). It contains finely disseminated iron and copper sulphides.

The mineral samples from Stag, San Bernardino county, Cal., are calcium carbonate, and have the appearance of having been precipitated from calcareous springs.

The rock specimen from Mariposa county, Cal., is a much altered dike rock and belongs to the greenstones, though now stained brown by iron oxide. Rock of this kind is frequently found in the neighborhood of pocket mines in Mariposa county.

In securing assays and analysis on ores and minerals, where the presence of the rarer metals and minerals are suspected, great care should be taken to verify the report of these rare substances. For instance: An ordinary appearing ore apparently carrying pyrite and a little blackened iron sulphate, with quartz, but which is reported to contain "Black oxide of iron, arsenical iron, manganese, nickel, cobalt, bismuth, sulphur, magnetic iron, carbon, phosphorus, silica, lime, titanium, and other substances," may be looked upon with some suspicion, for it is more than possible that there has been a mistake made by some one, either by confusing with another sample or in the chemical determinations.

The rock samples from Mancos, Colo., are volcanic tuffs firmly consolidated.

The rock specimen from Liscum, Ariz., is pegmatite, a variety of granite. The constituents prominently visible are pink orthoclase, vitreous quartz, purple fluorite and small scales of white mica.

The rock specimens from A. E. R., Marysville, Mont., are: Norite, a rock composed largely of basic plagioclase and a rhombic pyroxene (in this instance hypersthene). This rock is not of wide occurrence, but is found at a number of localities in the United States.

The rocks from Olinghouse, Nev., are largely garnet, with quartz and iron oxide. A small amount of sulphide of iron is seen in the oxidized iron ore.

The rocks from Upper Cow creek, Shasta county, Cal., are various kinds of andesite, dacite, etc., tuff and other volcanic rocks.

\*Bulletin No. 7, South Dakota School of Mines.

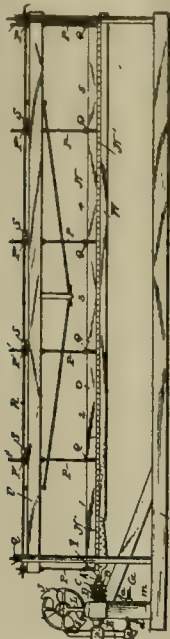


# Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 27, 1904.

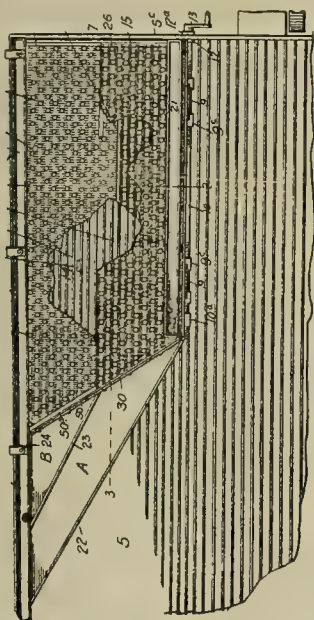
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE WASHING OR CONCENTRATING MACHINE.—No. 771,107; E. A. Wall, Salt Lake City, Utah.



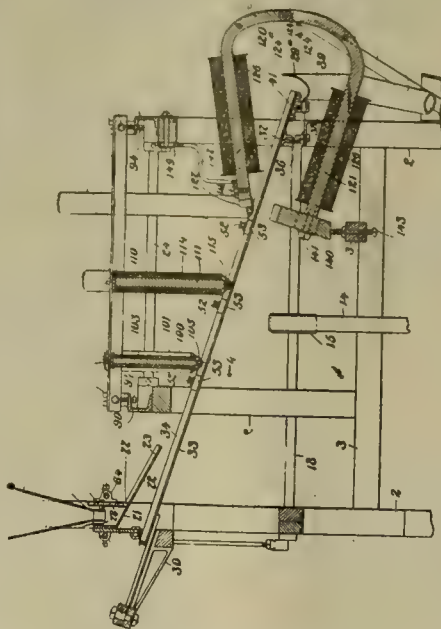
Ore concentrating machine or table adapted to receive actuating impulse from head end, in combination with operating rod or bar attached to head of table, buffer bar through which rod passes, spring on rod at inner side of buffer bar and buffer block secured to rod at outer side of buffer bar or timber to receive and resist impact of spring and suddenly stop forward movement of table at head end as it moves in direction of tail, and means for retracting operating rod against spring and suddenly releasing it.

CLASSIFYING OR SIZING APPARATUS.—No. 770,877; A. T. Winkler, Denver, Colo.



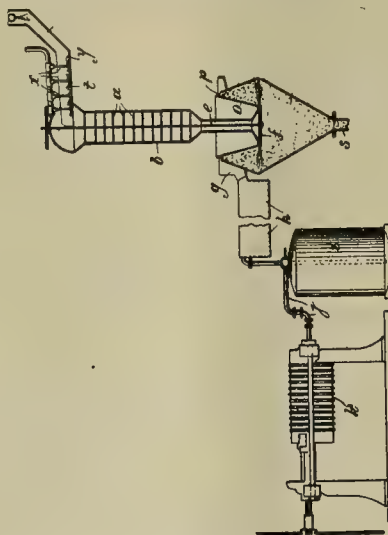
Combination with transversely inclined concentrating table of lineoleum-covered rifled plate, transversely inclined toward and hinged at upper edge of table, adjoining longitudinal screens secured to frame on plate, space between them and plate being divided into two compartments open at one end, suitable means for regulating discharge from compartments, screen located above and covering one of screens and part of adjoining one, projections extending above surface of screens, feed trough located above uppermost screen, means on concentrating table for directing various grades of ore, discharged onto it, toward upper edge of table, water trough located at upper edge of table and provided with discharge apertures and corresponding gates, and suitable means for varying inclination of rifled plate in relation to table.

APPARATUS FOR SEPARATING ORE.—No. 770,796; H. F. Campbell, Boston, Mass.



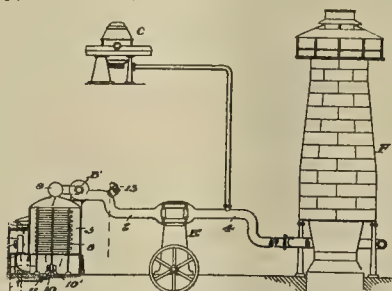
In a magnetic separator, a magnet; means, presenting unobstructed surface at due distance below magnet, for supporting and conveying material under and past magnet and through uninterrupted field of such magnet, and to pass it, spread in film of uniform thickness on surface beneath magnet, and means for causing particles of ore to be mechanically agitated under magnet in direction other than that of travel of ore.

SEPARATION OF MINERAL SUBSTANCES BY MEANS OF THE SELECTIVE ACTION OF OIL.—No. 771,075; C. Kendall, Upper Norwood, England.



Process for treatment of finely divided material for separation of graphitic substance contained therein from associated rocky matter or gangue, consisting in mixing material with water, bringing material intimately into contact or thoroughly mixing it with suitable pure thin oil, as kerosene or paraffine oil, projecting at considerable velocity mixture so produced under surface of volume composed of material, water and oil, allowing oil and graphitic substance adhering thereto to pass upward to surface, and drawing off from surface oil and graphitic substance on arrival at surface.

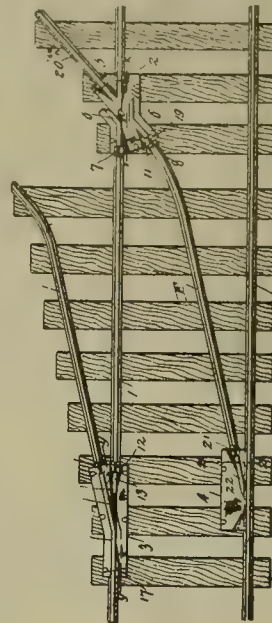
METHOD OF EXTRACTING MOISTURE FROM AIR FOR BLAST FURNACES OR CONVERTERS.—No. 771,058; J. Gayley, New York, N. Y.



Method of feeding air blast to blast furnaces or converters, consisting in feeding air into refrigerating chamber, forcibly distributing it therein in cur-

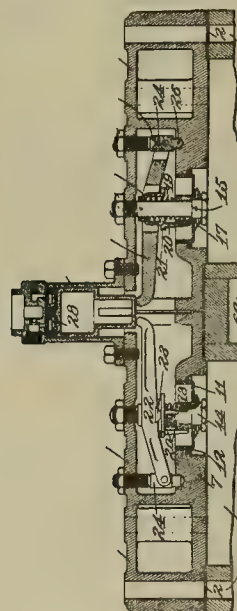
rent directed successively in varying directions, and cooling it artificially to reduce its moisture to small percentage, feeding dried air to blowing engine by initial pressure of relatively small degree sufficient to overcome in whole or in part friction of air current in apparatus, increasing its pressure at blowing engine to degree above that to which it was initially subjected and feeding dried air therefrom under compression from time it leaves blowing engine until it enters furnace or converter.

MINE TRACK SYSTEM.—No. 770,882; J. Whitehead, Farmington, Ill.



In mine track system, combination of rail, switch plate located intermediate ends of such rail and provided with slotted portions, short rail section integral with switch plate and abutting with one end of main rail, integral rail section formed upon switch plate having straight portion and converging portion, and switch plate between its integral rail portions having beveled or tapered upper face in manner and for purposes specified.

PRESSURE CONTROL FOR AIR COMPRESSORS.—No. 770,785; E. H. Steedman, St. Louis, Mo.



In air compressor combination with cylinders of duplex single-acting air compressor, of separate hollow cylinder heads arranged thereon, suction chamber in each of heads, suction chambers communicating with each other between two heads, suction chamber in walls of cylinders also in communication with suction chambers in heads, suction valve in each suction chamber, which valve is introduced from cylinder side into inner wall of cylinder head, and common means for stopping operation of suction valves.

PROCESS OF MANUFACTURING ARTIFICIAL STONE FROM MAGNESITE.—No. 771,062; C. Groyen, Bonn, Germany.

Process of manufacturing artificial stones from magnesite and hydrochloric acid which consists in mixing magnesite in any form or condition with strong concentrated hydrochloric acid, neutralizing resultant mixture with magnesite and ammonia and incorporating suitable fillers with mixture.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

G. D. Roberts, Director of the U. S. Mint, reports production of gold and silver in the United States for the calendar year 1903, for the principal States and Territories:

State.	Gold Value.	Silver, Commercial Value.
Alaska.....	\$ 8,614,700	\$ 77,554
Arizona.....	4,357,600	1,829,034
California.....	16,104,500	503,010
Colorado.....	22,540,100	7,014,078
Idaho.....	1,570,400	3,513,996
Montana.....	4,441,900	6,888,842
Nevada.....	3,388,500	2,027,070
New Mexico.....	244,600	97,558
Oregon.....	1,029,200	62,720
South Carolina.....	100,700	162
South Dakota.....	6,826,700	119,448
Texas.....	245,376	245,376
Utah.....	3,691,400	6,046,272
Washington.....	279,900	159,030
Wyoming.....	3,600	108
Totals.....	\$73,193,300	\$28,565,258

The total number of fine ounces gold produced in the United States for the calendar year 1903 was 54,300,000. The value of silver is computed at 54 cents per fine ounce. The total output of gold shows a decrease of \$6,400,000, and of silver a decline of 1,200,000 ounces from the figures of the previous year. The falling off in both metals is almost entirely due, according to the Director's report, to labor troubles in Colorado. The most important gain by any State was about \$500,000 in gold by Nevada.—The following table, included in the report, shows the world's production of gold and silver for the calendar year 1903:

	Gold Value.	Silver, Commercial Value.
United States.....	\$73,193,300	\$28,565,258
Mexico.....	10,677,500	38,070,000
Canada.....	15,839,500	1,700,800
Africa.....	67,998,100	185,300
Australia.....	89,201,100	5,228,700
EUROPE—		
Russia.....	24,632,200	82,000
Austria-Hungary.....	2,451,100	877,000
Germany.....	70,500	3,144,100
Norway.....	2,700	2,700
Italy.....	25,700	435,400
Spain.....	5,400	2,209,100
Greece.....	.....	573,300
Turkey.....	30,700	247,800
France.....	.....	403,600
Great Britain.....	77,300	79,000
SOUTH AMERICA—		
Bolivia.....	1,000	4,834,600
Chile.....	66,900	1,402,600
Colombia.....	2,724,400	609,500
Ecuador.....	274,400	.....
Brazil.....	274,200	.....
British Guiana.....	375,900	.....
French Guiana.....	2,101,500	.....
Peru.....	693,200	943,200
Central America.....	1,012,432	234,000
ASIA—		
Japan.....	2,002,700	292,900
China.....	7,324,700	.....
Corea.....	3,000,000	.....
British India (British).....	11,428,900	.....
East Indies (British).....	1,170,200	.....
East Indies (Dutch).....	501,500	66,200
Totals.....	\$320,048,900	\$88,291,558

The total number of ounces of gold is given as 170,443,670. These figures show a gain over the output of 1902 of \$29,637,600 in gold and 9,109,331 ounces in silver. The commercial value of the silver output is \$6,572,400 greater than in 1902 at the average price of 54 cents per ounce, compared with 53 cents in the previous year. The most important gains in gold were \$28,974,400 in Africa and \$7,631,300 in Australia, and the most serious loss was in the United States. The most important change in silver produced was in Mexico, which reports an increase of 10,323,308 fine ounces. Australia shows a gain of 1,656,928 ounces silver.

## ALASKA.

The Alaska-Mexican G. M. Co., at Treadwell, J. MacDonald superintendent, reports for month of August: 120-stamp mill ran 30½ days, crushed 19,693 tons of ore; value of bullion, \$27,861; saved 479 tons sulphurets of estimated value \$32,155; working expenses for month, \$30,112.—Alaska-United G. M. Co. for August: Ready Bullion claim—120-stamp mill ran 30½ days, crushing 20,210 tons ore; value of bullion, \$15,714; saved 360 tons sulphurets of estimated value of \$9856; working expenses for month, \$26,617.

The annual report of the Alaska Treadwell M. Co., operating at Treadwell on Douglas island, for the fiscal year ended June 1, 1904, shows the 240-stamp mill ran (with both steam and water power) total of 341 days 22 hours, crushing 370,648 tons of ore. The 300-stamp mill (using water power only) ran 244 days, crushing 404,502 tons of ore. Total tonnage crushed by 540 stamps, 775,150 tons. Total of 939,137 tons of ore were broken in the mine and 74,575 tons sent to mills. The ore reserves are estimated at 4,017,289 tons. Ore sent to mill included 26.2% from stopes on 440-foot level, 43.7% from pits and underhand stopes above 110-foot level. An average of 37.5 machine drills were operated daily in the mine—18.5 on stoping, 9 on development, 7 in pits and 3

in cutting out. Per 10-hour shift each drill averaged 33.55 feet of holes and 1.02 tons of ore were broken for each foot drilled. Development and exploration work done during the year was:

	Feet.
Drifts.....	2,733
Raises.....	4,051
Intermediate drifts.....	1,281
Shafts.....	759
Crosscuts.....	415
Shaft sinking.....	183
Total.....	9,372

Connection has been made by main east drift on the 750-foot level with bottom of the Alaska United shaft. The mills produced \$892,888 in bullion, or \$1.152 per ton of ore crushed, and \$936,620, or \$1.208 per ton, in bullion from concentrates. Costs were divided as follows:

	Per Ton.	Total.
Mining.....	\$0.9724	\$753,720
Milling.....	0.1583	122,658
Sulphurets.....	0.1461	113,236
General expense, Douglas island.....	0.0231	17,914
San Francisco office.....	.....	6,908
London office.....	.....	1,253
Paris office.....	.....	230
Consulting engineer.....	.....	1,183
Bullion charges.....	.....	8,214
Taxes.....	.....	2,880
New construction and repairs.....	.....	36,389
Total.....	.....	\$1,064,585

Skilled labor was scarce during the year. Machine men, underground, received \$2.50 per day with board and lodging, and same work in the pits pays \$3.50 per day with board and lodging. The foundry produced 482,627 pounds iron castings and 5652 pounds brass castings.

## ARIZONA.

### Cochise County.

At Paradise there are five companies operating mines. The Chiricahua D. Co. has a crosscut tunnel in 770 feet, cutting the ledge at a depth of 280 feet from the surface. A vertical three-compartment shaft has been sunk 300 feet. On the west side of the mountain, 15,000 feet from the main shaft, they are sinking a two-compartment shaft. The surface plant contains a double-drum steam hoist of 2000 feet capacity, a 20-drill compressor, two 150 H. P. boilers, pumps, etc. J. H. Knowles is manager.—The Duluth & Chiricahua D. Co., composed of M. & B. Pattison, T. Bardon and G. H. Crosby of Duluth, Minn., has bought the Sullivan group of seven claims, near Paradise, and has begun development work.—The Rieder group of ten claims, 1 mile east of the Sullivan group, is being developed by U. Rieder, owner, who reports opening up quartzite carrying iron and copper sulphides.—The Davis group of seventeen claims has been bonded to the Cochise Con. Co., H. Alexander president and H. H. Douglas consulting engineer, both of New York City. The company has twenty men at work on development and will increase the number to forty-five.

### Gila County.

At Globe the Old Dominion management last week blew in the first furnace of the new plant. Work done during the week included grading for the bullion dump and for additional tracks, the construction of the storage bins on the old smelter site, the shifting of the standard tracks and the laying of tracks for the hauling of bullion and slag, completion of the platform and skids for the lining of the converter shells, and completing the pipe connections. The machinery in the power house has been tested. The locomotive for hauling slag and the electric motor to deliver the ore from the bins to the furnaces are in operation.

### Graham County.

The Santa Rosa C. Co. holdings have been bought by the Detroit C. M. Co. at Clifton.

### Yavapai County.

(Special Correspondence).—The Mt. Union Con. M. Co., which recently acquired the properties of the Mt. Union and Arizona-Michigan mining companies, is erecting a mill on its properties in the Hasayampa district, 15 miles south of Prescott. The plant will comprise two 60 H. P. boilers, 50 H. P. engine, two Huntington mills, four concentrating tables, Gates rock breaker, etc. Two hoisting plants are already in operation on the property. Prescott, Oct. 4.

The Palace G. & C. Co. has men at work on its Tip Top group, south of Prescott, near the Maricopa county line. The camp was formerly a silver producer, but gold values are now being taken out. A tunnel is being driven on the Carbonate Queen.

H. L. Hall, manager of the United Miners G. & C. Co., has bought the Buster group near Prescott and has put men on the mine and mill overhauling equipment.

The George A. Treadwell Co. is putting in a hoist at the Hackberry mine at Mayer. As soon as the smelter is completed they will put on additional men.—T. B. Bassett of Prescott, consulting engineer of the Yavapai G. M. Co., whose

mines are on the Agua Fria river, near Mayer, says the company will equip same with steam hoist.

Work has been resumed at the Crowned King mill at Crown King, in the Bradshaw mountains.

F. C. Smith, superintendent of the Socorro mine, near Martinez, says he will reopen the mine and increase developments. The mine will not be operated until sufficient development work has been done to insure a supply of ore. Fifteen men have been put to work.

## CALIFORNIA.

### Amador County.

At the Wildman mine, near Sutter Creek, there are thirty men employed, there being seventeen at the Wildman shaft, five at the Mahoney and eight at the Lincoln. At the Wildman shaft a 55-foot derrick is being put up for handling timbers. It will be run by water power. Timber, consisting of logs, lagging and lumber, is being put away for use this winter. At the Lincoln shaft the water is down below the 1700-foot level. Where there are no crosscuts or drifts to be drained, the shaft is emptied at the rate of 60 feet per day. Superintendent Ross expects to have the shaft clear this week. Work on the drift to be run from the Lincoln shaft to the Wildman will begin about October 10th.

A larger hoist will be put in at the Zella mine, near Jackson, and will enable the shaft to be sunk to 3000 feet, says Manager Detert.

At the Zeila mine, near Jackson, repairs to the shaft have been completed. A station is being cut at the 1450-foot level. Sinking will carry the shaft 300 feet deeper, providing for opening up of three more levels. It is hoped to be able to run one-half the stamps during that time. Manager Detert says an electric pump will be put in.

The Red Hill quartz mine near Butte City, near Jackson, has been bought by W. E. Stewart for \$5000, for the Jose Gulch M. Co. The mill will be started as soon as water can be secured in the Horn ditch by the early rains. This ditch will be cleaned out. It has been idle for several years.

### Calaveras County.

The Sultana mine (formerly the Fritz & Bovee) at Angels is closed down.

At San Andreas the San Andreas Blue Gravel M. Co. has been incorporated by W. M. Nuner, Jr., J. A. Stewart, F. J. Juchter, H. W. and B. E. Miller to operate on gold-bearing gravel channels being opened up on the Whitlock estate. There is a shaft sunk into the channel and a hoisting and pumping plant will be put in.

It is reported the Big Trees M. Co. of Stockton, owning mines on the Stanislaus river, above Murphys, proposes to build a smelting plant at Murphys. G. J. Thompson is secretary.

At West Point, the Lone Star mine, idle for the past year, has again started up and has fifteen men working, with two machine drills in the shaft. The mine is being worked by the Farmington G. M. Co., under management of M. D. Newell.

The Fred Greve property has been opened up and a ledge uncovered. A hoist is being put up, also engine and boiler.—The Burns mine, worked by Superintendent Hitchcock, is running full blast. They are sinking on the vein.

The Black Oak G. M. Co., operating near Angels, will develop and operate the Maltman mine at Angels. J. J. Meyers of San Francisco is president of the Black Oak Co., and R. E. Walsh, on whose property the Black Oak mine is situated, is superintendent and manager. An 8-foot ledge of ore showing free gold and sulphurets has been struck. A crosscut is being run west from shaft.

Work has been resumed in the Prince mine at Altaville, near Angels, now under lease to the Altaville G. M. Co.

### El Dorado County.

The owners of the Rio Vista copper mine, near Fair Play, report development of the vein satisfactory. They have ore 13 feet vein, with payable copper values. They have been sinking a shaft from a tunnel which is to connect with a lower tunnel. They are cutting out timber from the wagon grade to connect with the railroad—3 miles away—at Cole's. J. H. Bradley is interested.

### Kern County.

Bakersfield reports say extensive deposits of bicarbonate of soda, 86% pure, have been found in Lake Carissa, 13 miles from Olig, on the McKittrick branch line of the Southern Pacific R. R., and a San Francisco company has made application to the Kern County Board of Trade for a five-acre site at Bakersfield for a refinery.

### Mariposa County.

The Mt. Gaines mine, near Hornitos, has been sold to Los Angeles men, who will resume development and operation of

the property. The shaft is sunk to 300 feet, and at the 300-foot level ore was being taken out when the mine closed down four years ago. A 10-stamp mill was on the mine, power being supplied by a 180 H. P. electric motor. The Consolidated M. & P. Co. of Los Angeles, of which W. T. Carter is secretary and treasurer, has bought the Mt. Gaines. Pumping out the mine will start this week. About a year ago the stamp mill burned down.

### Nevada County.

The Esperance Drift M. Co. has been reorganized at Nevada City to open a gravel mine near French Corral, on San Juan ridge. F. Searls is president, E. T. R. Powell vice-president and D. E. Morgan secretary.

After several months of idleness the Mountain Maid mine, near Nevada City, is being reopened by Manager Pusheck. The pumps are unwatering the mine. A ditch 8 miles in length will bring water power to the mine. R. Riley has been appointed superintendent of the Mountain Maid.

The New York-Grass Valley G. M. Co. has bought 120 acres of mineral lands adjoining the 600 acres which they already own. The land has veins of ore. The company will put in ten stamps additional to handle its surplus ore. G. W. Root is manager.

Operations will be started near Graniteville, near Nevada City, by J. McKelvey. There are ten claims, known as the Southern Fork mines, on the south fork of Poorman's creek, ¼ mile from Graniteville. They were worked several years ago. Men have been put on and supplies taken to the camp.

The Pittsburg mine, near Town Talk, near Nevada City, has been bonded to E. O. Ord and Eastern men. The company proposes to put in an air compressor and power drills. No. 6 level will be extended north and south. The seventh, eighth and ninth levels will be extended. The two-compartment shaft will be put in running order. The 10-stamp mill will be remodeled. The main shaft is down 1000 feet on the incline.

As a result of six days' run at the Orleans mill of ten stamps, near Nevada City, Superintendent Brockington reports producing a gold bar valued at \$3000. The ore came from the Houston Hill north, some of it averaging \$75 per ton.

The Drummond mine near Canada Hill, near Nevada City, has been bonded to B. Graves, P. Heintz et al. They are arranging to put in a 3-stamp mill, and later enlarge to twenty stamps. The mine shows a ledge 5 feet wide assaying \$20. The Blake, Grave & McDonald claim is on same section. The Gold King mine, owned by J. Beach & Sons, is also showing payable ore. G. Payne has a 5-stamp mill, and Bell & Thomas have a 10-stamp mill running in that section.

### Shasta County.

Redding reports say next week fifty men will be at work on the Clipper mine near Kennet, which has been idle. J. M. Barron is principal owner of the Clipper group of mines. The 10-stamp mill that is on the property will be replaced by a modern 40-stamp mill.

### Siskiyou County.

A. H. Denny of Etna has bought the Herr ranch, on the Oregon road, between Yreka and Ager, and will open the coal mine there. Work will be resumed in the spring, as heavier pumping machinery is keeping out water. When work was suspended coal was being taken out.—The Mount Vernon M. Co., between Greenhorn and Cherry creeks, near Yreka, has the framework up for the quartz mill and machinery is being put in the same. The mill will be run by electricity. The sawmill, run by electric power, is supplying lumber for building and mining operations.—Manager Bryant, who bought the Crocker quartz mine at Deadwood, is putting up a quartz mill. It will be in running order before winter sets in.

### Tuolumne County.

R. P. Sibley of Los Angeles has a lease, with option to buy, for \$15,000 the Reward, Madison and April quartz claims in Basin district, southeast of Confidence.

The Jumper Syndicate at Stent, M. B. Kerr manager, will enlarge developments at the mine. The shaft will be sunk and exploration done. At present the ore is low grade.—L. F. Triplett has bought the C. L. Woodside interests in the Springfield Tunneling Co. placers, known as the Woodside gravel mine, consisting of 100 acres near Springfield, near Columbia.

At the Confidence mine, at Confidence, the mine will be run throughout the winter. Stoping is in progress between the 500 and 600 levels, south of the shaft. The cyanide plant has put through 17,000 tons, and will continue working until the heavy rains come, as the rain clogs



the tailings and prevents their being worked. The tailings are run into a basin below the mill, dried in the sun and mixed by two cultivators, which are drawn by two horses each. The tailings contain finely divided gold and about 90% is recovered. The mill of twenty stamps is in steady operation, says Superintendent H. Carmichael.

The Black Oak mill, near Soulsbyville, has been closed and the mine partially so on account of the shut-off of the water power. About thirty men will be kept at work, some of them sinking and others making repairs and improvements. The hoist and compressor will be run by steam, generated by crude oil burners.

At the Longfellow mine at Groveland the big hoist is ready for operation, having a capacity of 2000 feet. The stamp mill is said to be doing good work. It crushes five tons per stamp per day, says Superintendent Partington.

#### Yuba County.

Development work will be resumed near Rackerby in the mines on the Pauline farm, says Superintendent Webb. He will put men to work sinking a shaft on the lode.

### COLORADO.

#### Clear Creek County.

Near Idaho Springs, the Honest John Co. reports improvements being made on Chicago creek. Manager Puchert says the tunnel is in 780 feet and will go to the 1000-foot point. A blower for providing the workings with air has been put in. The company is also putting up several buildings, including a power house. The Honest John tunnel is being driven 8x8 feet in the clear, double tracks, and between the tracks a water box. The compressor plant is in operation. The Honest John Co. owns eighty-six lode claims on the line of its tunnel.

J. J. O'Neill, H. Leonard and P. Kennedy of Denver, owners of the Mammoth group in Brown gulch, near Silver Plume, are resuming operations. The tunnels will be cleaned out.

After being closed down for two months, the Terrible mine, near Silver Plume, has resumed operations. The mill will not be started up at present, it being intended to unwater and retimber the shaft below the tunnel level and put the lower workings in shape for further development. A pump has been set up, a hoisting engine being already in place.

The Mendota mill, near Georgetown, is shipping from forty to fifty tons of lead concentrates per month, and from 125 to 130 tons of zinc concentrates. About 400 tons of pyrite have been stacked up, from which shipments have started. There are four sets of lessees on the Mendota. The Sunburst mine is shipping ore to the Golden smelter. A large body of low-grade material has been opened up. Beside this low-grade ore is a body of smelting ore from which shipments are made.

Silver Plume reports say the recent reduction in the smelting and freight charges on low-grade ores has added 50% to the tonnage from that end of the county. About forty tons are shipped daily from the Pelican and Doris dumps, and Manager Eaton expects to double it.

Operations have been started on the Liberty Bell group of claims sold to B. J. Martelon, et al. who have organized the Silver Leaf M. Co. Manager Martelon will drive a tunnel at a point opposite the Terrible mine and about 600 feet above the creek. The Liberty Bell group is near the World's Fair mine, the Mary Etta group, of the Silver Plume M. & T. Co., and the Aldrich group in East Argentine district, near Silver Plume.

At Idaho Springs, the Central tunnel of the Big Five Co. last week passed the 4000-foot mark. The tramway to the Hudson mill is nearing completion, by which the mineral from the Shafter vein will be trammed direct from the tunnel to the mill, and thus avoid wagon haul.

C. I. Burt says he will resume operations on the Vulcan property, near Silver Plume. It is intended to drive a crosscut from the Pay Rock lode on the Silver Bank tunnel level to cut the Vulcan, which will thus be opened at 300 feet deeper.

#### Fremont County.

The Union mill at Florence, owned by the United States R. & R. Co., resumed operations last week, including the sampler, the chlorinating and roasting departments. The full capacity of the mill is 450 tons per day, but starts at 350 tons, with 180 men. Agreements have been made whereby ore will be received from the Golden Cycle, Theresa, Stratton's Independence and from the sampling works at Cripple Creek.

#### Gilpin County.

Eastern and Denver parties are interested in the operations of the Kathryn property, and are developing their group of claims in Pleasant valley by a tunnel from North Clear creek. They will put

in an electric plant and compressor. E. H. Roberts of Black Hawk is in charge.

About thirty men are at work at the East Notaway mining property in Lake and Russell districts, near Russell Gulch, all of whom are working on the leasing system, under the Town Topics G. M. Co. Milling and smelting ores are being shipped. Connections are being made between the 420 and 555 foot levels by raise and winze. The main shaft is down 603 feet, and Manager Josephi intends to sink at least 400 feet deeper. T. Martin is superintendent.

Idaho Springs stockholders in the Lucania tunnel have formed the Quartz Hill M. Co. which is operating a group of claims on Quartz hill at Russell Gulch. Development work has been increased and a new shaft sunk. Ore is being taken out, the milling product having been treated at the Alpine and Newton mills in Idaho Springs. The group will in time be cut by the Lucania tunnel at a depth of 2000 feet and worked through the tunnel.

The Pittsburg mine of the Cashier G. M. & R. Co., in Lake district, near Central City, is shipping first and second class smelting ores. The first-class ores run \$200 per ton, while the second-class ores range from \$50 to \$80 per ton. There is also a large tonnage of milling ores on hand for shipment to the concentrator. The company will put in a hoisting engine of 60 H. P. capacity, and expects to sink the main shaft, of 600 feet in depth, a farther 200 feet. Several lessees are working the ground above the fifth level and are taking out ores of smelting grade.

Colorado and Milwaukee, Wis., men have a lease and bond on the Modoc mine, on the "Patch" on Quartz hill, in Nevada district, near Central City. The main shaft is down 180 feet and it is intended to sink to the level of the La Crosse tunnel. A hoisting plant is being put up for temporary arrangement and will hoist ore for testing, after which the operators will install a larger hoisting plant and increase the top buildings. F. Soper is in charge as superintendent for the Union M. & E. Co.

The Black Hills & Denver G. M. Co. has added to its holdings in Boulder Park section, near Rollinsville, which now consist of 500 acres. Their Park tunnel is in 375 feet, and the B. & D. tunnel, on the south side of the park, is in 250 feet. Work on those tunnels is being increased. The water ditch from Jenny creek to the Park tunnel has been completed and the company will finish the power house and put in an air compressor and machine drills. It is also intended to erect a concentrating plant of 100 tons capacity and to furnish power to neighboring enterprises. The ores on the Park tunnel group are of sulphides. Molybdenum has been found in the Park tunnel and a shipment of that mineral will be made to Denver for treatment. S. H. Blakeslee is president and M. H. French manager, with J. Smith superintendent.

#### Gunnison County.

At the Golden Islet mine in Jones gulch in the gold belt, near Pitkin, owned by the Golden Islet M. & M. Co., ore is opened up for 100 feet, the vein being 3 feet wide and running \$10 per ton. The 10-stamp mill will be ready to start next week. The Gold Cross group in Box Canyon mining district, owned by G. Brant, is being worked. The shaft is sinking and shows a vein 7 feet wide with average value of \$20 per ton in gold. A steam hoist will be placed.

#### Hinsdale County.

(Special Correspondence).—For several months past L. Kafka has been leasing on the Hidden Treasure mine. He has spent several thousand dollars in retimbering and putting the mine in shape for operating. Some changes have been made in the mill and two more concentrators are being added. P. C. McCarthy, superintendent, says there are \$2,000,000 of ore in sight in the mine. The incline shaft is 1000 feet deep. They are working on the third and sixth levels. The aerial tramway from the mine to the mill is 3660 feet long. The mine is 1000 feet higher than the mill. This property is on Henson creek about 3 miles from Lake City. There are about fifty men working on the Hidden Treasure and forty more could be used.

Lake City, Oct. 2.

(Special Correspondence).—The Max mine is understood to have been sold for \$60,000 and the new owners will start work this month. Lessees are doing work on the Pride of America and shipping ore.

The Hannah M. & M. Co., which has been closed down, will start up again.

Capitol City, Oct. 2.

(Special Correspondence).—W. F. Smith, manager of the Bon-Homme M. Co., in Burrows Park, states they have a tunnel 1700 feet long and 1000 feet of drifting on the vein. The ore is sulphide carrying gold, silver, copper and lead

values. He is making a raise of 700 feet to connect with the old workings. Winter supplies are being hauled in. The new road from Silverton to Animas Forks is within 3 miles of the property. Ore will be packed over Cinnamon pass to Animas Forks, which will save a 24-mile haul to Lake City. Work is being done in the mine with air drills. It is the intention of the company to put in a mill as soon as certain legal controversies are disposed of. Manager Smith also states considerable prospecting is being done in the Park.

White Cross, Oct. 2.

The Handles Peak G. M. & M. Co. has been incorporated to operate in Hinsdale county. The directors of the company, which will have headquarters in Denver, are F. H. Sprague, S. T. McDermith, R. R. Bollinger, W. J. Robinson, F. A. Ellis, J. E. Young and W. C. Burrows.

#### Lake County.

Manager T. S. Schlessinger is carrying on development of his properties at Leadville through the Bon Air shaft with satisfactory results and is taking out fair-grade ore. The raise which he started from the drift in the Wood fraction has extended beyond the line of fraction and into the P. O. S. ground, where another body of mineral has been opened. The ore is yellow ochre carrying values in silver.

#### Summit County.

J. S. Morton of Columbus, Ohio, interested in the Mountain Pride and Deep Shaft mines, near Breckenridge, says he will resume operations. On account of shortage of water the Gold Pan placer pit has been shut down for the season.

Breckenridge reports say the Morning Star group on Mount Baldy is being developed under a lease by Zerbe, Condon et al. In former years the property was a producer of auriferous hematite. The mine is said to be frozen as deep as it has ever been worked—one shaft was 160 feet deep when work was discontinued. The present operators are driving a tunnel from the east slope of the ridge, near the Enterprise shaft. They had to do considerable timbering until they reached the frozen ground, which "stands" well without timbering. The frozen ground being difficult to drill, Superintendent Zerbe says he will put in a modified coal drill.

The Colorado & Wyoming Dev. Co., operating a group of lode claims on Mineral hill, near Breckenridge, is loading cars at the Gold Pan spur of the Colorado & Southern railroad with zinc-lead ore from the 11-foot vein opened from the Orthodox level, with a crosscut tunnel. The company has a contract to supply the zinc works at Canyon City with 3000 tons of its zinc ore by December 20. As the lead and silver ores which the mine produces lie parallel to one another in the same vein, the company expects to mine both metals at a profit. The Colorado & Wyoming Dev. Co. is owned in Breckenridge.

The Michigan mine on Sheep mountain, near Kokomo, has started work again. The mine is under lease to G. T. McDonald and is worked by a tunnel.

#### Teller County.

The Vindicator mine at Cripple Creek has 100 men employed on company account, exclusive of lessees. The company is shipping out fifty tons of ore per day that give average value of \$50 in gold per ton. The ore is being mined principally between the fifth and tenth levels.

H. H. Barbee of Colorado Springs has for \$200,000 bought the property of the Princess Alice Con. Co., comprising the Ruby, Abe Lincoln and Lafayette claims on Bull hill and the Bonnie Nell, Cutter, Mary Ann and Sido claims of the Bonnie Nell Con. Co., on Raven hill. The Cripple Creek Merger G. M. Co. has been incorporated to work these holdings, and will start operation on the Bonnie Nell, which adjoins the Moose mine. Part of this ground is already being operated under lease, the lessees having opened up several veins. The directors are B. Conger of Groton, N. Y.; E. C. Lusklin of Buffalo, N. Y., and H. H. Barbee, G. Sturgiss, E. V. Cumberland, R. J. Gwillim, A. F. Woodward, G. M. Davis and J. W. Pring of Colorado Springs.

Cripple Creek reports say J. M. Wright has an option on the Joe Dandy mine on Raven hill for \$100,000. The Joe Dandy has been a producer of high grade ore.

A bond for \$35,000 and a lease for two years has been obtained by Childers & Co. on the New Hope claim, which contains eight acres on Mineral hill. The leasing terms are 10% on all ore up to \$25 to the ton and 20% on all ore over \$25 to the ton.

A raise has been made in mill and smelter charges. About July 1st they made a cut in rates, but the charges have been abolished, and a new schedule put into effect. The cause assigned is that the American R. & R. Co. now has no

competition other than the Dorcas mill at Florence.

The comparative table of figures, f. o. b. to valley, is:

Grade—	Former Price	Present Price.
Half-ounce, gold per ton	\$5.50	\$ 8.25
One ounce	6.00	7.50
One and a quarter ounce	6.50	8.00
One and a half ounce	6.75	8.50
Two ounces	8.25	10.00
Five ounces		10.50
Ten ounces	9.00	11.50

The mill and smelter men say they have been handling and buying ore at a loss.

The Beacon Hill L. Co. has been incorporated by W. H. Roller, S. Murdock, W. Schofield, W. H. Ryan and B. Dismann, with main office in Salida. The company has a lease on the Old Gold mine on Beacon hill from the Old Gold Co. for two years, for 30% royalty on ore up to \$100 per ton and 40% on all ore over that amount.

The California mine, on Gold Hill, near Anaconda, will be started up again, says the Times.

The R. E. A. & A. cyanide mill on the Wild Horse mine, on Bull hill, at Victor, and, treating Wild Horse ore, is handling about eighty tons per day, which is giving returns of \$5 in gold per ton. The greater portion of the ore being handled is coming from the dumps. About 200 tons of ore is being mined and shipped to the Economic mill, giving returns of four ounces in gold per ton. The company is also doing development work.

### IDAHO.

#### Blaine County.

S. Smith, manager of the Greyhound M. Co., says the work of getting in their smelter material from Ketchum, the nearest railway station, is going ahead. After the material is hauled 85 miles to Wagon town, it is then packed 14 miles over a trail to the mine. He says a kiln of 50,000 brick is ready to burn and the sawmill is working. The smelter is expected to be ready for blowing in by Nov. 10.

#### Boise County.

The Blue Rock M. Co. has given a bond on its properties at Horseshoe bend to the Spear-American Exchange of New York for six months at \$75,000.

A. R. Schaffer of Boise and H. J. Myers of Chicago, Ill., for the Germania M. & D. Co., have bonded the holdings of the Black Hornet M. Co., and will build a reduction plant.

#### Cassia County.

Work has been resumed at the Melcher mine, in Cassia county, owned by the Melcher M. & M. Co. of Salt Lake City. The company is driving a tunnel to tap the ore bodies at depth.

#### Custer County.

The Mackay Telegraph reports improvements being made in the White Knob C. Co. smelter at Mackay. The company is putting in a briquetting machine and making other additions.

J. A. Cizek, manager of the Lost Packer mine at Loon creek, near Custer, says work is being done on Bismarck mountain. The Golden Sunbeam M. Co., under the management of C. E. Goble, is increasing development. From the deposits of free gold on this property the company is grinding out fifty tons a day with two mills, the ore yielding \$6 per ton on the plates. The ore is quarried. A consolidation of the Sunbeam and Montana properties is proposed.

#### Idaho County.

D. S. Nevins has started work of building a 200-ton cyanide plant for the Iron Springs M. Co., of which he is president. The mines are in Rapid River district, near Warren.

The mill at the Mayflower mine, near Warren, has begun operations, says Manager J. E. Jewell. The mill consists of a 50-ton grinding mill, with concentrators and cyanide equipment. In the mine two tunnels have been driven showing the main ledge 8 feet wide.

#### Owyhee County.

Work will be resumed at the Baxter mine on War Eagle mountain, near Silver City. Material for construction work is on the ground.

#### Shoshone County.

The annual report of the Bunker Hill & Sullivan M. & Conc. Co., operating at Wardner, for the fiscal year ended May 31, 1904, shows production of ore:

Mine.	Tons.
Bunker Hill	234,561
Sullivan	25,224
Stenwinder	9,928
Tyler	16,035

Total, concentrating ore.....286,208

Shipping ore.....2,505

Total production.....288,713

The concentrator operating 333.4 days, treated 285,828 tons of ore at a cost of 20.1 cents per ton, yielding 37,636 tons of concentrates. The ore is all taken from the



mine out through the Kellogg tunnel by electric haulage; and in addition to the ore, 47,000 tons of waste were handled. The haulage cost is 6.5 cents per ton. Stopping cost \$1563 per ton mined. Value of ore mined was \$48.66 per ton; Wardner operating costs totaled \$14.13 per ton; and freight and treatment charges were \$19.89; leaving operating profits of \$14.64 per ton of ore mined. Total costs per ton for stopping, tramming, concentrating, etc., show 20% lower than that of the lowest preceding year, says Manager S. A. Easton.

#### Latah County.

The Moscow opal mines are again to be opened and worked by the Clement-Campbell Co., Mrs. V. S. Clement having bought the farm on which the opal mines are located. They have put men at work opening up the mines that have been idle since 1893. The mines are 4 miles northwest of Moscow, near the Washington-Idaho State line.

#### Washington County.

A 20-stamp mill and other mining machinery for the Empress M. Co. of Big creek, near Council, are being put in, says D. M. Mackenzie, manager.

### MICHIGAN.

#### Houghton County.

The smelter of the Michigan S. Co. is 2 miles west of Houghton and is in full operation. It is built on a steep hillside, which enabled the designer to lay out the works to take advantage of gravity in handling mineral. The mineral from the concentrating mills is dumped into cylindrical steel bins, whence it is fed by gravity to the furnaces. The reverberatory furnaces are made to furnish power from their waste gases. A traveling crane operates the length of the casting room of the reverberatory building and casting is done by machinery, copper moulds being used. The ingots, weighing a ton each, are of unusual shape in order to permit their free discharge from the moulds, which soon crack from the intense heat, averaging but two casts each. The ingots are automatically dumped into running water, and after chilling are automatically landed on the receiving table, where they are stamped and loaded for shipment. The Michigan plant is handling the copper of the Baltic, Tri-mount and Champion mines of Painesdale. The blast furnace is working satisfactorily. Slags from the reverberatories are broken and hoisted by bucket elevator to the blast furnace. Slag discharge from the blast furnace is automatic and continuous, slag running into a settler and discharging by overflow into a strong current of running water, being granulated and carried thereby to the dump. The works are managed by F. I. Cairns.

### MONTANA.

#### Flathead County.

J. Maxwell et al. of Libby and Great Falls men are developing the Moulton and other copper holdings in the Rainy creek district, near Libby. They are also working placers.

#### Lewis and Clarke County.

The Montana M. Co. at Marysville reports for month of August at Drummond mine thirty-five stamps dropped for twenty-four days, crushing 1366 tons of ore, producing bullion bars and concentrates estimated to realize \$11,400; the tailings plant was employed for thirty-one days, treating 12,600 tons of tailings and fines, producing cyanide precipitate values of \$25,400; total (represented by 1470 ounces of gold and 13,170 ounces of silver), \$36,800. Expenditure: General maintenance and milling, \$6300; extraneous expenses (insurance), \$600; total, \$6900; treatment of 12,600 tons of tailings and fines, \$14,100; total, \$21,000.

#### Madison County.

C. L. Freiderichs, operating the Mammoth mine and mill, near Pony, is shipping gold-bearing concentrates to Helena. The free gold is caught on the plates, while the residue is run over concentrating and slimes tables.

E. L. Ballou of Igo, Cal., superintendent of the Garnet G. M. Co.'s group of mines, near Pony, is increasing development and other work. The tunnel, being driven under contract, is in nearly 1000 feet. The tunnel will be driven at least 200 feet farther before the main vein is reached.

#### Silver Bow County.

Separators with which to reduce the zinc-bearing product of the Alice mines at Walkerville are to be added to the equipment, says Manager Walker of Salt Lake City, Utah.

### NEVADA.

#### Elko County.

U. U. Withie of Ogden, Utah, with Boston, Mass., men, has bought a group at

Mountain City and a company is being organized. The ground adjoins the Resurrection mine, in which Withie is interested.

#### Esmeralda County.

(Special Correspondence).—C. Oddie has obtained control of the water supply of Alkali springs, 10 miles from Goldfield. He will build a pipe line to carry 100,000 gallons of water daily to the mines of Goldfield. Contracts have been made with the Combination M. Co. for water supply.

Goldfield, Oct. 2.

A. Tripp of Tonopah, president and superintendent of the Tonopah Railroad, says his company has surveyed two lines for a railroad into Goldfield, and that the company proposes building a line into the camp as soon as the tonnage obtainable there is sufficient to justify a railroad. The company's present rolling stock of four engines and sixty 20-ton cars is kept busy at full capacity on Tonopah ore, with what is hauled by wagon from Goldfield.

The Sylvania mine was sold last week to G. L. Patrick, W. D. Clair and J. D. Shaefer, the last named being local manager. The mine is in Fish Lake valley, 30 miles southwest of Silver Peak, and consists of seven claims on which development work has been done, and there are 1000 tons of ore on the dump. The ore is silver-lead, both galena and carbonate, occurring in dolomitic limestone, which forms a contact with a granitic belt. There being ample wood and water in the district, they will build a concentrating plant and also resume development work.

The Utahna-Goldfield M. Co. has been incorporated at Ogden, Utah, to carry on mining in Utah and Nevada, with head offices at Ogden. The directors are O. A. Moyer, O. A. Kennedy, E. E. Harrison, W. B. Wilson and R. P. Hunter. The property of the company is a lease on north half of No. 1, Algae Fraction mining claim, at Goldfield.

The following estimate of ore shipped from mines and leases of Goldfield since discovery of the camp in October, 1903, is reported by M. E. Ish, operating there. This is exclusive of all ore running less than \$100 a ton, as this kind of ore is placed on the dumps awaiting treatment plants in the camp. Shipments to the smelters total as follows:

Combination M. Co.	\$700,000
January lessees	250,000
Bowles & McCain lease on the Jumbo	250,000
The Curtis-Ridge lease on the Jumbo	150,000
Hennessey, Wingfield & Sweeney lease on the Florence	150,000
Vermilyea lease on the Jumbo	100,000

At present twenty more sets of lessees are shipping. The ore goes from Goldfield to Tonopah by wagon and thence by rail.

#### Humboldt County.

The De Soto M. Co. has been organized by members of the Sheba M. Co. of Salt Lake City, Utah, including G. W. Bartch, W. H. Child et al. The property, which adjoins that of the Sheba, south of Mill City, consists of twenty-four claims, eleven of which have been patented. Arrangements will be made whereby the ores from the De Soto will be treated by the Sheba mill.

#### Lincoln County.

J. V. Brooks of Salt Lake City, Utah, has started developments on the property of the Empire M. Co. at Freiburg.

J. T. Hume and M. Wilbur, owners of the Blue Ridge group of gold mines on Virgin river, near Caliente, reports they will put in a mill at the mines.—S. Gregory, of Reno, at the Virgin River district, reports having struck a 26-inch vein of gold ore on the Cloud Burst group, northeast of the salt mines north of the river. A 10-stamp mill will replace the arrastra on the Cloud Burst group.

The Old Roman M. Co., which bought the F. M. Frye mines in Newberry mountain, near Searchlight, has works under way. C. F. DePuy is manager.

The Quartette M. Co. at Searchlight will start up its 20-stamp mill on the Colorado river next week, says Superintendent F. J. Harrington. The company's mill at the mine continues in operation. The tailings will be cyanided.

The management of the E. & F. group of mines, near Pioche, is shipping copper ore carrying values in silver, lead and gold. A. C. Ellis of Salt Lake City, Utah, part owner, says that in the lower tunnel, by which the ledge has been tapped at a depth of 400 feet, there is exposed 6 feet of ore of commercial quality.

The tunnel of the Blue Bird, one of the Caliente G. M. Co.'s claims, at Caliente, is in on the free gold-bearing ledge crosscut for 12 feet in the shaft. It is said a mill will be built at the mine.

#### White Pine County.

The Pilot Knob G. M. Co. of Monmouth, Or., is putting up a 2-stamp mill and concentrator at Willard creek, near Osceola. W. C. Williams of Olinghouse, near

Wadsworth, is opening up the Addie C. mine at White Horse canyon. The hoist is being set up. The vein is said to be 60 feet in width and carries gold-bearing pyrites that assay from \$6 to \$11. About 40% of the values may be recovered by amalgamation. The vein is nearly vertical.

#### Washoe County.

Reno reports say a strike of free-milling gold ore has been made on the Schour claim, ½ mile from Derby station, on the Southern Pacific line. A shaft has been sunk and the vein is being followed. Free gold is visible in the ore.

### NEW MEXICO.

#### Dona Ana County.

Gold Camp is on the east side of the Organ mountains near Organ, 25 miles northeast of Las Cruces and 45 miles southwest of Alamogordo. It consists of a natural basin about 16 miles long and 6 miles wide, surrounded on three sides by mountains. This basin lies 4500 feet above sea level. Among the mining interests that are developing is the Dona Dora Co. property, which consists of thirty claims. The company is composed of New York and Philadelphia, Pa., men and they are increasing work. The Mormon M. & M. Co. has claims which are being developed and which have produced profitable shipping ore. As freight and smelting charges are high, the company is building a concentrating plant and will be in operation by Dec. 15.

#### Grant County.

(Special Correspondence).—The Boston Co.'s copper mines in the Burro mountains are concentrating the low-grade ores and shipping a good tonnage of concentrates. They are operating the mill moved there from Pinos Altos. It is said they have recently opened several large bodies of 8% to 10% ore in the Sampson and St. Louis claims. The property is now controlled by the Leopolds of Chicago.

The Comanche Co., rebuilding the Silver City reduction works, which were burned last year, will have a large amount of ore on hand by the time the work is completed.

Silver City, Oct. 3.

#### San Miguel County.

Machinery for the mill of the Blake M. Co. has been moved to the mines near Rociada. A flow of water sufficient for all purposes has been opened on the Three Brothers mine.

Considerable work is being done on the mines of the Pecos M. Co., in Hamilton mining district, on the Upper Pecos river, near Pecos. Additional machinery has been installed. The group of mines owned by the company carry copper, silver and gold values. The company also owns several coal prospects.

#### Taos County.

At the Green mountain mines, Manager Fairchild of the Green Mountain M. Co., at Dixon, says they are down 80 feet and started drifting and are opening up ore. Work on the tunnel has stopped for the present. Assays show up to 25% copper and fifty ounces silver. Ore is being shipped to Pueblo, Colo., which averages 12% copper.

M. D. Pierce and A. Mason are having ore treated at the Jayhawk mill, near Red River, to determine the process best adapted for treatment of the ore, which is from the Carrie mine in Pioneer gulch.—J. Bowman last week cut a 3-foot lead on the Ajax mine, near Red River.

### OREGON.

#### Baker County.

(Special Correspondence).—L. R. Bellman, manager for the Turnigan Arm M. Co., owning the Cracker-Oregon mine at Bourne, will begin extensive operations on that property this week. Over a year ago the company completed a 20-stamp mill, but have never milled any ore, although a considerable amount of high-grade milling ore is said to have been found in the lower tunnel. The Cracker-Oregon is an adjoining property to the E. & E. and on a parallel vein.

O. Herlocker, superintendent of the Highland mine, has plans for a concentrating plant which he proposes installing. Several four-horse teams are hauling ore from the Imperial mine in Cable Cove to the Sumpter smelter. The ore is being assorted from ore bins and dumps and was mostly taken out of the mine several years ago.

November 18 is the date set for the final adjustment of the Red Boy mine litigation, and by that time the new management will begin operations. Among other improvements they propose to complete the power plant, as planned by the old company. Estimates have been made from preliminary surveys, that the water from Olive lake can be carried by pipe line a distance of 8 miles, and in sufficient

quantity to generate 4000 H. P. of electric energy.

C. J. Johns of Sumpter is getting patent on the Maiden's Dream group. Three years ago a mill was erected on this ground and rich ore milled for a short time. Litigation interfered with operations for a time, but has now been adjusted.

Sumpter, Oct. 4.

Manager Wright of the Blue Bird mine, near Sumpter, says the stamp mill is ready for operation. A cyanide plant of 100-ton capacity will also be put in. Ore from vein No. 2 will be handled by the stamp mill, while that from the large, low-grade body in vein No. 3 will be treated by cyanide.

G. W. Daines, manager of the Belcher mine near Greenhorn, says he has started work of building a stamp mill.

A. Burch of Spokane, Wash., manager, says work has started on installation of a gold dredger of 2000 yards daily capacity on the Crane Flat placers, near Sumpter. The Burch & Burbridge Co. owns 200 acres of placer ground at Crane Flat.

Manager J. Doyle of the Gold Coin group in Cracker Creek district, near Sumpter, reports progress being made in the crosscut tunnel, which will go 1500 feet before being completed. The property is owned by the Citizens' Con. G. M. Co. of Virginia. There are fifteen claims in the group. The compressor is operated by steam.

The manager of the Sumpter smelter at Sumpter has leased the Baker City sampling works and will operate them.—An air compressor has been added to the Gem mine, in Sparta district.

At Greenhorn, A. Larsen and H. Smith, owners of the Salmon group, will, with Cincinnati, Ohio, men, increase development work. The group, comprising eleven claims, is 2 miles west of Greenhorn, on Salmon creek, below the Intrinsic mine. Work has been centered in a crosscut tunnel. A compressor plant will be put in, and in addition to continuing the tunnel, drifts will be run on veins 2 and 3.

A strike of free milling ore is reported in the Lost Cabin group, in Minersville district, near Sumpter. On the surface the ledge matter assayed \$2.50, but in the crosscut assays run \$10 in gold. R. F. Evans, the owner, states they will go lower down the hill and run another drift.—In the same district, on the Golden Wizard, a tunnel 700 feet long has been run and a shaft sunk to the ledge. Two pumps and two 75 H. P. boilers have been required to keep it dry. A hoist has been put in and a mill partly built, but the machinery is not yet in place. It is intended by the Golden Wizard management to drive a crosscut tunnel to 3000 feet. This will cut several parallel ledges and also drain the upper workings.

The Buffalo mine, 2 miles north of the Magnolia mine, near Sumpter, in the same zone as the Cougar and Monumental, is working and shipping ore. The property is owned by N. T. Berkeley et al. of Pendleton. More men will be put on.

A bond and lease from the Eagle M. Co. has been given to Arthur & Shanks on the Eagle Con. mine, which embraces the Imperial and twenty claims in Cable Cove, near Sumpter, for \$75,000. In addition to the lease on the Imperial, they have also a bond on the Miner, the adjoining mine. The milling plant being built is partly on the Miner. The new drift on the Imperial vein will be started on the Miner, giving an additional depth of 150 feet and allowing economical handling of ore to the mill. Steady shipments of ore and concentrates being made to the smelter will be increased.

The Auburn Deep M. Co. is increasing development work at Auburn. A shaft has been sunk 200 feet and a drift started from the 100-foot level and the gold bearing gravel channel is being opened up. A steam hoist has been set up and the deposit will be hoisted to the surface and washed.

#### Columbia County.

H. D. Staley, who is developing coal mines near Columbia City, says veins have been uncovered and his men are running a crosscut. Where the main vein was uncovered it is 4 feet in width. The coal is of good quality, and the mine is near the Columbia & Nehalem Logging Railway, by which coal can be shipped to Portland.

#### Grant County.

Shipments of ore have been resumed from the Buffalo group, 2 miles north of the Magnolia mine, near Granite. The Buffalo is under lease to Clark & Donovan, and owned by N. T. Berkeley et al. of Pendleton. Another crosscut tunnel will be driven.

#### Douglas County.

(Special Correspondence).—A ditch 4½ miles long is being built to convey 2000 inches of water from Reuben creek to the Harris Flat placer, near the mouth of Grave creek. It will be completed for



next season's run. A. M. Scott and A. W. Shearer are rushing preliminary work on the placer claims of the Gold Flat M. Co. Glendale, Oct. 4.

Development this season on the Pittsburgh group, near Bohemia, is reported, showing satisfactory results. The group of six claims, owned by W. H. Sharr and others, is at the head of Rock creek, on the Monte Rico ridge, 2½ miles from the Musick mine, at Bohemia. Over 700 feet of tunnels have been run. The main crosscut tunnel, in 160 feet, will cut seven ledges in 1000 feet, and will then have vertical depth of 1000 feet. The group has timber, water power and millsite, and a wagon road will be built by which machinery will be taken in.

Bohemia reports say a body of milling ore is opened up in the Twin Rock group of nine claims, on Twin Rock Ridge. The main working tunnels is being driven and a crosscut shows 15 feet of ore. The owners of the properties in that section of the district are arranging to combine for construction of a wagon road to connect with the main stage route, to facilitate transportation of machinery next season.

#### Jackson County.

(Special Correspondence).—The Bieveu Bros., on Rich creek, intend to enlarge their operations this winter and will use a 6-inch pipe, 600 feet long, and have pressure enough to readily handle the red clay and gravel formation of their claims. The pipe line is completed, as are also the ditch and reservoir.

The Blue Ledge C. Co. has bonded the J. Bars land, owned by J. L. Willetts, consisting of 160 acres. In the tract are several acres of level land, having good water supply, which makes it desirable for a townsite. Stages make semi-weekly trips between Watkins and Jacksonville. Watkins, Oct. 3.

(Special Correspondence).—The Oregon Belle mine, on Forest creek, 12 miles southwest of Jacksonville, is being developed. The group consists of nine claims in slate and diorite formations, with two ledges 4 feet in width, with a northeasterly trend. The Oregon Belle claim shows a pay shoot of 18 inches, while the Gold King claim has a 3-foot ledge of free milling quartz. Developments are mostly on the Oregon Belle, by several drifts and tunnels connected by raises. The 250-foot shoot of pay ore is cut by these drifts at 100 feet apart. Work now consists in driving a crosscut tunnel to strike the ledge at 940 feet below its apex. After drifting 200 feet on the new level a crosscut will be run to cut the ledge of the Gold King 230 feet below the surface. The ore of the Oregon Belle is free milling, with values averaging \$17 per ton, and that of the Gold King an oxidized ore with quartz, with average values of \$8 per ton. The Oregon Belle has eight levels. The mill and lower tunnel are at an elevation of 3300 feet above sea level. An abundance of timber and water for all purposes is at hand. The equipments are a 3½-foot Huntington mill, a concentrating table, a return tubular boiler, just installed, and two 2½-inch machine drills. The property is owned by the New York & Western M. Co., with home office at Amsterdam, N. Y. W. S. Roberts is president and A. H. Gunnell, Grants Pass, Western manager. Jackson, Oct. 4.

The Homestake mine, near Woodville, has its 5-stamp mill ready for operation. A body of high-grade ore has been developed.

R. A. Miller of Portland says he will resume development work on his quartz mining properties adjoining the Opp mine, near Jacksonville. A stamp mill will be built.

#### Josephine County.

(Special Correspondence).—Three miles north of Leland, A. E. Reeves, representing Mullan, Idaho, parties, is developing a group of three claims, through which runs a 20-foot ledge enclosed in diorite and slate. The ore is quartz with chalcopryite, carrying 7% copper and \$2 in gold. The Benton group of seventeen claims, in Mt. Reuben district, has over 4000 feet of development, including one tunnel of 1460 feet, with raises of 200 feet and other workings giving 500 feet of backs. The general formation is syenite and granite. About 20% of the ore is free-milling and 90% of the values can be saved by cyaniding. Sinking is the system of development and the ore is stacked on the dump ready for a cyaniding plant to be placed in the spring. Placer ground and mill sites are in connection with the property. J. C. Lewis and R. Jones have been developing this property.

The ideal gravel mine, owned by Blaisdell and others, in Mt. Reuben district, covers 700 acres of bench land. The owners are starting to construct a ditch, including 6 miles of flume and piping, the whole to cost \$50,000.

The Columbia gravel mine, owned by Lewis Bros. of Portland, near the Green-

back quartz mine, works forty men during the winter season.

Five miles east of Leland, T. J. Macklin and A. J. Bennett are developing a free-milling proposition: the ledge matter is in granite and porphyry. A tunnel and an incline shaft have developed ore bodies which, by arrastra, yield \$20 per ton in gold.

#### Leland, Oct. 4.

(Special Correspondence).—The Copper Stain group of claims, in Mt. Reuben district, is being developed under management of W. H. Dana. The vein is in diorite. The ledge is 2 feet in width with quartz giving mill returns of \$15 in gold. From the several levels are over 2000 feet of drifting. The mine is owned by Springfield, Ill., men.

#### Grants Pass, Oct. 4.

(Special Correspondence).—On Jump Off Joe creek, near Grants Pass, and about 3 miles north of the Granite Hills property, is the Oro Fino group of three claims, owned by S. Chase of Portland. There are several ledges averaging 4½ feet in width in diorite. The pay streaks vary from 18 inches to 40 inches of free-milling ore near the surface, changing to high-grade sulphurets with depth. Development has reached a depth of 240 feet and is in ore. Values in the main ledge \$15 to the ton and in the laterals \$30 in gold. The ledge of the Elkhart, an extension, has a 400-foot tunnel showing a 16-inch pay streak of \$21 ore. Improvements are a roll crusher, Sturtevant rolls, a Fairbanks-Morse steam hoist of 25 H. P. and a 50-ton cyaniding plant.

One of the extensive gold-bearing channels in southern Oregon is that owned by the Old Channel M. Co. on the benches above where Galice creek empties into Rogue river, 20 miles west of Grants Pass. It has been proven 2400 feet in width in places, with banks of gravel averaging 120 feet in height. The holdings consist of 1500 acres, 900 acres being patented and extending 4½ miles in length. The property is worked by J. R. Harvey, part owner, under lease. With the available supply of water and an unlimited dump, he handles 10,000 cubic yards of gravel daily at an expense of 2½ cents per cubic yard. The ditch and flume, 12 miles in length, carry 5000 inches of water and deliver it at the mines under a pressure of 510 feet by three 6-inch nozzles with No. 4 giants. The gold of the channels is coarse, with a value of \$19.33 per ounce, while that from the banks has a value of \$18.25 per ounce. The lower gravel of this mine has been found to contain metals of the platinum group—platinum, osmium, ruthenium and iridium. The concentrates are easily saved, as 1300 yards of gravel make one cubic yard of concentrates, and in regular season one ton is saved every two days. Manager Harvey is repairing at all points, preparatory for a heavy season's work. The arrangement of the sluice channel is such that there is a constant gravity flow to the center and off to the dumping ground.

#### Grants Pass, Oct. 4.

J. T. Breedon has leased and will operate the Nunan hydraulic mines of Forest creek, near Grants Pass. These mines cover 150 acres of placer ground. The water rights supply the diggings through two ditches, one giving 280 and the other 580 feet pressure.

Superintendent H. Foster of the Oregon Belle mine, on Forest creek, near Grant's Pass, reports improvements being made. The Oregon Belle is owned by the New York Western M. Co. Developments will be increased and they will put in a 10-stamp mill. Superintendent Foster says the compressor plant is ready to run. Two drills will be used and men put to work extending the two tunnels now opened.

Grants Pass reports say the Benton mine of Mount Reuben, which has been undergoing development for two years, is to have a 40-stamp mill. The Benton is owned by J. C. Lewis of Portland and R. Jones, the latter being superintendent. A 1400-foot tunnel has been driven all on the vein.

The Golden Drift M. Co., at the Rogue river, near Grants Pass, is placing turbines to supply power and water to the Dry Diggings placers. There remains only the installation of the pump, the laying of pipes and the setting of giants. Manager Ament says this will be completed in November. The four turbines in place will give sufficient power for present requirements, and the number will be increased later. The company will supply power not only for its own uses, but for surrounding mines. The pumps for the Golden Drift dam are of the five-step centrifugal type, each one having a weight of 42,000 pounds, and each capable of delivering 9000 gallons of water per minute to a height of 800 feet and giving it to the giants in the diggings under an equivalent gravity head of 400 to 500 feet.

Foster & Gunnell of Grant's Pass, who

are developing the Oregon Belle mine of Forest creek, will build a 10-stamp mill.

J. T. Breedon has leased and will operate the Nunan hydraulic mines of Forest creek, near Grants Pass. These mines cover 150 acres of placer ground. The water rights supply the diggings through two ditches, one giving 280 and the other 580-foot pressure.

The Sylvanite G. M. Co. has been incorporated at Portland by J. T. Walls, Washington; T. Daniels, H. L. Pittock, F. J. Conway, Nampa, Idaho; J. R. Neill, Sumpter; B. C. Ely and A. L. Morris to work mines near Grants Pass.

## SOUTH DAKOTA.

#### Custer County.

The Ivanhoe G. M. Co. will equip its property with a 10-stamp mill, which it is expected to have running before Jan. 1st. Tests are said to have shown the ore to contain platinum in payable quantities, and they will equip the plant for saving this metal as well as the gold. The mine is 8 miles east of Custer.

#### Lawrence County.

Foundations have been started at the millsite of the Globe G. M. Co., west of the Lead City limits, in Whitetail gulch. The plant is expected to be in operation before winter sets in. The mill will have a capacity of 100 tons per day, using two grinding mills in pulverizing, with amalgamation, concentration and cyanidation in recovery of the values. Gasoline engines will supply power. Water for the plant will come from the mine, where on the 500-foot level a sufficient flow for mill work has been opened.

The Eleventh Hour G. M. Co. has been incorporated by W. S. Elder and G. P. Baldwin of Deadwood, J. Madill, C. E. and F. R. Brown. Manager Baldwin says they propose building a cyanide plant and mill at the mine. The property is developed by 2000 feet of cuts and drifts, showing a shoot of cyaniding ore.

President Wibaux of the Clover Leaf M. Co. at Roubaix says he will sink the shaft, now 700 feet deep, to the 1000-foot level. To facilitate the work an auxiliary hoist will be placed at the 700-foot station. A heavy station pump will also be put on this level. The pump has a capacity of 400 gallons per minute.

The report of the Homestake M. Co. at Lead for the fiscal year ending June 1, 1904, shows bullion receipts were \$4,800,558.48. The number of tons of ore milled was 1,299,057, average value per ton \$3.695. (Bullion receipts for the previous year were \$4,526,942.04, and tons milled 1,279,075; average of \$3.539 per ton). In his statement, T. J. Grier, superintendent, says: Development of the mine progressed steadily and satisfactorily. The 1100-foot level reached a year ago in the Ellison shaft has been opened sufficiently to show that the ore vein being worked above that level continues to it, and also holds its width at that depth, while the shaft has been sunk to 1250 feet, where the next level will be opened. The 100-stamp addition to the Amicus mill has been completed. Under head of disbursements are:

Assaying.....	\$ 24,280 43
Six stamp mills.....	744,559 96
Bullion freight.....	7,125 00
Six shafts.....	194,769 69
Two cyanide plants.....	322,919 02
Dead work.....	18,697 00
General and legal expenses.....	27,433 61
Foundry.....	68,194 50
Machine and blacksmith shops.....	10,606 89
Mine, including candles, coal, labor, machinery, oil, etc.....	2,110,182 02

Dividends paid during the year amounted to \$655,200. The greatest item of expense was for labor in the mine, for which the company paid during the year \$1,570,740.60. This does not include items of labor in the various mills and shafts. There was paid out by the company for purchase of property during the period, \$210,168.85; salaries, \$23,200; maintenance of superintendent's house, \$3,934.40; stable, \$29,367.40; survey, \$16,976.24; slimes, \$172.75; tramway, \$27,340.07; taxes, \$78,758.10; timber land, \$300; water, \$65,747.68; wood and timber, \$54,324.89.

#### Pennington County.

The Golden West M. Co., near Rochford, is putting in two Huntington mills. An aerial tramway is being built from mine to mill.

## UTAH.

September in the ore and bullion market closed on settlements aggregating \$2,055,388, compared with \$1,956,912 for September, 1903, says the Tribune, exclusive of settlements made on lead ores by the United States M. Co. The producer was called on during the month to supply the furnaces with 90,000 tons of ore. At the American, at Bingham, the full battery of furnaces is in blast. Adding to the settlements in the open market the value of bullion produced at the independent plants and the total from all

sources is given at \$3,000,000. From the copper furnaces of the valley to the refineries of the East there was forwarded during the month 3,689,336 pounds of copper, gold and silver-bearing bullion of a value of \$1,000,000. During corresponding month last year output of same class of bullion amounted to 2,317,900 pounds. The yield was divided as follows:

	Pounds.
Bingham Con.	1,086,700
Utah Con.	1,510,806
United States.	1,617,740
Total.	3,689,336

In addition to the output from the copper furnaces, there was contained in the matte sent out by the American S. & R. Co. 900,000 pounds, making total from all sources 4,600,000 pounds.

#### Beaver County.

The Wild Bill group, near Milford, owned by the Chicago M. Co., will resume operations—the ores on its dump to be made to supply the means with which to explore the ledge at greater depth. This ore is said to contain 15% lead, 15 ounces silver and about \$3 gold, with 40% iron. It is intended to sink another 100 feet on the ledge.

#### Grand County.

Reports from Basin, in La Sal mountains, says mining deal is being negotiated whereby Denver capital will consolidate the principal mines on Mineral mountain, including the High Ore mine. T. B. Crawford and A. E. Ackerman are interested. The company will run a 2000-foot tunnel into Mineral mountain through the High Ore ground and open up adjacent property, which will include the Skylark group of three claims, the Double Standard, Golden Scepter, Copper Glance, Sunrise, M. I. F., Annie Laurie and Florence mining claims.

Basin reports say J. Welsh, part owner of the Welsh-Lofftus uranium-radium mines, reports experiments show the values of the ore, including the uranium and vanadium contents, can be profitably extracted and that they will put up a plant at Radium, near Basin, next spring.

C. Reagan of Telluride, Colo., is negotiating for a lease on the Basin stamp mill at Basin, which will start up. He will add a concentrating table and cyanide tanks to the present 5-stamp mill. He expects to work the Tornado, M. Y. F., Anaconda and Grouse Mountain ores.

#### Iron County.

The Bullion Canyon M. & M. Co., near Parowan, is again at work and increasing development. The California company that is developing the Canfield property in that section is also at work.

#### San Juan County.

At Eureka the rebuilding of the Uncle Sam shaft house which was destroyed by fire September 24 is in progress, and Superintendent C. C. Griggs says the hoisting plant will be ready for use by October 25. The boilers were found in good condition and the engine also stood the fire in good shape, but will have to be refitted with fixtures. The timbers in the shaft were burned down about 40 feet. While the new plant is going up the company will do considerable work on the tunnel level taking out ore to run the mill. Besides the mill, revenue is being derived from four sets of lessees in the Humbug ground.

#### Salt Lake County.

The aerial tramway, to transport the output of the Galena mines at Bingham to the lead furnaces of the United States smelter, will be completed this month, says Chief Engineer Lyon. All material is on the ground. The towers are going up. The length of the tramway, which will extend from the Galena shaft to the headhouse on the Old Jordan division, is 1656 feet.

In Bingham the driving of a tunnel will be started by the Utah-Apex M. Co. The adit will cut under the mineral-bearing portions of the Apex property at a vertical depth of 1000 feet, and on the dip about twice that amount. It will drain the mine of water and enable the economic handling of the ores, says Manager Orem. Machine drills will be put in. The tunnel will start from the Carr Fork side and will be 2000 feet in length.

Surveying for the aerial tram over which the milling ores of the Continental mines at Alta will pass to the concentrator in Tanner's Flat is in progress and raising of the towers started, says Manager Crowther. The tramway will be 5 miles long. Surveying for the power line has been completed and 4000 feet of pipe will be placed, while at the millsite lumber is on the ground.

The rails of the Copper Belt Railway will be extended to at least two more of Bingham's producers, says Manager W. Bayley at Salt Lake City. The Utah-Apex and the Bingham & New Haven are said to be preparing for rail shipments. The latter has had under consideration building of a tramway, over which



to forward its output to a connection with the Yampa branch on the Copper Belt, says Treasurer Farnum of New Haven, Conn. Sixty tons are going from it daily to the smelter.

Superintendent A. O. Jacobson of the Columbus Con. mine at Alta reports that, with the exception of the delayed transformer and motors, all the equipment for the new mill is set up, and it is expected the plant can be placed in operation next week. The electric coils, which burned out during the recent storm in Little Cottonwood canyon, have been replaced.

#### Summit County.

The Woodside mine at Park City is closed down.

An addition to the Daly-West mill at Park City is being built. It will contain six concentrating tables and one Huntington mill.

The buildings at the mouth of the Corona shaft, where the work was done last winter, have been taken down and rebuilt at the new tunnel site at bottom of Marsac hill. Superintendent Hasson says the tunnel will be 1000 feet in length. He expects to put in a steam plant and an air compressor.

#### Tooele County.

A deal for bonding of the Midas mine and mill in Deep Creek district, near Ibapah, to G. Georgetta is pending, says Manager Chipman of Salt Lake City.

## FOREIGN.

### AFRICA.

The Transvaal Chamber of Mines at Johannesburg reports the gold output for August a total of 312,277 fine ounces, being 301,112 ounces from the Witwatersrand, an increase of 2288 ounces over July, and 11,164 ounces from outside districts, an increase of 2149 ounces over July.—The Chamber of Mines also reports the following as to labor on the Rand:

Natives distributed to mines during August	
by Native Labor Association.....	6,178
Time expired and other wastage.....	7,624
Net loss during August.....	1,446
Total number employed, end of August.....	65,848
Natives allotted to railways.....	514
Chinese employed by members at end of July.	4,947

### AUSTRALIA.

#### New South Wales.

Sydney reports give the gold yield of New South Wales for the month of August at 14,271 ounces, valued at £54,520, as compared with 14,636 ounces, valued at £53,149, in August, 1903. The yield for eight months of 1904 to September 1st aggregates 210,487 ounces, valued at £753,832, as compared with 176,441 ounces, valued at £647,087, for eight months of 1903.

#### Queensland.

The output of the gold mines of Queensland for the month of August is reported at:

District.	Tons.	Crushed.	Yield.
Charters Towers.....	20,300		20,600
Croydon.....	5,400		3,300
Gympie.....	17,900		10,100
Mount Morgan.....	21,800		11,100
Evenswood.....	3,400		1,700
Other fields.....	2,300		2,300
Alluvial.....			1,400
Total.....			52,500

## BRITISH COLUMBIA.

#### Boundary District.

The Montreal & Boston Con. M. & S. Co. is shipping ore to the company's smelter at Boundary Falls at rate of 300 tons per day. Retimbering and widening the Brooklyn incline shaft is completed. At the Stemwinder men are building the new gallow frame. Until the air compressor has been placed, the Brooklyn group, by arrangement with the Granby Co., will buy sufficient air to operate five or six drills. The work of stripping and preparing the Rawhide, another of the Brooklyn group, but a half mile distant, is progressing.

#### Rossland District.

Le Roi No. 2 M. Co. has bonded for \$30,000 the Evening-Eureka group of claims on Red mountain, near Rossland, and will start development work this week. The property comprises four claims and fractions. The Evening group is west of the California mine and south-west of the Giant. The Vernon and Evening claims adjoin the California. The Eureka is a full claim farther west and crossing the gulch between Red and Spokane mountains. The principal work has been done on the Evening. The group is accessible by wagon road and is near the main line of the Red Mountain Railroad.

Concentration operations at the Velvet-Portland mine at Rossland having proved successful, the London directors have authorized doubling the capacity of the works. The plant handles fifty tons of ore daily by straight water concentration. Ground for foundations was broken when

the present mill was built. The company has concentrates said to aggregate \$10,000 in value stored at the mill, and will market this product as soon as snow falls.—Milling has been resumed at the White Bear concentrator, where a shortage of water necessitated a shutdown. Water from the mine will be used for the present, and a permanent supply will be obtained from the forks of Little Sheep creek, to which a flume is being built.

#### Slocan District.

It is reported that the Great Northern Railway will put in a plant at Kaslo for separation and concentration of lead and zinc ores.

At Sandon W. J. Sutton of Victoria will reopen the Noble Five and adjoining properties. Equipment will be put in.

#### Vancouver Island.

Alberni reports state the Alberni Consolidated gold-copper mine will again be worked.

An aerial tramway extending from the mines of the Britannia C. Co., near Vancouver, to the reduction works on the seashore is being built. The towers are up, with the foundation for the terminals nearing completion. In construction of the plant progress is being made. Managing Director G. H. Robinson of Salt Lake City, Utah, says reduction of copper, gold and silver-bearing ore will begin in November. The tramway is 3 miles in length. There are about 100 men at work.

#### West Kootenay District.

In the Lardeau district the mill and concentrator of the Great Western M. Ltd., at Three Mile near Ferguson, is treating ore of the Nettie L.—The management of the Triune mine will continue operations all winter with fifteen men. Provisions and supplies for six months have been taken in to the mine. At the end of August a shipment of 349 sacks of high-grade ore was made to the smelter, and a further shipment of 330 sacks made last week.—Ore is being shipped by pack train from the Old Gold mine on the Duncan road to Ferguson. The mine is owned by the Con. M. & S. Co. Ltd.

## CANADA.

#### Ontario.

The Department of Trade and Commerce reports, at Bannockburn, a company proposes to take advantage of the Lead Bounty Act. A smelter has been erected at Bannockburn and a considerable quantity of lead is awaiting the report of the government inspector, so that the company may claim the bounty. The British Columbia lead producers induced the Government to grant the bounty. Deposits of lead are said to exist in Ontario and Quebec. These could not be worked in competition with the British Columbia deposits, as they contained only lead, while the western ore carries a percentage of gold and silver. It appears that the Government bounty will offset the precious alloy of the western lead.—The Carter White Lead Co. of Chicago, Ill., and Omaha, Neb., is establishing a factory at Toronto, says the News. The company will have a lead corroding plant and will, it is said, utilize British Columbia ore.

The Canadian C. Co. of New York, operating at Sudbury and at Copper Cliff, reports its increased metallurgical plant at Copper Cliff nearly finished. The ore from the company's mines is nickeliferous chalcopyrite, with pyrrhotite gangue, occurring in lenses. It is said to average 2.75% copper and 2.5% nickel. A high-grade matte is produced which is shipped to the refinery, where the nickel and copper are separated and electrolytic copper produced. The company's annual production is about 6,000,000 pounds of copper and 4,000,000 pounds of nickel. R. G. Leckie is manager.

#### Yakon Territory.

Three waterways to be used in connection with mining operations are about completed at Gold hill, near Dawson. All will be finished before the freezeup. The Acklen ditch will be the longest and the other two are both on Bonanza, one being known as the Palmer ditch and the other as the Norwood. On the Palmer ditch the water is taken from Bonanza creek at 55 above, where a dam is located by which the flow at all stages can be regulated, and follows down the left limit of Bonanza to a point opposite Gold hill, the locality on which the water is to be used. The excavating has been comparatively easy, but little rock work being struck that necessitated blasting. The ditch is 4 feet wide on the bottom and 2½ feet deep on the outer edge. Seventy-five men and from fourteen to sixteen teams have been employed on the work for several weeks. From the end of the ditch on the hill back of the forks the water is conveyed across Bonanza creek by means of an inverted siphon of steel pipe.

## JAPAN.

A hydro-electric plant will be built on the Kosaka copper mine at Kosakamura, Rikuchu. An 850 H. P. water turbine to operate on a 104-foot head and to be direct connected to an electric generator, is among the machinery required. The mines are owned by the Fujiti Gumi, with F. Kuhara and K. Taketa, managers.

## MEXICO.

#### Chihuahua.

E. M. Ray, manager of the Pinos Altos M. Co., operating mines at Pinos Altos, says the company will put in a reduction plant, including cyanide equipment. It is also said an electric plant to furnish power for the mines is proposed. Water power for developing electric power to the extent of 2500 H. P. is said to exist within 15 miles of Pinos Altos.

P. Ginther, manager of the Encinillas Mines, Ltd., at Santa Rosalia, says he will increase the size of the plant at Santa Rosalia another 200 tons daily capacity, making a total of 300 tons. The plant will do custom work as well as treat ores from the company's mines, 60 miles east of Santa Rosalia.

It is said J. G. Hardy, manager of the Dolores mine at Dolores, west of Minaca, will build a cyanide plant.

M. Agullera, vice-president and manager of the Cia Minera de Venecia y Roma del Parral, reports the company's mine, near Parral, is yielding ore that assays 48 kilograms (1500 ounces) of silver and 40 grams of gold. P. de Celis of Mexico City is president of the company. The mine is 3 miles from Parral and 3 miles from the Mexican Central Railroad and comprises 154 pertenencias. Fifty-four pertenencias are in the Venecia group and 100 in the Roma group in Balleza.

The Premier Exp. & Dev. Syndicate, Ltd., has been organized in London, England, by H. G. Ricardo of Gatcombe, Glos., T. Symington of Glasgow and S. Berry of London, with A. Searle of London secretary. The company has concessions covering several thousand acres of mineral lands near Parral, in the State of Sinaloa. W. P. Guthridge is resident manager at Parral.

At Carrizo, from the sulphur reduction works, Manager E. F. White says sulphur is shipped to the dynamite works at Colton. There are sixty men employed in assorting and working the dumps at the mine. The ore shipped and reduced each day yields about one ton of commercial sulphur. Joining the above mine is the claim belonging to the Dynamite Co., under superintendency of E. F. White.

#### Durango.

Transfer of the Gavilanes mine of Durango has been made by the E. M. Bind Exploration Co. of Torreon to the Gavilanes M. & M. Co. A 20-ton mill with concentrator was put in a year ago. There will be increase in development of the property. A mill site will be prepared for a plant that will handle 500 tons of ore a day.

At Tomaco the Mexico-Pacific G. & S. M. Co. has ten properties which it is preparing to work as soon as machinery arrives. The company has bought 4500 acres of timber land for use of mines. A. B. Garrett is president.

#### Guerrero.

Work will be started next week unwaterring the Gallo mine, an antigua silver property at Coahuayutla, by the Gallo M. Co. of Mexico. Development work is in charge of R. James, of London, Eng., who with J. G. Fort et al. of London has organized the Gallo M. Co.

#### Jalisco.

The Santo Domingo mine of the Amparo M. Co. of Philadelphia, Pa., near Etzatlan, is producing an average of fifty carloads of ore per month, shipped to the Mapimi smelter. Additional machinery including a reduction plant are going in. E. J. Callahan is superintendent.

#### Lower California.

The Morgan smelter, built in San Diego, Cal., and which belonged to the San Diego S. & R. Co., has been dismantled to be shipped to Lower California, and will be put up at San Domingo for treatment of ores of the mines of G. P. Brown and the Esperanza M. Co.

#### Mexico.

El Oro M. & R. Co., at El Oro, reports for month ending Aug. 31, mill ran 29 days, crushed 9613 tons; produced from 100-stamp mill, \$109,800; produced from cyanide plant, \$22,111; working expenses and development, \$68,486. Profit from railway for month was \$400. There has been expended \$52,348 in permanent improvements, including \$50,182 on new mill.

#### Nuevo Leon.

B. P. Buchard and A. L. Fernandez of Monterey have bought a group of mines

east of La Ventura, and will equip the same with machinery for development.

#### San Luis Potosi.

The Monterey News says Treasurer V. Ferrino and Manager M. Martinez, of the Compania Explotadora de Zinc, have started development of a group of mines which produce zinc. Carbonate ores are being taken out for shipment from San Salvador in La Ventura district of San Luis Potosi. Shipments will probably be made to Swansea, Wales.

#### Sinaloa.

At the Dura mine F. Aragon, of Cosala, is putting in machinery for a concentrating plant and hoisting works.

The San Fernando G. M. Co., C. W. Pritchett manager, is putting in machinery at its mines at San Fernando. The machinery is for enlargement of the reduction plant.

#### Sonora.

The Gold Coin P. & Dev. Co., L. Ginger of Colorado Springs, Colo., president, will increase machinery equipment of its mines in Sonora.

J. L. Giroux of Los Angeles, Cal., owner of the Sultana mine at Copete, will build a reduction plant. The main shaft is down 1050 feet, opening up ore to its full depth. The ore carries copper, gold and silver.

Pumping machinery and pipe are being put in at the Bacanora mine, 3 miles from Las Chispas, near Arizpe, by W. H. Colburn and R. J. Verner. A stamp mill has been built and 140 men are at work.

#### Queretaro.

O. and T. Braniff will increase development of their mining properties at Cadereytas and will put in additional machinery equipment. They have organized the Braniff M. & S. Co., and report \$500,000 gold will be expended in development work. A wagon road will be built from the mining camp through the Cadereytas to Bernal, a station on the National railway. The length of the road will be 40 miles. A concentrating plant will be erected at Maconi with initial capacity of 200 tons—the ultimate capacity will, however, be 500 tons daily. Considerable cableway work will also be carried out. E. A. H. Tays will be resident engineer in charge of development work.

#### Zacatecas.

The Alma M. & M. Co. of Los Angeles, Cal., operating at Nieves, has its 100-ton concentrating plant running on ore from the dump. The company is building a 50-ton smelter. Two hundred men are at work. P. B. McCabe of Los Angeles, Cal., is president.

W. C. Carpenter et al. of Torrington, Mass., are unwaterring the Santa Rita mine, near Nieves. The shaft is being enlarged to a double compartment.

## NEW ZEALAND.

The gold returns of New Zealand for the month of August amounted to 46,773 ounces, valued at £178,624, as compared with 30,074 ounces, valued at £110,572, for August, 1903.

## SWEDEN.

The Swedish Board of Trade reports the quantity and value of minerals extracted during last year were:

	Metric Tons.	Value.
Iron ore.....	3,677,841	16,626,381
Silver and lead ore.....	9,792	191,005
Copper ore.....	36,687	331,725
Zinc ore.....	62,927	2,233,681
Manganese ore.....	2,344	36,550
Pyrites of iron.....	7,793	46,000

\*Krona = \$0.27.  
Increase over preceding year is shown except in manganese ore. The output of coal in 1903 was 320,390 metric tons, as against 304,733 metric tons in 1902. The refractory clay deposits, which are worked in connection with the extraction of coal, produced 172,718 metric tons of clay.

## Trade Treatises.

Fourth Edition Catalogue No. 14, from the Risdon Iron Works, San Francisco, Cal., illustrates and describes in detail the Johnston concentrator.

Catalogues 1018 and 1020 from the Atlas Car & Mfg. Co., Cleveland, Ohio, illustrate and describe in detail their many makes of mine cars, skips, turntables, trucks, switches, etc.

The largest and finest trade treatise received this week is entitled "Lidgerwood Cableways." It is from the Lidgerwood Mfg. Co., 96 Liberty St., New York City, and contains 160 pages, 9x11½ inches, handsomely portraying the numerous styles of cableway transportation put in by the Lidgerwood Mfg. Co. in various parts of the world and in as many different forms of industrial activity. The catalogue is a creditable and comprehensive work.



## Personal.

W. E. DEFTY will be in Montana during October.

E. O. C. ORD is manager of the Pittsburg mine, near Nevada City, Cal.

A. I. GOODELL has assumed charge of Le Roi smelter at Northport, Wash.

C. A. BROCKINGTON is manager of the Orleans M. Co., near Grass Valley, Cal.

J. F. BRANDES returned to Denver, Colo., last week from a ten months' visit in Europe.

H. O. GRANBERG is manager of the Anchora mine at Copperton, near Dillon, Wyoming.

L. R. POUNDSTONE has resigned as superintendent of the Gaston mine at Gaston, Cal.

H. WAYNE is assayer for the Mariposa C. & M. Co. at the Princeton mine, Mount Bullion, Cal.

GRANT FORD is electrical engineer for the Velardena M. & S. Co., at Velardena, Durango, Mex.

R. HEATH is foreman of the Bamberger-DeLamar mine at De Lamar, Lincoln county, Nev.

R. E. WALSH is manager and superintendent of the Black Oak G. M. Co., operating at Angels, Cal.

J. SMITH is superintendent of the mines of the Black Hills & Denver G. M. Co., near Rollinsville, Colo.

J. H. MORELAND has been appointed assayer to the U. S. Surveyor of Customs at Kansas City, Kansas.

E. TRUXALL, of Pittsburg, Pa., is president of the Truxall Con. M. & T. Co., operating at Dumont, Colo.

W. B. ALBERTSON is assistant superintendent of the Clover Creek Cinnabar Co., northeast of Redding, Cal.

C. T. ARKINS, recently of Denver, Colo., is superintendent of the Horseshoe mill at Kalgoorlie, Western Australia.

K. SOPER is superintendent of the Union M. & Exp. Co., operating the Modoc mine, near Central City, Colo.

M. H. FRENCH is manager of the Black Hills & Denver G. M. Co., operating in Boulder Park near Rollinsville, Colo.

ALBERT C. CALKINS of the Calkins Co., Los Angeles, Cal., has returned from a business visit to San Francisco, Cal.

LEE COCHRANE, of the Mine & Smelter Supply Co., Denver, Colo., is in San Francisco, Cal., en route to Portland, Or.

F. I. CAIRNS, formerly connected with Montana copper smelter, is manager of the Michigan S. Co., near Houghton, Mich.

E. L. YOUNG is underground superintendent of the Gladstone mine of the Hazel G. M. Co. at French Gulch, Shasta county, Cal.

J. MACDONALD, general superintendent of the Treadwell mines, on Douglas island, Alaska, has gone East, to be absent several months.

F. M. FLYNN has resigned as assistant superintendent at the smelter of the Cia. Metallurgica de Torreon, at Torreon, Durango, Mex.

F. M. MILLER of Grass Valley, Cal., is superintendent of the Gaston mine at Gaston, Nevada county, Cal., vice L. R. Poundstone, resigned.

H. N. SIMS, formerly manager of the Sun & Moon mine at Idaho Springs, Colo., is with the Traveler's G. M. Co., at Atlantic City, Fremont county, Wyo.

R. P. NOBLE, recently of the University of Chicago, at Chicago, Ill., has been appointed professor of chemistry in the New Mexico School of Mines, at Socorro, N. Mex.

C. E. BRAINARD has resigned as metallurgical engineer of the N. A. Furnace Co. and assumed charge of the mining department of Fairbanks, Morse & Co., Chicago, Ill.

E. H. BENJAMIN, secretary California State Miners' Association, has returned to San Francisco, Cal., from St. Louis, Mo., where he was on the jury of awards, in the World's Fair.

R. E. LYMAN has resumed his position as professor of civil engineering at the University of Utah, Salt Lake City, Utah, after a two-years' leave of absence for advanced study in the East.

L. W. TRUMBULL, E. M., of the University of Wyoming, Laramie, is examining placer property in the Medicine Bow

mountains, preparatory to the installation of dredgers and sluices.

F. A. BRISTOL, recently manager of the Jupiter and Simmer West mines, on the Rand, is manager of the Robinson Deep G. M. Co., Ltd., at Johannesburg, South Africa, vice W. J. S. Stubbs.

D. GILLIES has resigned as superintendent of the Pittsburg & Montana C. Co., at Butte, Mont., and has gone to Tonopah, Nev., as manager of the Montana-Tonopah M. Co.

R. RILEY, recently superintendent of the Vine Spring mine in Tuolumne county, Cal., has been appointed superintendent of the Mountain Maid mine, near Nevada City, Cal.

W. WATSON, manager of the South Rose Deep, Ltd., mine on the Rand, is manager of the Jupiter and Simmer & Jack West mines, near Johannesburg, South Africa, vice F. A. Bristol, resigned.

ASSISTANT SUPERINTENDENT R. A. KINZIE is in charge of operations at the Treadwell mines at Treadwell, Douglas Island, Alaska, during the absence of Superintendent J. A. MacDonald, who has gone East.

G. F. COLLINS, who has extensive acquaintance throughout the East among officials and engineers of large railroad and steel companies, has recently entered the employ of the Allis-Chalmers Co. as special representative at their New York office.

## Commercial Paragraphs.

THE Brown Corliss Engine Co. of Corliss, Wis., have shipped a large compressor to the J. I. Case Plow Works, Racine, Wis.

THE Burt Manufacturing Co. of Akron, Ohio, have recently sent six oil filters to supply their trade at St. Petersburg, Russia, and twenty-seven oil filters and exhaust heads to their agency at Genoa, Italy, as well as a shipment of twelve exhaust heads and three oil filters to their agency at Malmo, Sweden.

THE Jeaneville Iron Works Co., Denver branch, reports shipments of compound condensing mine pump, high lift, to Park City, Utah; one improved Jeaneville sinker to Cripple Creek; one sinker to Durango, Colo.; one to Boulder, Colo.; one sinker to local dealers; one station pump to Silverton, Colo., and one station pump to Wyoming.

SPENCER MILLER, chief engineer of the Lidgerwood Manufacturing Co. of New York City, has returned from St. Petersburg, Russia, where he went by request of the Russian Government to inspect ten Lidgerwood marine cableways which had been installed upon the ten largest battleships and cruisers of the Baltic fleet, known, however, in Russia as the second Pacific squadron, the sailing of which has been announced this week.

ERNEST H. SIMONDS, assayer and chemist of San Francisco, and Lochiel M. King, recently superintendent for the American S. & R. Co. at Oakland, Cal., have formed a partnership as metallurgical engineers, assayers and chemists. The new firm will continue the former's practice and retain the offices and laboratory of Mr. Simonds at 417 Montgomery street, San Francisco, Cal., and in addition will engage in general practice as metallurgical engineers.

THE Union Gas Engine Co. of San Francisco, Cal., is building a 125 H. P. 3-cylinder marine engine and a complete electric light plant for Williams, Dimond & Co. of San Francisco, to be installed in a German ship. This company is also building an 85 H. P. heavy duty engine, and a 20 H. P. stationary gas engine, both fitted to run on crude oil, for the Mine & Smelter Supply Co. of Salt Lake City, Utah. These engines to be used by the Pfau G. M. & R. Co. of Cherry Creek, Ariz.

The Power & Mining Machinery Co. of Cudahy, Wis., have a contract from the Western Gas & Fuel Co. for one 2-cylinder American-Crossley gas engine, 28x36 inches, single acting; speed 130 revolutions per minute; normal brake H. P., 510; maximum, 570; direct connected to two Ingersoll-Sergeant 14x36-inch single-acting compressors; cylinders located in tandem to the gas cylinders to be used for compressing gas entering the cylinders at an initial pressure of 50 pounds, and discharging at 350 pounds. The gas will enter the compressor cylinder at the end nearest the gas engine and will pass through the piston inlet valve to the other side on the forward stroke of the engine, compressing on the return stroke. This construction permits of minimum

clearance in the compressing end of the cylinder and at the same time effectually prevents any chance of leakage of gas into the room; any leakage past the piston, as will be seen, returns to the inlet side. The company's guarantees cover the gas consumption of the engine when operating at rated load, at 500 brake H. P., at which load they have guaranteed a gas consumption of 114 cubic feet of natural gas having a calorific value of 1000 British thermal units per cubic foot. They have further guaranteed that with 1000 cubic feet of gas used in the gas engines of this value 36,480 cubic feet of gas per minute, measured at atmospheric pressure, will be delivered. Gas pumping plants in Indiana and Ohio are now reported using practically 25% of the output of the wells for pumping. It is stated that the plant to be installed by the Power & Machinery Co. will do the work on 34%.

## Latest Market Reports.

SAN FRANCISCO, October 7, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 57½c, refined (1000 fine); San Francisco, 57½c; Mexican dollars, 47c San Francisco, 46c New York.

COPPER.—New York: Standard, \$12.87½; Lake, 1 to 3 casks, \$13.00; electrolytic, 1 to 3 casks, \$12.85; Casting, 1 to 3 casks, \$12.75; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £58 10s 6d spot per ton.

LEAD.—New York, \$4.30; Salt Lake City, \$3.50; St. Louis, \$4.12½. San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £11 10s 9d long ton.

SPELTHER.—New York, \$5.20; St. Louis, \$5.00; London, £22 15s 3d; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$28.25@28.50; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, \$32½@35c. London, £129 5s spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BARBIT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 16c.

ZINC.—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

NICKEL.—New York, 40@47c ½ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.75 @12.85; gray forge, \$12.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c ½ lb.

### CHICAGO CURRENT QUOTATIONS.

Bessemer	14 50@14 75
Charcoal	14 75@15 00
Foundry Northern 1	14 00@14 25
Northern 2	13 50@13 75
Northern 3	13 00@13 25
Southern 1	13 65@13 90
Southern 2	13 15@13 40
Southern 3	12 65@12 90
Forge	11 90@12 15
Billets, Bessemer	—@22 50
Bars, iron	1 35@1 40
Bars, steel	—@1 46
Rails, standard	28 00@28 00
Rails, light	23 00@25 00
Plates, boiler	1 71@—
Tank	1 56@—
Sheets, 27 store	2 17@2 22
Angles	1 57@—
Beams	1 57@—
Tees	1 57@—
Zees	1 57@—
Channels	1 57@—
No. 1 railroad wrought	11 50@12 00
No. 1 cast, net ton	10 50@11 00
Iron rails	16 00@16 50
Car wheels	11 50@12 00
Cast borings	4 00@4 50
Turnings	7 00@7 50

WHITE LEAD.—Per lb., in kegs, 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½ lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary

sizes, \$24.00@25.00; extra sizes higher: redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for car-load lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city ½ bbl.

CEMENT.—Imported, \$2.15@2.65 ½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 ½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1½, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9c; less than one ton, 11c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c ½ lb.; carloads, 23@24c; in tins, 30c; soda ash, \$2.00 ½ lb. 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ½ lb.; Cal. s. soda, bbls., \$1.20@1.40 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c ½ lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1½@2c ½ lb.; nitric acid, carboys, 8c ½ lb.

OILS.—Linseed, boiled, bbl., 53c; cs., 58c; raw, bbl., 51c; cs., 56c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Ecocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 88° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c ½ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c; Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c ½ lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c ½ lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, ½ lb., 7c; less than 500 lbs., 7½c. LITHARGE.—Pure, in 25-lb. bags, 8@9c ½ lb.

MOLYBDENUM.—Best, \$2.75 ½ lb.

CHROMIUM.—90% and over, ½ lb., 80c.

PHOSPHORUS.—American, ½ lb., 70c.

SILVER.—Chloride, ½ oz., 90c@1.00; nitrate, 55c.

MERCURY.—Bichloride, ½ lb., 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—½ lb., \$2.75.

SODIUM.—Metal, ½ lb., 50c.

BISMUTH.—Subnitrate, ½ lb., \$2.10.

URANIUM.—Oxide, ½ lb., \$3.50.

FIRE BRICK.—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

### Dividends.

Bunker Hill & Sullivan M. & C. Co., dividend No. 84 of \$75,000; payable Oct. 4.



## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING SEPTEMBER 27, 1904.

- 771,114.—TELEPHONE SWITCH—Audriano & Herbst, S. F.  
 770,841.—EDUCATIONAL CONCENTRATOR—J. F. Barker, Los Angeles, Cal.  
 770,953.—RULE HOLDER—W. O. Bell, Soldiers' Home, Cal.  
 771,030.—BED—F. W. Boecker, Oakland, Cal.  
 770,957.—FRUIT PITTER—J. S. Briggs, Los Angeles, Cal.  
 771,121.—JAR CLOSURE—W. E. Brown, Los Angeles, Cal.  
 771,122.—BOTTLE—F. A. Busse, Alameda, Cal.  
 771,128.—HYGIENIC MOUTHPIECE—H. L. Cutter, Los Angeles, Cal.  
 770,898.—STEAM GENERATOR—I. T. Danks, Fresno, Cal.  
 770,747.—POSTOFFICE BOX—W. & M. H. Folsom, Pilotrock, Or.  
 771,005.—PUMP HEAD—S. M. Fulton, Pomona, Cal.  
 771,205.—DRILL—F. P. Hepler, Crescent City, Cal.  
 771,070.—MUFFLER—W. J. Hewitt, Del Monte, Cal.  
 770,857.—GUIDE SHEAVE—Hollenbeck & Palmer, S. F.  
 770,858.—TROLLING SPOON—R. C. Hornung, S. F.  
 771,016.—AXLE CUTTER—Ingram & Stickney, Sacramento, Cal.  
 770,072.—PUZZLE—E. G. Jackson, S. F.  
 771,153.—HOUSE CONSTRUCTION—W. C. James, Cucamonga, Cal.  
 771,154.—HOUSE CONSTRUCTION—W. C. James, Cucamonga, Cal.  
 770,969.—REFRIGERATOR—E. Johns, Puyallup, Wash.  
 770,758.—ROAD GATE—H. Kirch, Santa Rosa, Cal.  
 770,804.—GUIDE—ZITHER—M. Kolander, S. F.  
 771,165.—CANE AND STOOL—Manderson & Coombs, Seattle, Wash.  
 770,866.—PUMP—R. J. Mullin, Seattle, Wash.  
 770,868.—HARROW TOOTH—J. Porteous, Fresno, Cal.  
 771,308.—GAGE COCK—J. W. C. Prochnow, Flagstaff, Ariz.  
 771,010.—GAME TABLE—P. J. Sausen, Seattle, Wash.  
 771,108.—HOIST—S. T. Wallace, Los Angeles, Cal.  
 770,881.—PLANE—J. Weyland, Los Angeles, Cal.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

GUIDE SHEAVE FOR HOISTING APPARATUS.—No. 770,857. Sept. 27, 1904. J. W. Hollenbeck and Wm. E. Palmer, San Francisco, Cal. This invention relates to a guide sheave for hoisting and like ropes and means for adjusting said sheave to the varying directions of travel of the ropes. It consists in a support from which each sheave is suspended and about which it is turnable in conformity with varying movements of the rope. The object of the invention is to provide what is known as a "guy" or guiding sheave over which the rope passes, with a means for automatically adjusting it to the varying changes of the rope as it is caused to swing from side to side, this sheave being placed at some point between the winding drum and the outer connections of the ropes.

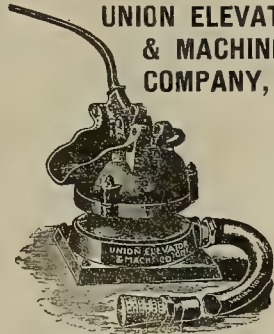
TROLLING SPOON.—No. 770,858. Sept. 27, 1904. R. C. Hornung, San Francisco, Cal. The object of this invention is to provide a lure or decoy of simple construction which will generally simulate the movements and characteristics of such fish as are preyed upon by other fish and which will maintain such simulation whether the trolling boat moves fast or slow through the water. The invention comprises a trolling spoon generally oblong in appearance with curved symmetrical ends, a portion of the spoon intermediate of its ends having oppositely upturned edges and essentially ogee in form in the direction of its width.

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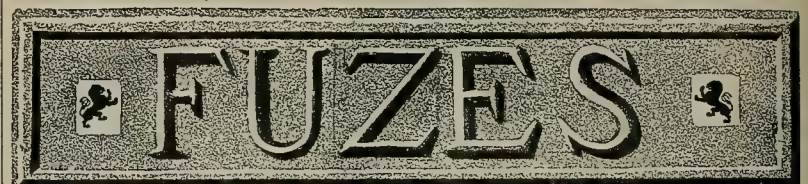
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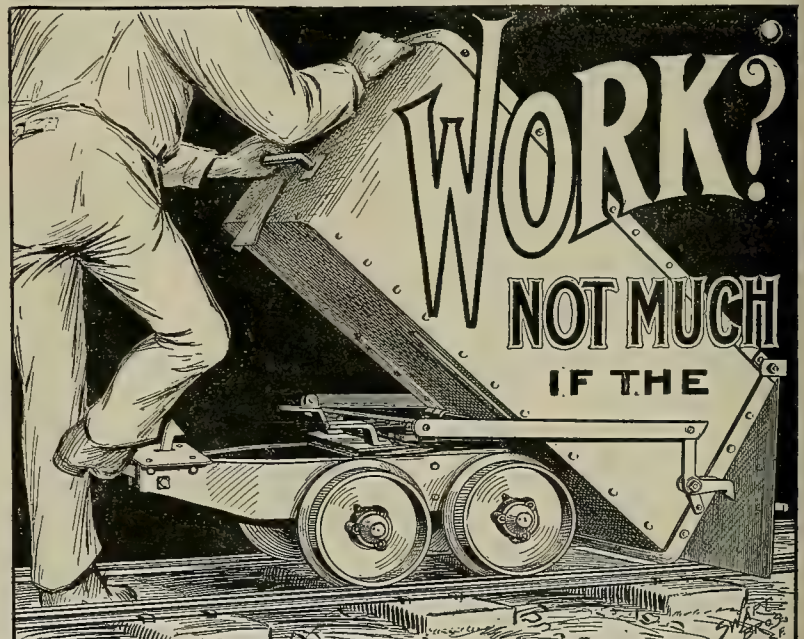
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## The Promoter in Mining.

That the promoter is a necessary adjunct to the growth of the mining industry seems an established fact. The prospector goes into the mountains to search for mineral, finds it, and locates the government land upon which the mineral is found. He is usually a man of little—often of no means. He seldom comes individually in touch with the capitalist whom he expects eventually will buy and operate the mine which he has found and commenced to develop. The promoter is really nothing more nor less than a broker who carries on negotiations (with greater or less success and profit to himself) between the claim owner and the person or persons who buy, equip and operate his mine. The promoter has as much a place in the economies of modern mining as the prospector or the capitalist, and has become an important factor in the industry. There are, however, a number of grades of promoters—high grade, low grade and base. A first-class promoter will deal only in what he considers “gilt edged” properties—those having actual merit, and the development of which shows values somewhere near the price asked for the property. He makes mine promotion and brokerage his business, and having once done business with wealthy clients treats them in such a manner that he can at any time do business with them again. He is careful in his selection of property for disposal to his clients, careful to state facts only, and careful not to take so large a commission as to result in his being unable to do further business with the buyer should information of its amount come to his knowledge. There is another type of promoter who takes a good prospect, and “promotes” it by organizing a company with a capital stock running into the millions of dollars, and sells stock to those who are willing to draw 20% per annum on this inflated valuation. His prospectus is not characterized by the moderation of its statements, but is couched in language which every practical miner recognizes at once as the work of the novice at everything connected with mining, and the prospectus as the height of artistic and conscienceless lying. A third class of promoter needs nothing better than a prospect hole, with or without ore, upon which to base statements calculated to trap the unwary into investing in the stock of the wildcat concern. The inexperienced are unable to distinguish the bona fide from the “fake” scheme, and many invest their savings only to lose them. Instances of this character are of frequent occurrence.

Although this class of promotions is of frequent occurrence and the complaint of those who have been



Santa Ysabel Hoist, Quartz Mountain, Stent, Cal. (See Page 257).



Santa Ysabel Mill on Quartz Mountain, Stent, Cal. (See Page 257).



The App Mine, at Quartz Mountain, Mother Lode, Tuolumne County, Cal. (See Page 257.)

“taken in” in their desire to “get rich quick” is equally frequent and loud, yet the honest promotion of legitimate mining enterprises is successfully continued and will continue, for the integrity of the men engaged in this latter class of promotion is a sufficient guarantee of the character of the proposition offered. The most successful operators are those who carefully select good mines, equip and further develop them, place them on a paying basis and then sell them to the investing public at a price commensurate with the actual value of the property. In this case the buyers, through the agents or brokers, become themselves promoters. It is something along these lines that some of the largest and most successful mining operations of recent years have been promoted, and, without doubt, the method is an excellent one, fruitful of good results and worthy of emulation by others engaged in the promotion of mining properties great and small. There are many engaged in this business of acting as an agent or broker between the mine owner and capitalist, and fair dealing will do more to promote confidence in legitimate mining than anything else, for there are always those who are willing to take a reasonable risk if they feel confident they are not to be robbed, for no one likes to contemplate being fleeced.



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J. F. HALLORAN.....Publisher

SAN FRANCISCO, OCTOBER 15, 1904.

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## The Labor Situation.

From the mining States come at present little reports of labor difficulties. Strikes are on in only a few unimportant localities, but there are in some directions expressions of fear of a renewal of strife between mine operators and the Western Federation. In the Lake Superior copper region the agitators of the Western Federation are quietly at work endeavoring to get a following among the miners of that region, but thus far only a few of the weaker element have joined. For years the mines of the Lake have run successfully and peacefully, and the miners appear satisfied. Many of them own their homes and conditions are satisfactory to the sober-minded and industrious workmen.

In the Black Hills of South Dakota the Federation dominates everything except the Homestake mine. At Lead City is a powerful local union, but its officers are steady men of brains and experience. During the twenty-seven years of their existence the Lead City Miners' Union has never had a serious disagreement with the Homestake Company, which shows that under wise counsel labor unions can exist and thrive when the right kind of men are at the helm. At Leadville, Colo., the Western Federation has succeeded in securing an injunction against the Mine Operators' Association, enjoining them from discriminating against Federation men. It is said over 2000 operators' cards have been issued. What advantage is derived from this injunction of the court it is difficult to see. Leadville has had a peaceful career during the past eight years, and the district is more prosperous than at any time within a decade, and all interested in the success of the mining industry there regret to see the clouds of dissension arise. It is probable, however, that the prompt action of the Mine Owners' Association in anticipating trouble will have a deterrent effect. At Cripple Creek the mines are operating smoothly and the outlook for a peaceful continuance of these conditions through the approaching winter is good at present. In California there are heard occasional reports of threatened trouble, but nothing of a serious nature has occurred there for several months. In the Great Basin region there are no troubles worthy of mention at this time, miners and owners alike being too busily engaged in the development of the mineral resources of the country to stop to argue over wage rates, hours or other conditions of employment. In New South Wales, Australia, several large mines have recently been closed owing to demands of organized labor, the management of the mines declaring that to meet these demands would result in running the mines at a loss. These troubles are thus far confined to the Lloyd and Cobar copper mines. At the Lloyd mines the result of operations was becoming discouraging and the manager prepared a sliding scale of wages depending upon the financial result of operations. This was submitted to the men. It provided that if during a month's run the mine did not pay, the men's wages should be reduced, but if the following or any subsequent month the mine showed a profit the wages should be advanced accordingly. Also if at the end of the year there was a profit the men should receive a certain pro rata as a reward for the risk they had taken. The miners admitted the eminent fairness of the proposition, but the wood choppers refused to agree. The arbitration court suggested that the men accept the reduced wage rate until the court could examine into the matter and determine upon its merits, but the union declined to accept the suggestion, and as a consequence the mine was closed down, throwing 1500 men out of employment. The obstinate wood cutters are in the minority—350 in number—and it is they who are the most seriously affected. At the Great Cobar mines the union has submitted a new scale of wages and conditions of employment. The demand contemplated an increase on the existing scale of 42%. As at the Lloyd mine, the miners are apparently willing to let well enough alone, evidently realizing that the company may close the mine, but the officers of the union insist upon the terms as set forth in the official demand. There are 1300 men employed at the Great Cobar mines, and it is said that 5000 people will be directly or indirectly affected by the closing of the mines. It is merely another evidence of what can be accomplished by professional labor agitators. It is stated

that rather than be dragged into the prolonged and expensive litigation incident to a hearing before the Judicial Arbitration Court the directors will close the mines.

## Pioneers in Mining.

The object which men have in view when locating new mining claims is, primarily, the making of money—making it in some indefinite, unforeseen way, and in larger amount than would be possible by the slow process of working for a stipulated daily wage, and saving each day a portion of their earnings, no matter how small. The average prospector is willing to face uncertainty and endure hardship and privation, but the idea of building up a fortune by the practice of self-denial and long-continued patience is almost unknown to him. He may subsist upon plain and sometimes scant food, but his outdoor life and hard work make him strong and healthy and self-reliant, and he lives in the future. He goes out on his search for a fortune with a light heart, and with optimistic faith in his own ability to win it from the rocks. This is written of the real prospector—he who actively engages in the business and work of looking for new veins and deposits of ore, but does not apply to so great an extent to another class who might, perhaps, better be styled "locators"—a class of men who rush precipitately into a newly discovered district and locate everything in sight, taking advantage of the result of the pioneer work of the prospector who made the first discovery. The aim of the first is to find a new deposit of mineral, develop and work, or sell it, and thereby secure the long-hoped-for competency. The aim of the other is to secure all the ground he can which he hopes he may be able to sell to his own advantage to some one who desires to emulate in a measure the real prospector by mining in search of pay rock. The prospector of the first class is necessary to the development and extension of the mining industry. He of the second class is inevitable. He, too, is useful, but not to so great an extent as the pioneer prospector, who has nothing but his knowledge, gained of experience, to guide him. The second fellow has the way paved for him, and although entitled to less than the former, he often gets as much or more. He is in evidence in every attractive and rich camp, and doubtless he will be as enduring as the other, for to a great extent the mining laws give him the same privileges and opportunities as his brother, the pioneer, and seeing this he often takes more.

ANOTHER large ore body of gold rock is reported discovered on Breece hill, at Leadville, Colo. This new find was made some time since, but has been kept quiet while development progressed. The new find is in the porphyry, and is similar to the Antioch, Ibex, Resurrection and other gold deposits back of the city of Leadville. Although mining has been vigorously prosecuted for twenty-seven years in Leadville, new and important strikes of large ore bodies continue to be reported. The most noted among these are the recent development of sulphide ore on the Coronado mine, under the town of Leadville, the strike of carbonate and chloride ore on Rock hill, south of town, and now this find of siliceous gold ore on the mountain east of the city. These several strikes will do much to stimulate prospecting in that camp, and it is highly improbable that all of the ore deposits are known. There still remains a large area of undeveloped territory on the range back of Leadville, and what may exist under the western part of town is entirely speculative, while development has seldom, if ever, been carried below the lowest known ore-bearing limestone, although there appears to be great possibilities in the underlying quartzites of the Cambrian.

ANOTHER large electric installation in the mountains of California has been planned to furnish power to the mining and other industries. The plan, it is said, involves driving a tunnel nearly 3 miles in length, which will make available a water power of 500 cubic feet per second, developing 15,000 horse power. This new company, it is stated, has bought the privileges of the Fort Miller Company, organized in 1900. Fort Miller is the name of a small fortification, now in ruins, situated a few miles above the village of Pollasky, east of Fresno, and on the banks of the San Joaquin river.

THE statement in some detail appearing elsewhere herein of the cost of producing copper in Tennessee is of interest for the purpose of comparison with the cost of similar operations in the mines of the West and elsewhere. The cost, \$3.08 per ton of ore treated, is lower than at most places in the Western States. In this regard it is to be remembered that wages are lower in Tennessee than in the West, or abroad.

THE inventive genius of numerous experimenters in the treatment of gold ores by the cyanide process is being directed toward an improvement in filter pressing which will lessen the time required to charge and discharge the presses and at the same time, if possible, to secure a lower percentage of moisture in the cakes, and decreasing the cost of operation. In view of this fact, some innovations in filter press practice and possibly in the construction of these machines may be anticipated.

THE thirteenth annual session of the California Miners' Association will meet in San Francisco, Cal., on December 5-8, 1904. It is proposed that the morning sessions shall be devoted to the reading of papers on practical mining subjects by experienced men, being somewhat of an extension of the innovation made in the two preceding annual conventions of the Association. A further idea of the program as outlined is to have the afternoons of each day given to excursions of local interest. The California State Miners' Association has had an honorable and fairly successful existence and is possessed of much deserved prestige. It has done considerable for mining and is capable of continuing such work. The annual sessions have always been seasons of pleasure and mutual profit, and the forthcoming convention will doubtless be no exception to the general rule.



## CONCENTRATES.

"CHEMICALLY PURE LEAD" can be had from any dealer in assay supplies, but would cost more than its ordinary use would warrant.

GRAPHITE is a good lubricant for the hot crank pin. The questioner might also try a mixture of nine parts valve oil and one part white lead.

THE fibrous talc sent is coarse, of short fiber and hence of little value. That substance, when of suitable structure, is used by makers of paper and dynamite.

IF distance and transportation prevent hauling to the chlorination plant, the iron sulphate can be made right at the mine from scrap iron, sulphuric acid and water.

IN beginning the development of a placer mine, it is desirable, where possible, to have the main sluices in the open air, rather than in a tunnel, though the latter is permissible when necessary.

MANY large quartz veins show a cross fracture extending at approximately right angles to the walls and extending from wall to wall. This cross fracture is sometimes mistaken for dip when the walls of the vein are not visible.

IN many instances where leather or rubber does not make a satisfactory gasket, sheet lead may be used as a substitute. This is particularly applicable to cases where steam pipes are frequently connected and disconnected, as about a mine pump.

THE longest tunnel in the world is the Simplon, recently completed. It passes through the Swiss Alps, joining Switzerland and Italy, and is 12 miles 1374 feet in length. The St. Gothard is  $9\frac{1}{2}$  miles long, the Mount Cenis 8 miles and the Arlberg  $6\frac{1}{2}$  miles.

CALIFORNIA is the principal State producing magnesite. It is found in abundance in a number of counties, notably in Alameda, Santa Clara, Tulare and Napa, and in smaller amount in many others. The magnesite used east of the Rocky mountains is mostly imported from Greece.

GRANITE and rhyolite belong to the same rock family, granite being the plutonic, deep-seated rock and rhyolite the eruptive, volcanic equivalent. In the same way, yenite represents a deep-seated rock and trachyte its effusive equivalent. Diorite is a deep-seated intrusive rock and andesite its volcanic equivalent.

WHEN designing cyanide or other tanks it is well to remember that timbers and lumber are cut standard lengths, and it is economy to make the size of the tanks such that they will conform as nearly as possible with the standard sizes of timbers and lumber. Thus it is inadvisable to figure on timbers 12 feet 4 inches when the standard sizes are 12 feet and 14 feet.

IN the event of a mineral vein extending into railroad land, if the railroad has not received a patent for the section in question, it is still open to location as mineral land, the same as the adjoining even numbered sections. No mineral is reserved to the railroad company. It is only by taking out a patent for the land before the mineral is discovered and claimed that the railroad companies can hold mineral land.

ASSESSMENT WORK which has been neglected on mining claims during 1904 may be held by the claimants beginning work on the claim before Jan. 1, 1905, and continuing the work until \$100 worth of work shall have been accomplished or improvements made. Some claim holders begin their work in October or November and do \$100 worth of work, and continue into the succeeding year, when they do an additional \$100 worth. By this arrangement they are required to visit the claim only once in two years instead of yearly. If an amount of work be done in excess of the legal requirement during any one year, it does not count on the assessment work required the following year. It is true that in saving a claim from relocation a claim holder may begin the work for 1904 late in that year and finish it in 1905, but he may not do work for 1905 in 1904.

WHERE A buys a one-half interest in an unpatented mining claim from B, and B fails to do his share of assessment work, A cannot relocate all or any part of the claim for himself alone as against B, but A may do all of the necessary assessment work; and then if B refuses to pay his proportion of its cost, A may "advertise Bout," as provided by law. The extension of any claim is subject to location at any time if not already taken, and a discovery of mineral-bearing rock in place can be made on it. Aside from the necessity of making a new discovery on a first location, the acts to be performed in relocating a claim are the same as those followed in making an original location. In relocating, a new discovery is not necessary, and assessment work may be performed in a shaft or other excavation already made,

but the full amount of new work required by law must be performed.

IT is improbable that assays of country rock taken at a distance from a vein are a reliable basis for the supposition that the minerals of the vein were derived from the walls by "lateral secretion." It seems more probable that the minerals found in the country rock at a distance from the vein came from the same sources as the minerals in the vein itself, and reached their present position by slowly infiltrating waters coming up from below through a fissure or zone of fracture and permeating the country rock. Often the mineralization nearest the vein or fissure is more pronounced than at a distance from it, thus indicating the manner of formation of the deposit. The Bunker Hill & Sullivan ore deposit in the Coeur d'Alene district of Idaho is an example of this condition.

RUNNING GROUND may usually be passed through by carrying "breast boards," top and side lagging and employing "false sets" to help sustain the heavy ground. If the ground be very wet, better headway is sometimes made by allowing it to drain. This makes the ground firmer and decreases the tendency to run. No one should be permitted to attempt this class of mining work but experienced men, for, by improper timbering or other faulty work, the entire length of drift in the running ground may be lost. The water should be carried away in a pipe or box, thus keeping the floor as free from water as possible. Swelling ground rarely gives trouble when first cut. It is after being exposed to the air several days or weeks that the rock begins to "swell," and its force is almost irresistible, and can only be safely handled by cutting away the ground forced into the workings and removing it in a car. If the floor of the drift raises, the track must be torn up, if necessary, and the raising ground cut down to proper level. This may have to be repeated many times before the swelling of the ground ceases to be troublesome. If it continues after several months of cutting away and it is necessary to keep the workings open, it were better to drive a lateral drift in the hard foot or hanging wall, until the bad ground is passed. If the walls adjacent to a pay shoot swell, remove the ore as rapidly as possible and allow the workings to close up.

DIORITE is one of the most common intrusive rocks. Its essential constituents are hornblende, quartz and plagioclase feldspar (the feldspar may be variable—usually oligoclase, sometimes andesite, labradorite or anorthite). Mica, pyroxene and occasionally orthoclase are present, but not essential. Magnetite is more or less abundant. The rock varies in texture according as the mass is large or small. In large masses it is generally comparatively coarse in texture, in small dikes fine grained (aphanite). Diorite is usually named in accordance with prominent constituents by the use of descriptive terms as mica-diorite in a diorite where mica is abundant. Diorite-porphyrity is a diorite showing phenocrysts. It differs from porphyry, which is a compact rock of orthoclase or orthoclase-quartz mixture. There are diorite-porphyrity, mica-diorite porphyry and diorite-aphanite. The latter term is applied to diorites so fine textured and dense that its constituent minerals cannot be determined with a lens. The greenish color of most diorites (and also of diabase) is due to the alteration of the hornblende, (and in diabase of the augite) to chloritic mineral. All diorites contain more or less magnetite and often titanite. It is these iron ores that give the black varieties their dark color. The blackest diorites usually appear green or grayish-green in thin section. The grano-diorite of the Sierra Nevada mountains of California contain all of the essential constituents of both granite and diorite, as well as a number of accessory minerals.

THERE are two important processes employed in treating matte containing gold and silver—one, the Hunt & Douglas process, the other the Black & Hartman. By the Hunt & Douglas process the matte is roasted at low temperature with the purpose of forming copper sulphate and oxide, without forming at the same time silver sulphate. The roasted matte is then leached with dilute sulphuric acid, the gold, silver and lead remaining in the residue. To the copper solution obtained is added chloride of lime, and the copper precipitated as subchloride by passing sulphurous acid through the solution. This product is reduced to suboxide by addition of milk of lime, the latter forming chloride of lime, which is recovered for reuse, and the suboxide is melted into bars. The Black & Hartman process of recovering gold from matte is said to be similar to that in use at Argo, Colo. The matte is roasted to convert the silver present into sulphate, in which condition it is leachable by water, the silver being precipitated on metallic copper, the gold remaining in the matte. Or, it may be roasted in a reverberatory furnace to black copper, granulated, ground, roasted and leached with salt solution by the Augustin process, and the silver precipitated. The residue containing the copper and gold is then concentrated in a reverberatory furnace until a small amount of copper is extracted, as a copper bottom, carrying nearly all the gold. The subsequent separation of the gold from these copper bottoms is accomplished by a process that has not been divulged by the management at Argo.

A TANK for holding the drainage water of the level of the mine, and also, if desirable, of the levels above it,

may be cut in the solid rock beneath the station floor or under the floor of a drift at one side. It may or may not be necessary to construct a dam of concrete, or of lumber and clay at one end of this excavation, depending upon the ability of the rocks to hold water. As the space beneath the station is usually taken up by ore pockets, it is the better plan to cut the water tank beneath a drift or make an excavation at one side of the station for the tank. This tank should be provided with a good sized pipe, 6 or 8 inches diameter, extending to the shaft, and provided at one end with a simple "clack" valve which tightly closes the entrance to the pipe. This valve is suspended at its upper edge by a hinge attached to the pipe. The latter is cut at an angle of about 45° to its length, so that the valve when closed rests in a sloping position. A stout cord, or piece of bell line, is tied in an eye on the valve, and this cord passed upward over a pulley and thence horizontally to the shaft, where it is made fast, and within easy reach of the skip tender. At the opposite end of the pipe, and adjoining the shaft, the pipe is provided with several feet of canvas pipe bound tightly to the iron pipe. This permits the skip tender to fill the skip by placing the outer end of the canvas hose in the skip and pulling the cord, which raises the valve in the tank. When the skip is full the cord is released and the valve closes automatically. The canvas hose is hung up on a hook and the arrangement gives no further trouble unless the tank overflows, which it is the duty of the skip tender to see does not occur.

THE location of a mill should always be carefully considered before the site is selected, both with reference to delivery of the ore from the mine and to the operations to be performed within and about the mill. One common error is to place the mill so high that ore must be elevated to get it above the crusher floor, or so low that tailings have to be elevated to get them to a point where they will flow away from the mill. Of the two evils the latter is the least desirable. Ore can be elevated if necessary, but it is probably cheaper to lift it dry and in good sized pieces than to lift it in the form of sand with about four or five times its weight of water in addition. When planning a mill consideration must be given the concentration, as well as the crushing problem. It may be necessary to put in hydraulic classifiers and other devices, as well as concentrating machines, and this requires abundant "fall." Then, too, it may be desirable to subsequently treat the tailings by cyanidation or some other process, and this requires forethought and careful planning. In some instances it is cheaper to tram the ore a considerable distance from the mine to a suitable site than to handle it several times at a site near the mine. The method of transportation in such an instance must be determined by surrounding conditions, the amount likely to be moved daily and the relative cost of each of the several methods which may be employed, as well as the cost of installation. There are a number of methods to choose from—tramping by men, by animals, by steam, by electricity and by compressed air, and sending the ore on an aerial tram either by gravity or by power. It is usually desirable and less expensive to crush the ore in rock breakers at the mine and to send the crushed rock by whatever means may be employed to mill, rather than to put rock breakers in the mill and distribute it by tramping. This is particularly the case with a large mill.

IN many head frames are seen more or less complicated devices for dumping skips, both at vertical and inclined shafts. Experience has shown that this can be quickly and safely accomplished by turning the track from the vertical or inclined direction to horizontal at the proper point above the ore bin in the head frame and placing a bumper on this horizontal track. When the skip is raised to the level of the horizontal section of track the upper wheels pass out upon this flat track and the rear or lower wheels would follow but for the forward wheels striking the bumpers which prohibits their moving farther in that direction. The engineer continues to hoist slowly. Then, owing to the peculiar construction of the skips, the rearward wheels and lower end of the skip are lifted upward clear of the track by the side bars, which are attached either to a bar passing under the bottom of the skip, or as is more common, to lugs projecting from heavy plates secured to the sides near the lower end of the skip. When the skip has been overturned to the proper angle the contents will immediately discharge into the bin and the skip is lowered again, the wheels taking the track, the weight of the lower portion being sufficient to cause the upper wheels to run backward on the horizontal track and the skip again descends the shaft. Lugs on the side of the skip and beneath the side bars prevent the skip from overturning backward in the shaft, either going up or down. The side bars should be set below the center of the skip, if above this medial line there is danger of the bottom end being lifted from the rails and the skip overturned in that manner, if there be sufficient room, or otherwise striking the timbers. In shafts approaching the vertical it is better for safety and fast running to provide side guides. These prevent overturning, and in the head frame they may be dispensed with at the proper point. In dumping in the manner above suggested at vertical shafts it is well to provide some device to prevent overwinding, for if the skip be lifted a few inches too high when dumping, the forward wheels are inclined to run backward and cause a portion of the load to be dumped into the shaft.



## Coal in British Columbia.

Written for the MINING AND SCIENTIFIC PRESS by  
W. A. HARRIS.

Up here, near the portal of the Crow's Nest Pass, nature with a lavish hand deposited bituminous coal measures which for thickness and quality are scarcely rivaled anywhere. The development of this potential wealth so essential to the economic progress of a young nation like the Dominion dates back in a relative sense only yesterday. Coleman, where the Dennison colliery of the International Coal & Coke Co. is situated, had no existence a year ago; to-day it gives promise of soon becoming the chief center of the coal and coke industry of the entire district. The transformation has been little short of marvelous. The coal company is rapidly completing the installation of a plant with a capacity to handle an output of 2000 tons of bituminous coal daily. Since last October 30,000 tons of coal have been extracted in the course of development. A fortnight hence, even before the most essential equipment shall have been installed, the colliery will be maintaining an output of 500 tons daily. It is conservatively estimated that the production will reach 1000 tons daily by January 1 next, and 2000 tons per day—the limit of the plant—by May or June next. Thus far the entire output has been sold in advance. To accommodate the growing traffic, the Canadian Pacific Railroad has built 2½ miles of tracks and sidings on the company's property at Coleman. A double battery of 104 coke ovens, capable of producing 140 tons of coke daily, were completed recently, and provision has been made for the erection of 300 additional coke ovens at an early date. A portion of the coking plant is now in operation. It is producing a superior quality of coke, which finds a ready market in the British Columbia smelters.

This, in outline, is the story of the results accomplished at Coleman in less than twelve months. The company employs about 300 men, including mechanics engaged in construction work. A noteworthy feature is the fact that the coal extracted in the course of development has thus far actually paid all costs of development of the mine.

The bituminous coal lands acquired by this company extend about 7 miles north and south on the strike of the coal measures, and south of the railway. The main line of the Crow's Nest branch of the Canadian Pacific Railroad passes within 200 yards of the main entry of the mine. The seams—seven in number—run parallel north and south and are embraced in an area less than 700 feet wide. The croppings can be plainly traced at intervals on the surface for 2 miles north and 5 miles south of the track. The seams have a westerly dip of about 35°, and are regular and in good condition wherever tested. With one exception, they are all east of and under that now known as No. 2, and on which for the present most of the development has been done. No. 1, the most westerly seam, is about 5 feet in thickness; No. 2 is 14 feet; No. 3, which is opened 2 miles away to the southward, is 17 feet; No. 4 is 8 feet and No. 5 about 7 feet. A Pittsburg, Pa., consulting coal mining engineer last year estimated the coal in sight above the water level of the Old Man river at 64,000,000 tons. The coal taken out in development is excellent for steaming purposes, being free from impurities. It runs from 60% to 65% in fixed carbon, and makes a firm coke of good quality.

Development work is being concentrated on No. 2 and No. 4 seams. The main entry and airway driven on No. 2 seam are now in about 2200 feet. This seam is uniform throughout, averaging about 14 feet in thickness. Coal has been extracted from this working daily since the commencement of operations. At a point 1000 feet distant from the pit mouth of the main entry and airway a crosscut was driven at 45° through rock, intersecting No. 3 seam, 150 feet distant, and encountering No. 4 seam 80 feet farther east. The development of No. 3 seam has not yet been undertaken. An entry and airway have been driven south from the crosscut along No. 4 seam for a distance of about 500 feet. This seam is 8 feet in thickness, possesses a good roof and bottom, and in the matter of dip presents the same uniform characteristics as No. 2 seam. The entries on the coal have already opened up a large area of ground. The mine is being developed on the stall and pillar system, with barrier pillars. Later on the crosscut from No. 2 to No. 4 seams will be extended farther east to intersect the three other seams. The face—2000 feet from the portal of No. 2 seam—owing to the gradual rise of the mountain, gives a depth of 400 feet vertically from the surface. A slope now being sunk on No. 2 seam is down 400 feet on the pitch of the seam. Lifts will be made every 300 feet. This will provide rooms 300 feet in length, thus affording a rapid and economical method of development and extraction, combined with safety. Every device known to modern coal mining practice is being utilized. The main system of ore haulage will be compressed air. The workings will be ventilated by a reversible fan 16 feet in diameter, driven by a two-speed 150 H. P. motor, and will furnish 150,000 cubic feet of air per minute. This fan—now being installed on No. 2 seam

at the surface—will be in operation some time during the present month.

The policy of the company is evidenced by the large expenditure in the erection and equipment of the surface works, including the power house and tippie, all of which are nearing completion. These works are situated north of Old Man river and alongside the main line of the railway. The powerhouse—80x82 feet—is a fireproof (stone) structure. It contains six boilers, each of 125 H. P. capacity. The engines—two in number—are each of 400 H. P. capacity. The engines are directly connected with two 250 K.W. electric generators (equivalent to 335 H. P. each), supplied by the Westinghouse Electric Co. of Pittsburgh, Pa. These generators will furnish the electrical current for the various motors to operate the fan, tippie, larries, machine shop, and for the lighting of the town of Coleman. Other machinery equipment comprises a Rand compressor of 1000 pounds pressure for the purpose of furnishing air for the car haulage system throughout the mine. This machine compresses air at the rate of 750 cubic feet per minute.

The tippie—situated at the railway track and 200 yards from the colliery—is the largest affair of the kind in the Crow's Nest district. It has a handling and storage capacity of 4000 tons of coal daily. A steam hoist of 100 H. P. will hoist the cars from the yard in a self-dumping cage 80 feet to the top of the tippie. The coal, after passing over a series of screens, falls upon two picking tables, with a capacity of 100 tons each per hour and driven by a 25 H. P. electric motor. Falling by gravity, it is automatically screened and delivered in bins in the lower floor of the tippie, ready for shipment by rail. The slack coal, previously separated, is delivered into other bins, whence it falls into the larries (cars), which in turn convey it and automatically dump it into the coke ovens, a short distance away. The tippie has a capacity of 2000 tons every ten hours. If worked full time, it will be ample to handle the output of the mine for several years to come. The larries which convey the slack coal to the coke ovens are operated by electricity. The loading of the railway box cars will be effected by means of a car loader located in front of the tippie and alongside the railway track. This device is a great labor saver and prevents breakage of the coal.

The company has also erected machine, blacksmith and woodworking shops. Power furnished by a 25 H. P. electric motor.

At the present rate of development Coleman is destined to become one of the largest and most prosperous towns on the Crow's Nest Railway. The Canadian Pacific Railway is a large consumer of coal, and the wants of thousands of settlers on the prairies for purely domestic purposes are growing, and are likely to tax the productive capacity of many coal mines. A considerable proportion of the output will be converted into coke, for which a ready market is already assured, not only in the smelter towns of British Columbia, but at leading American smelting centers like Great Falls, Butte and Anaconda. The mileage to Montana is not greater than to Boundary smelting points. The plant and equipment, as well as the economical method of mining now in vogue at Coleman, will enable Coleman coal and coke to meet all competitors in the Western markets on both sides of the line.

The president of the International Coal & Coke Co. is A. C. Flumerfelt of Victoria, B. C., who is largely interested in the mining, smelting and lumbering industries. His decision to engage in coal mining was reached only after a careful study of the possibilities of the industry. The general manager and vice-president of the coal company is H. E. Galer, who two months ago resigned the position of assistant general manager of the Granby Consolidated Mining, Smelting & Power Co. to assume the active management of the International Co. at Coleman.

The general superintendent is Edward E. Reynolds, C. E. and M. E., who resigned the office of mine inspector of the seventh district of Pennsylvania, in January last, to enter the service of the International Coal & Coke Co. Since his arrival at Coleman Mr. Reynolds has directed the work of opening up the mine and the construction of the surface works. Mr. Reynolds has been engaged in coal mining since boyhood, filling every position from errand boy to mine manager. He is authority for the statement that the No. 2 seam here is nearly twice the size and of equally good quality as the coal seam in the Connellsville region of Pennsylvania.

## Schistosity and Slaty Cleavage.

"Experiments on Schistosity and Slaty Cleavage" is the title of a bulletin (No. 241) recently published by the United States Geological Survey. The author, G. F. Becker, first published in 1893 a theory of slaty cleavage founded on experiment and analysis. His theory is in contrast to the explanation offered in 1849 by D. Sharpe, which is the one most generally accepted by geologists. Sharpe's theory is that a fracture perpendicular to the line of pressure would run along the flattest faces of the component grains and meet the smallest number of them. This hypothesis implies that the mass is heterogeneous and that adhesion between the component particles is smaller

than the cohesion within the particles. According to Becker's theory, cleavage is due to a weakness of cohesion, antecedent to rupture, on planes of maximum tangential strain, the effects being influenced by viscosity, although the direction is independent of viscosity. These and other disputed theories have been thoroughly tested by Becker, and the results of his experiments are clearly set forth, with appropriate illustrations, in Bulletin No. 241.

Schistosity as a structure is important, and it is part of the business of geologists to explain its origin. Slaty cleavage has further and greater importance as a possible tectonic feature. Scarcely a great mountain range exists along the course of which belts of slaty rock are not found, the dip of the cleavage usually approaching verticality. Are these slaty belts equivalent to minutely distributed step faults of great total throw, or do they indicate compression perpendicular to the cleavage without attendant relative dislocation?

The distinction between Sharpe's theory and Becker's is well defined. If in any portion of the mass before strain a small sphere is supposed to be marked out, this sphere after strain will have become an ellipsoid, called the strain ellipsoid. If Sharpe's theory is correct, the cleavage due to pressure will be in surfaces perpendicular to the smallest axis of the strain ellipsoid. If Becker's theory is correct, the cleavage will make with this smallest axis an acute angle equal to or greater than 45°, and increasing as the strain grows greater. The general nature of the experiments needed to compare the theories is made plain by this contrast. It amounts to a study of the strain ellipsoid.

## Stamp Milling Practice in Nova Scotia.\*

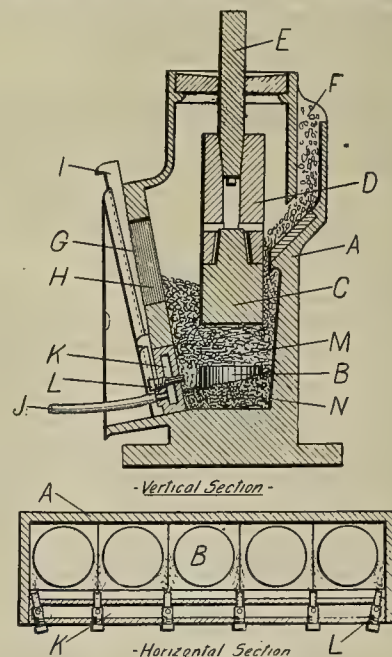
Written by M. R. O'SHAUGHNESSY.

At the request of a number of Nova Scotian gold miners and members of the Mining Society, I submit for their consideration the following notes on Nova Scotian practice in wet crushing stamp mills:

It will be necessary to call attention to the two different types of mills now in use, namely, the light mill, equipped with 650-pound to 700-pound stamps and capable of pulverizing one and a half tons per stamp in twenty-four hours, and the modern heavy high-speed mill, equipped with stamps ranging in weight from 850 pounds to 1100 pounds, capable of pulverizing from two to four tons per stamp in twenty-four hours.

But the question may be asked, How does the heavy mill differ from the light mill in the pulverization of ores and collection of values in gold? A brief description of the practical workings of the two mills will be necessary to demonstrate the relation one mill bears to another.

I will first take up the practical working of the light mill and point out that this mill in general use



A Mortar. B Die. C Shoe. D Stamp-head or boss. E Stamp rod. F Feed opening. G Screen. H Screen opening. I Battery key or key wedge. J Water supply pipe. K Water chamber. L Water jet or nozzle. M Ore under action of stamp. N Gold and heavier particles of ore lying protected about base of die.

previous to the introduction of the modern heavy mill was not, and is not to-day, when intelligently operated, the "old trap" that a great many miners believe it to be. The extraction of gold from our ores depends, with a few exceptions, on the one machine, namely, the stamp mortar with plates, and in all cases where the mill is in an isolated district, the one that appears best adapted to the extraction

\*Abstract Trans. Min. Soc. of Nova Scotia.



of gold is the light stamp and roomy mortar with a capacity of about one and a half tons per stamp in twenty-four hours, hand-fed preferably to automatic, unless a first-class automatic feeder is installed.

Let us assume that the light hand-fed mill is ready for commission, and the writer is in charge preparing for a run. After determining that the thrust of stamps is directly on the dies, the fronts are placed in position, the base of mortar, including dies, is covered thoroughly with sand or pulp recovered from the mortar in a former cleanup, screens are examined, placed in position, and made secure.

One of the most important points in practical stamp milling is the protection of the gold after it has been liberated from the gangue by the action of the stamp. Such being the case, it will be apparent that in order to mill successfully certain rules and regulations will have to be followed in the method of operating in order to secure the desired protection of the gold from the wearing action of the stamps and pulp in the mortar. One of the best methods to obtain this result is to take advantage of the law of gravitation. Gold having extraordinary gravity, all that is necessary to readily take advantage in the light mill of the laws of gravitation, and protect the gold after it is liberated from the ore, is to give strict attention in feeding ore and water during the first few hours' run of the mortar. By close or thin feeding for the first few hours, a stationary base is formed in the mortar. This base is the surface of the solidly packed sand that forms in all the mortars not otherwise fitted with appliances for preventing the stemming and packing of sands around the dies. By careful attention to feeding ore and water it is possible to establish this base from 1 to 2 inches below the crushing surface of the dies, and if care is exercised throughout the run in feeding ore, supplying sufficient water at all times to meet the requirements of the pulverized material, the material within the mortar will be displaced and washed by the action of the stamps to a depth of 2 inches below the crushing surfaces of the dies. One of the apparent advantages of the light mill is due to the easy pulsating motion given the pulp when properly supplied with water and ore. The liquid condition of the pulp allows the different atoms of the ore to find their relative position by gravity, hence the material having the least weight escapes from the mortar first and all particles of greater gravity are retained in the mortar the longest period of time and are reduced to the greatest degree of fineness. In nearly all our Nova Scotian ores gold is closely associated with the sulphides of iron or other minerals which are retained longest in the mortar until almost reduced to slimes, thus liberating a large percentage of gold that owing to prolonged abrasion readily amalgamates. Its weight will readily find it a resting place on the base line of mortar, the crowns of the dies acting as riffles to arrest the particles, whether pure amalgam or sulphurets carrying a percentage of gold.

Any person familiar with the panning motion of the moving pulp in the mortar under displacement by the stamps in the light mill, can readily comprehend the advantage of an abundance of water on the crushing surface of the dies. It materially increases the efficiency of the mill as a pulverizer, by washing out the disintegrated parts of the ore on the surface of the dies when the stamps are not resting thereon. It readily adjusts the pulp uniformly under each stamp, and it is at this stage of the crushing that the millman should see that the base of the mortar is formed at least  $1\frac{1}{2}$  inch below the crushing surface of the dies, and know that at all times sufficient water is being supplied to thoroughly wash the dies after each thrust of the stamps, as the displacing force of the descending stamps is the agency whereby the sand is mechanically displaced alternately from one die to another. It is only necessary to supply sufficient water and feed low or thin, to successfully displace the pulverized material after each thrust of the stamp. Such being the case, the liquid condition of the partly pulverized ore resting on the surface of the dies enables the broken or separated atoms of ore to take advantage of gravitation; and regardless of the agency of mercury, coarse and heavy gold readily falls a prey to the pockets created between the dies for the purpose of its protection after it has been liberated from the ore.

A large percentage of what is termed float-gold that escapes from the mill in the water is created by the action of the stamps reducing the gold to minute particles before the active and expelling force of the stamps is enabled to discharge or lodge them in a place of safety on inside plates. Knowing the soft malleable nature of gold, it is apparent that a large percentage of values escapes from poorly managed mills in the form of worn gold created by continuous exposure to the action of stamps and sands.

It will be apparent to any thoroughly practical, observant millman, that a great many of the difficulties surrounding the extraction and collection of gold in Nova Scotia is created by the very methods applied for the recovery of the values. As a rule, our gold-bearing ores may be considered practically free milling, and a large percentage is coarse and granular gold, which, if protected from wear, is easily recovered by the stamp mill wet crusher. If proper methods for the protection and collection by gravitation in the mortar of the coarse gold so commonly found in our ores, is put in practice, amalgamation

is only necessary for the finer and smaller atoms whose gravity is overcome by the action of stamps and which are expelled from the mortar through the screens. The conditions for early amalgamation are clear liquid and sharp pulp, so apparent in mortars supplied with lower or thin feed, and an abundance of water to carry off the ever recurring slimes. In the majority of our mills the supply of water to the mortar is governed by the flow passing over the stationary plates that were probably placed in position during the construction of the mill in accordance with the practice of an altogether different district. The plates can only be used as an indicator of the proper supply of water required by the mortar, after a series of experiments have been made to determine the required volume, and in all cases it will require adjusting to suit different qualities of ore.

(TO BE CONTINUED.)

### Royalties in Rhodesia.

The official gazette of the British South African Co. has published a scale of royalties under which mines may be operated in that country. The scale seems to have been devised without regard to the expense of getting the gold. It is a well-known fact that ordinarily the size of the vein is an important factor in the cost of operating a vein, but by the scale of this

## The Desert Dry Lakes of California.

NUMBER VIII.—CONCLUDED.

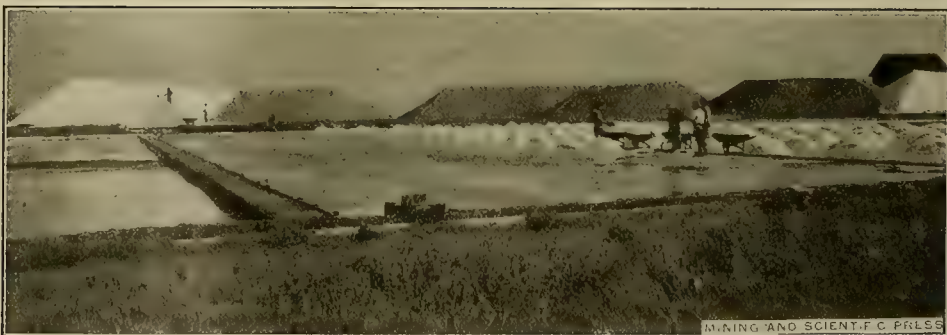
Written for the MINING AND SCIENTIFIC PRESS by  
G. E. BAILEY, E. M.

**USES OF OTHER SALINES.**—It is not necessary to dwell here on the uses of "natural sodas," for soda in its various forms has been a household word to everyone from childhood. Its uses alone in baking powder, soaps, and glass making form such colossal industries that none of its hundreds of other uses need be mentioned. The present value of the borax and sodas of the dry lakes and the unquestionable consumption of the future are alone of such great importance as to demand that immediate steps be taken to protect them, by placing them in a class by themselves; and the existence of other salines with them only intensifies their importance and makes the necessity of proper classification more imperative.

**THE FUTURE.**—In making predictions as to how long a natural resource like timber, placers, borax or soda, etc., will last, one is far more apt to overestimate the number of years than to underestimate. It is difficult to realize how fast a country may grow



Salt Making by Evaporation at Alvarado, Alameda Co., Cal.



Harvesting the Salt Crop in Alameda County, Cal.

company, one who operates a large vein on a small margin of profit but who produces a fair output must pay a larger tax than he who operates a small but rich mine in which the profit per ton is large. Following is the official notice:

"It is hereby notified for public information that the British South African Co. has resolved to grant the following additional facilities for working small propositions to persons, companies and syndicates desiring to work mining locations in their own name or over which they hold an option, lease or tribute agreement from the registered claim holder, without proceeding to flotation. The conditions contained in Sec. 44, Mines and Minerals Ordinance, 1903, whereby working for profit up to 750 tons per month is permitted, will remain in force, but workers of small propositions will have the option of working for profit without limit of stamping power or tonnage per month on payment of royalty on the following basis:

Output per month.	Royalty payable on value of gross gold won.
Up to 750 ounces	2 1/2 per cent
Above 750 ounces and not exceeding 850 ounces	3 1/2 per cent
Above 850 ounces and not exceeding 950 ounces	4 1/2 per cent
Above 950 ounces and not exceeding 1050 ounces	5 1/2 per cent
Above 1050 ounces and not exceeding 1150 ounces	6 1/2 per cent
Above 1150 ounces and not exceeding 1500 ounces	7 1/2 per cent

If the claim holder or holder of an option, lease, or tribute agreement desires to work the claims on a larger basis than 1500 ounces per month, an agreement will have to be entered into with the British South Africa Co. as to its interest in the claims in accordance with the provisions of Secs. 40 and 41 of the Mines and Minerals Ordinance, 1903.

Save as above set out, the provisions of Sec. 44, Mines and Minerals Ordinance, 1903, will apply to small propositions worked for profit under this notice."

and how rapidly a certain consumption may increase.

**SALINES WILL NOT LAST INDEFINITELY.**—One thing certain is that the deposits of salines will not last indefinitely. In 1830, Chili began the exportation of niter with 8340 tons. It took fifty years to increase these imports to the 593,518 tons of 1883, and it was believed that they would last indefinitely; but it took only another ten years for the exports to reach the million mark, or over 1,079,000 tons in 1894; and in 1901 they had increased to nearly a million and a half. The statistics for each year will be found on pages 152 and 153 of Bulletin No. 24 of the California State Mining Bureau. Already steps have been taken to limit the annual production of the niter, and experts predict that the supplies will be exhausted in less than fifty years more.

The borax industry has grown by leaps and bounds, and the natural soda industry is following in its footsteps. Twenty years from now may find the dry lakes of California producing 30,000 tons a month of borax and soda alone, instead of the 3000 tons per month now produced. An increase in the use of these salines is clearly indicated by the domestic nature of the present uses. The dry lakes producing them are found only in California and Nevada, excepting a small area in Oregon. The number of dry lakes is not large, and their total area is comparatively small. The natural supply of the United States is limited to the dry lakes of the Pacific coast. Few other countries possess these natural deposits, and their deposits are of limited extent. The deposits are resources of which both the State and Nation are proud. In view of these facts it is wisdom for those in authority to throw around these deposits such safeguards as will protect them from misuse and waste.



## A Simple Instrument for Mine Surveys.

Written by FRANK ROBBINS.

It may be well to say that no one more keenly appreciates accurate underground surveys and perfect mine plans than the writer; and none is more inclined to condemn loose and inexact work in this direction.

The experience of all of us no doubt—particularly in mine examinations—tends to show that many mines, especially those which are for sale or are in need of examination, have no plans at all; and in cases where plans exist they are frequently not found posted up to date. It may be taken as an axiom that a perfect report can not be made without a plan—that is, of course, unless it be something that can be condemned at a glance and summed up with a terse "No good." This plan must be something to show where samples are taken; where pay shoots begin and where they end; the reference of one level to another and the hundred and one details which will occur to the engineer.

Let us assume an extreme case. A short option is held upon a mine or prospect, situated in a remote mining district of British Columbia; the mine is reached by a mountain trail from the nearest small settlement, 25 miles away, it is 20 miles over a mountain road from the settlement to the nearest small town, from which it is 50 miles of staging to the railway. The clients in Montreal or Toronto have waited till the last minute before sending the engineer out—probably till the snows have set in—and they are now anxiously waiting for the report.

The mine is reached and it is found that the values are variable, lie in rather a flat vein, and consist of more or less irregular shoots or bodies, these have been opened up by several levels, all as crooked as a ram's horn, there are two or three faults, and the owners have no map of the workings. While the engineer is getting warm, an Indian messenger comes in with a wire from Montreal or Toronto telling him that it is important that he hurry his report. A plan is essential—there is no time for an accurate survey with careful closing points. What is wanted is something more than a sketch and something less than the perfectly-constructed plan of the colliery properly conducted. How often do engineers stumble upon just such a case as this? In my practice I find that they are the rule. Perhaps not in British Columbia, where the mine plans are kept up as carefully as the recollection of the catechism.

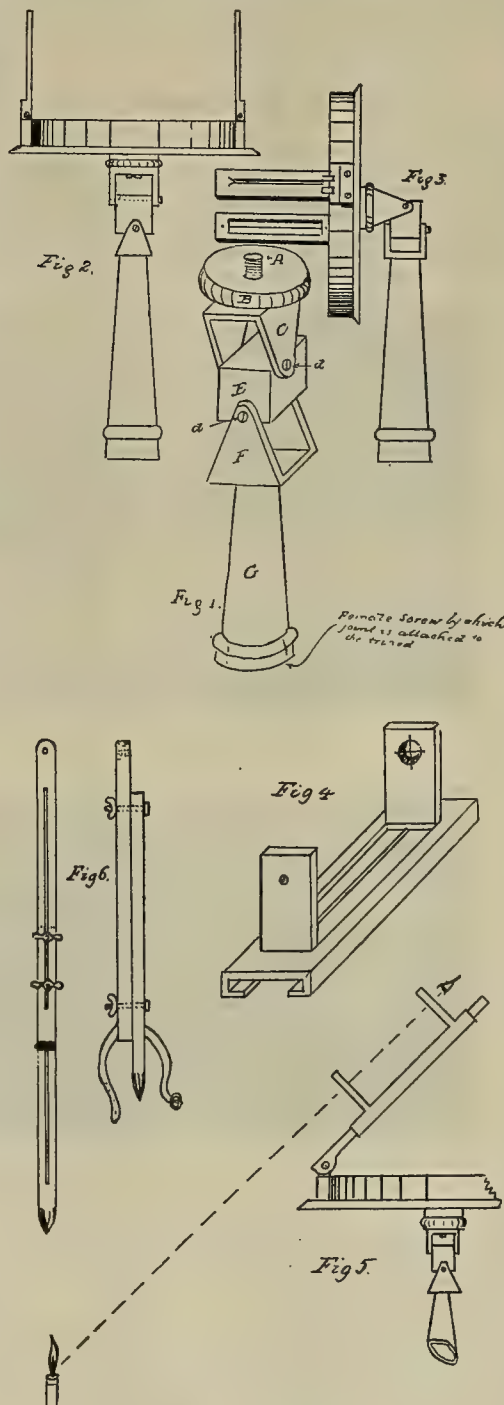
Some sort of a sketch plan may be prepared with the aid of a pocket compass. I have tried this with an old-fashioned mahogany box compass held in my note book, the sides of the book being used as sights; the needle never settled; I have tried it with a prismatic compass, but my points were never certain. I have carried a heavy transit along on such trips, nursing it carefully, in case of emergency, almost invariably in such a case to find the mine perfectly provided with plans.

In the light of such experiences I hit upon the simple and convenient instrument which gives the title to this paper; with the aid of the accompanying cuts I will endeavor to describe it.

First, I will assume that a compass which may be read to half a degree will come within the bounds of accuracy required. That, when local attraction is manifest, back and fore sights will be taken at every station and the included angle between them read, after the "old country" fashion of "blind dialing." Where attraction does not exist the instrument is to be set up at alternate stations only, and the middle station established by fore and back sights as in the ordinary compass practice; that the bottom plate of the dial have a semi-circle divided thereon, and graduated both ways from the E or W point from 0 to 90°, with a pendulum indicator suspended from the center pin traversing this semi-circle, by which angles of elevation and depression may be taken when the dial is set in a vertical plane.

Many years ago I came into the possession of a pocket compass, which consisted of a flat plate, about 5 inches square, upon which was set a compass dial, with the above pendulum attachment for vertical readings. This compass was provided with two folding sights. It was a good pocket compass. By laying the edge of a square plate upon a wall or upon a ladder, I could read slope angles. By leveling it upon a few rocks and lying down upon my stomach in a wet drift, I could get a bearing through the two sights with a fair degree of accuracy. By holding it in my hands and averaging the run of the needle through its oscillations, I could also usually guess a bearing somewhere within 5°. It struck me that this instrument was susceptible of improvement and that a light tripod to which the compass could be attached would prove a convenience. The tripod was easy enough; the attachment, however, had to be considered. The ordinary ball and socket joint was the first suggestion, but while this would admit of reading to perfection, it would not admit of the taking of readings in the vertical—a sine qua non in all mining instruments, I take it. I happened about this time to run across in an old book of mechanical movements the cut of a universal joint—Goyjot's joint it was called, if my memory serves me—which I

thought would do. This consisted of a square block of metal with a bended plate on top and another underneath, these plates being attached to the block by screws running through the latter, one above the center and one below it and at right angles to each other, thus admitting of the plate C passing through a semi-circular arc at right angles to the axis of the upper screw d. The block E has also a range of movement in arc at right angles to that of C and around its pivot the lower screw d. I made such a joint of wood and sheet brass and saw that it would answer the purpose. I sent this pattern to John Roach (the old instrument maker of San Francisco) who made for me the joint shown in Fig. 1.



A disc is centered and braced to the bottom of the compass; into this disc a female screw is tapped. A shows a male screw corresponding to this and by which the compass and milled headed disc B are attached to each other. B is attached but not fixed to the bent plate C by means of another screw passing through a hole in C, and threaded into B. Thus B with the compass attached may be turned in any direction upon the surface of C. See Fig. 2.

The bent plate C is attached to the block E by screw d passing through E but not fixed to it. The tension of the screw is sufficient to hold C in any position of its range of movement. The bent plate F is attached to block E in the same way and E has a range of movement at right angles to that of C. The bent plate F is fixed to the hollow spindle G which is screwed to the solid spindle of a simple tripod. It will be evident from Figs. 2 and 3 that not only can the instrument be leveled for horizontal observation, but it can also be turned into a truly vertical plane for dip readings with its pendulum clinometer.

In the position shown in Fig. 3 it is evident that an offset (equal to the distance from the point of sight—usually taken at the end of the sights near the compass box—to the center of the top of the block E) is

made between the positions of the instrument in horizontal and vertical sights. The compass center is coincident with the center of block E when the instrument is set for horizontal reading. Correction may be made for this offset, practically the same as for transits with parallel telescopes; but the error is so small that, with the limitations of the instrument, it may be disregarded.

With the above described joint and a light tripod, it will be seen that I now had an instrument which was stable and by which I could take angles of elevation and depression and also horizontal ones within the range of sight possible between the top and bottom of the two folding sights, in fact in this last respect having the same range of service as the land surveyor's plain compass. But as bearings have to be taken down steep inclines something further was necessary. This was hit upon in the expedient shown in Fig. 4 and consists of a pair of sights with a peep hole in one and a round opening with cross-hairs in the other; the construction of this admits of sliding it either way upon either of the folding sights of the compass—usually over the open or fore sight.

With this attachment in place it is possible by raising or lowering the folding sight to which it is attached to look down any depression or up any elevation.

Fig. 5 shows the application of this attachment to a sight down an incline.

In practice it is usual to take the bearing of the incline first and to establish the point, if underground, by a candle; the instrument is then turned over as in Fig. 3 and the angle of dip taken to the same candle, and this recorded, with, or without, the correction for the difference between the centers of the instrument in the two positions.

When the instrument is in use the slide sight is usually left attached to it; when not, it is detached and dropped into the pocket. In fact the whole instrument—with exception of the tripod, and even that with the legs off, can easily be accommodated in an ordinary coat pocket.

Knocking about in out of the way places and packing one's belongings on horse or mule back every ounce counts and every cubic inch becomes an incumbrance, hence a tripod between 4 and 5 feet in length does not add to the comfort of a trip. As the legs of the one for this little compass were light they could be easily replaced; so I took to leaving them behind, depending upon the country and a jack-knife to furnish a new set, but sometimes "hitting the high places," sticks were not easily obtainable, and I came to the conclusion that some kind of light extension tripod was a thing to be desired. A mine carpenter and a mine blacksmith between them constructed the device shown in Fig. 6 and it has proved a useful tool ever since and has never been obtrusive in the pack. It is not material whether the lower part of a tripod leg slides into the upper, as is usual, or lies along side as it does in this.

The construction is as follows: A strip of hard wood about 1 inch wide (depending upon the sockets of the tripod head) and 1½ inch deep, a trifle shorter than the ordinary tripod leg, is cut in two. Each half is then ripped through the major part of its length, say to within 3 inches of each end; the slit is enlarged to about ⅜ inch, it is on the deep side and as accurately as possible in the middle of this. The two pieces are of equal rectangular section, that is, they do not taper, except the lower one, which at the end is trimmed to a point and tipped with iron. Two brass screws with square heads and thumb screws are fitted to each pair of pieces. These screws couple each pair together through the long slot and by means of them the tripod legs can be extended to their full length for use or reduced to the length of a roll of blankets.

I have had the simple instrument above described in use now for a good many years and it is still in perfect condition. The attachment of the bent plates C and F to the block E by the screws d appears to be the only weak point; but these parts have not worked loose and the screws have always preserved the necessary tension to keep the surfaces in sufficiently close contact for the purpose required.

The only improvement which suggests itself is that a larger compass could be substituted for the small one I use, and that it have levels which mine has not. A pocket Vernier compass with 3½-inch needle would be admirable, if the pendulum clinometer were added to it.

With such an instrument as this in such a case as I have cited, the traverse could be run and the notes platted and the examination finished in less time than it would take to send word to the railway that a transit was needed; and for the purposes of examination and report, the plan would be quite as good as one made to minutes by a careful man with a high-class mining transit.

THE fineness of placer gold varies greatly in different regions, and often in the different gulches of the same region. It is a curious fact that placer gold appears to improve in fineness or grade as it gains distance from its original source. The gold in a placer mine is usually higher in grade than the gold of the vein from which it came. The grade and appearance of gold in the ancient rivers of California is often of assistance in identifying the several channels.



The Genesis of the Diamond.\*

NUMBER II

Written by GARDNER F. WILLIAMS.

There is conclusive proof that the diamonds in the South African mines were not formed in their original place of crystallization, as, for example, the frequent occurrence of broken crystals imbedded in the hard kimberlite. The geological strata of the rocks which surround the diamond-bearing pipes of the Kimberley district are shown in Fig. 2.

Concerning the discussion of the genesis of the diamond, Sir Isaac Newton's opinion was that it was of vegetable origin and combustible; but it was not until 1694 that the combustibility of the diamond was actually proved by the famous burning glass experiment of the academicians of Cimento.

Lavoisier, Guyton de Morveau and others determined that the diamond was converted into carbonic dioxide by burning. The experiments of Sir Humphry Davy, in 1816, showed that the diamond was

like a coal, but in reality intensely cold, escaped into the palm of my hand from the strong iron vessel in which, with a pressure of fifty atmospheres, he had liquefied carbonic acid gas—the very gas resulting from the combustion of the diamond." \* \* \* "In the carbonic acid gas generated from the carbonaceous shales by heat, and interspersed as bubbles in the cavities of the viscid, ferruginous amygdaloid and in the admixture of steam, lava and ashes known as the 'Kimberley blue,' reduced to the liquid state by the enormous pressure in the subaqueous volcano, we have the constituents of the diamond in a form admitting of crystallization, and the subsequent absorption of its oxygen by the iron always present in its containing walls during long intermittent periods of volcanic activity."

In this presentation Dr. Atherstone dogmatically puts the carbonic acid gas evolved from the carbonaceous shales into the cavities of the amygdaloid (presumably the melaphyre, which is the only one of the encasing rocks of the volcanic pipes, that is amygdaloidal). This gas is then reduced by pressure to a liquid state, in which form, as he thought, the carbon admitted of crystallization. He then absorbed the oxygen of the carbonic acid by the iron in the containing walls of the craters. As the melaphyre existed before the volcanoes burst through it, it is more than probable that the cavities, which existed in it at the time it was erupted, were filled with agate and calcite, which they now contain, before the diamond-bearing ground was forced up through it. If the theory above given had any foundation in fact, one of two results must have happened, viz., either the resultant diamonds would have been enclosed in the amygdaloidal rock, or the diamonds must be formed in the "blue" in their perfect state. Both of these assumptions are contrary to facts. As to the derivation of the necessary carbon from the carbonaceous shales surrounding the mines, it will be made clear subsequently that this assumption is not justified.

Professor Lewis alleged that the diamond is the result of the intrusion of igneous rocks into and through the carbonaceous shales. He says:

Perhaps the most interesting chemical observation concerning the blue ground was that made by Sir H. E. Roscoe. He found that on treating it with hot water an aromatic hydrocarbon could be extracted. By digesting the blue ground with ether, and allowing the solution to evaporate, this hydrocarbon was separated and found to be crystalline, strongly aromatic, volatile, burning with a smoky flame and melting at 50° C.

That the rock was a true lava, and not a mud or ash, is indicated by the fact that the minerals and their associations are those characteristic of eruptive ultra-basic rocks.

Professor Lewis further says:

The kimberlite is shared by no other terrestrial rock. In structure it resembles meteorites of similar composition. If the ground mass of kimberlite were replaced by native iron, it would be nearly allied in both structure and composition with meteorites known as chondrites."

The Ava meteorite, which fell in Hungary in 1846, contained graphite in cubic crystalline form, which Gustav Rose thought was produced by the transformation of diamonds. Later Weinschenk found transparent crystals (diamonds) in the Ava meteorite. Minute diamond crystals and graphite were found in the meteorites from Canyon Diablo, Arizona.

Professor Lewis advanced the theory that probably the diamond came from the hydrocarbon which was contained in the fragments of carbonaceous shales distributed through the blue ground, but the inclusion of carbonaceous shales in the blue ground can hardly be reconciled with Professor Lewis' conclusion "that the rock was a true lava."

Professor Molengraaff, formerly State Mineralogist to the South African Republic, discusses the genesis of the diamond, and says that the theory of the formation of diamonds during the ascension of the blue ground from carbon borrowed from the carbonaceous shales was, in his opinion, weak.

In the Pretorian beds, as well as in the formations underlying these, strata containing any notable quantities of carbon were nowhere to be found in the Transvaal, so that the conclusion might safely be drawn that the igneous blue ground, in forcing its way from great depths towards the place where it was found, could not borrow any carbon from the surrounding strata in order to convert it into diamonds.

In Bohemia a rock occurs which contains every

mineral known in the blue ground of Kimberley, except diamonds. On my visit to the Mining Academy at Freiberg, Saxony, a few years ago, Dr. Stelzner, professor of geology, showed me two cases containing these minerals, and in every instance the Bohemian minerals corresponded with those from Kimberley, except that the case of Kimberley minerals contained a few small diamonds which had been presented to the Academy.

Both the aqueous and igneous theories of the origin of the kimberlite have had able supporters, among the former being Stanislas Meunier, M. Chaper, and later Professor Garnier and Sir William Crookes. The igneous theory is strongly supported by Professors Lewis, Molengraaff and Stelzner. My own opinion is that the aqueous theory is the less assailable.

Concerning the origin of the blue ground, assuming that it is not the original matrix of the diamond, I find the following weak points in the igneous theory:

1. As already observed, it is impossible to account by the igneous theory for the water-worn boulders found in the blue ground.

2. The experiments of Herr W. Luzi of Leipsic, in the production of artificial figures of corrosion upon the surfaces of rough diamonds, are most interesting in the light which they throw on the crystallization and the probable matrix and genesis of the diamond. Until lately the only appearance of corrosion upon the surface of rough diamonds was the regular, triangular negative pyramids which were produced through heating the diamond in the open air or under an oxygen flame.

Herr Luzi discovered that the breccia (kimberlite) from the South African mines, when in a molten condition, possesses the property of absorbing the diamond or of changing its shape. He describes his experiment as follows:

A small quantity of the blue ground was melted in a crucible placed in a Fourquignon-Leclercq furnace at a temperature of 1770° R., which was the highest temperature attainable. A diamond with perfectly smooth natural faces was submerged in this molten mass. A further quantity of blue ground was added to the contents of the crucible until it was completely filled. A tightly fitting cover was placed on the crucible, which was again exposed for thirty minutes to the greatest heat attainable. When the crucible was cooled the diamond was removed and found to be covered with irregular oval and half round grooves of various depths. In one experiment the diamond was found to be deeply eaten away on one side.

Some of these partly absorbed diamonds upon which Herr Luzi experimented are deposited in the mineralogical museum of the Leipsic University.

(TO BE CONTINUED.)

The Mother Lode in Tuolumne County, California.\*

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

On the north end of Quartz mountain are the App and Heslep mines, which have been worked almost continuously the past ten years, and which were among the first mines to be opened on the mother lode in this county. In its early history the App mine was distinguished by having three pay shoots in the quartz occurring in the ankerite of the lode. In depth these three shoots (which were separated by from 40 to 60 feet of barren ground) united and formed a single shoot about 250 feet in length. In these shoots the gold was distributed with remarkable regularity.

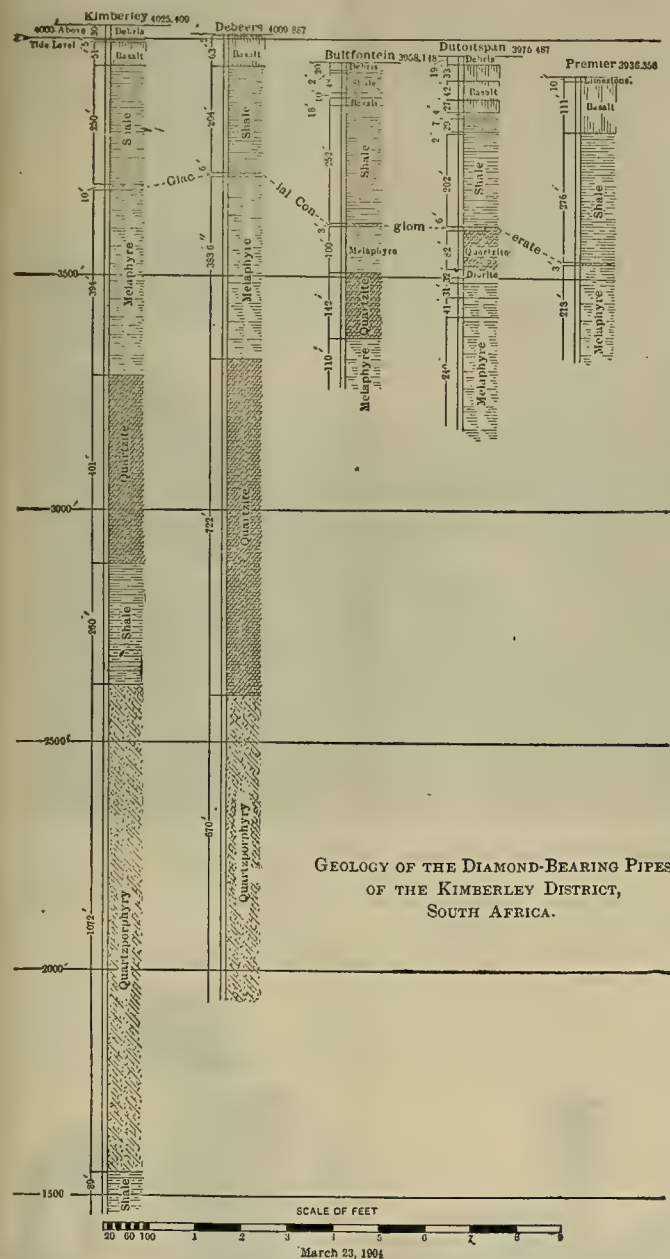
In these early days the cost of mining and milling was stated to be \$8 per ton. The Heslep vein adjoins the App and is parallel to it, the values being found in the amphibolite schists of the hanging wall country. The mines have been extensively developed and are well equipped with hoisting and milling machinery. There are a number of claims on Quartz mountain, and these are owned either by the App Co. at the north end of the hill, or by the Santa Ysabel at the south end. The latter company owns several full-sized claims and also a number of fractional claims. They also have four shafts—one of them being sunk in a tunnel. The first three shafts were known as the Knox & Boyle, Miller & Holmes and Santa Ysabel, respectively. Recently work was begun on a fourth vertical shaft, which is located east of the lode and is being sunk through the amphibolite schists of the hanging wall. Two of the engravings on the front page illustrate the Santa Ysabel hoist and mill and one of them the App property as viewed from the northwest side of the hill.

The new main shaft is down over 700 feet and sinking. The mine is equipped with steam hoist, oil being used as fuel. The hoist and the pumps at the 400 station are run by compressed air, generated by electricity. The mill has forty stamps. The power is so arranged that steam may be substituted for electric power at short notice in the event of anything occurring to prevent the latter from being used. At one time this company operated its own electric plant, but this has been discontinued.

In the Santa Ysabel mines both the ankerite and the amphibolite schist are developed and good values are found in both portions of the lode.

\*See illustrations on front page.

(TO BE CONTINUED.)



GEOLOGY OF THE DIAMOND-BEARING PIPES OF THE KIMBERLEY DISTRICT, SOUTH AFRICA.

almost pure carbon. These experiments have been confirmed by Dumas, Stas, Friedel, Roscoe and other eminent chemists, who have fixed with extreme precision the composition of the diamond to be pure carbon in crystalline form. The late Dr. W. Guybon Atherstone was one of the first scientists to deal with the occurrence and genesis of the diamond in the Kimberley mines. Being a resident of the Cape Colony, he made frequent visits to the diamond fields and made personal investigations.

"For a substance to crystallize," he says, "its molecules must be free to move. \* \* \* The diamond, we know, is neither soluble nor fusible. It is the element carbon crystallized, and is consumed by heat. How, then, could it survive as a crystal in the center of a volcano? The key to solve this mystery was placed in my hands over half a century ago by one of the greatest philosophers of the age, whose lectures I had the privilege of attending. \* \* \* 'Hold out your hand,' said Faraday, at the close of the lecture that fairly electrified the world of science, as with a loud hiss a snowy substance, burning

\*Trans. Am. Inst. Min. Eng.



## Cyaniding in Kern County, California.

Written for the MINING AND SCIENTIFIC PRESS by W. L. COBB.

The old Piute mine lies 30 miles east of Bakersfield, Kern Co., Cal., at an elevation of about 7000 feet. The ore from this mine as originally extracted was sorted into first-class and second-class lots. The former nearly clean quartz, averaging about \$90 per ton, was arrastraed; the latter, consisting of quartz, gangue and some granite, was allowed to accumulate until the present company installed a Hendy 3-stamp quadruple discharge mill. Subsequently all quartz was brought to the surface and milled without sorting. About 85% of the value was saved by amalgamation and the resulting tailings cyanided as described below.

The cyanide plant was designed to treat ten tons of tailings per day, and consists of three vats 11 feet in diameter by 4 feet deep; two solution tanks, each of seven tons solution capacity; one sump holding twelve tons; one small gold-solution tank, built on the premises of 2-inch redwood; one plunger pump for pumping up solution; ten individual sheet-iron zinc boxes, arranged in two tiers of six each, with capacity of 1 cubic foot zinc each and with necessary valves, piping, etc. Steam for pump was furnished from mill boiler.

Notwithstanding the fact that it costs \$46 per ton to get freight from San Francisco, the entire cost of plant was under \$1000 and cost of tailings treatment

## A World's Fair Exhibit.

One of the many interesting exhibits at the World's Fair is that of the F. W. Braun Co. of Los Angeles, Cal., in Block 81, Mines and Metallurgy Building. This firm has on display over forty different styles of assay furnaces, to be operated with either gasoline, gas or crude oil. The Cary hydrocarbon burner burns gasoline of a specific gravity of 74° Baume, producing a very hot flame. The Marvel crude oil burner burns any grade of oil.

Their Chipmunk crusher, automatic sampler and disc pulverizer are also shown.

The vibratory jaw of the Chipmunk crusher is mounted upon an eccentric at its upper end, which imparts a gyratory movement, and rests against a toggle near its lower end, which compels the lower end to describe an arc of a small circle. This motion is both forward and downward and impels a discharge. This machine has a capacity of 300 pounds of granite of  $\frac{1}{4}$  inch and smaller per hour. The front jaw is removable for cleaning.

In the Umpire ore sampler the buckets revolve in opposite directions, and each bucket is divided into four parts—two closed and two open. The sample is halved in the upper bucket and again in the lower, allowing one-quarter of the original to fall into the receptacle.

A cam on the crank shaft agitates the hopper by striking a strap which is attached to the hopper with

## THE PROSPECTOR.

The sub-metallic mineral scales on the copper ore from Baker City, Or., are torbernite (copper uranite), hydrous phosphate of uranium and copper.

The rocks from Hailey, Idaho, have been determined as follows: No. 1. A basic dike rock, probably diabase. No. 2. Orthoclase porphyry. No. 3. Trachyte (typical). No. 4. Feldspar porphyry, much altered. No. 5. Quartz porphyry.

The rock specimens from Boise, Idaho, contain molybdenite. It is said that this mineral concentrates readily by the various modifications of the oil process. It may also be concentrated by crushing and running the pulp into a cone classifier, the coarse sands running out at the bottom and the slimes containing molybdenite at the top. The electro magnetic separator has also been used effectively in concentrating molybdenite from its ores. By wet concentration good results have been secured by crushing in jaw breakers and then in rolls, employing sizing screens and running the pulp over concentrating tables. Molybdenite is worth from \$200 to \$300 per ton when pure. To be marketable it must contain not less than 45% molybdenum and be free from copper. The Bethlehem, Penn., Steel Co. would be



Cyanide Plant of the Piute Mine, Kern County, Cal.



Exhibit of F. W. Braun & Co. at the World's Fair, St. Louis.

\$1.69 per ton. Later it was found necessary to treat the clay slimes from the stamp mill by agitation. For this purpose an agitator was constructed by placing the parts of an old arrastra in a 5x10 foot tank. A 3-inch outlet for discharging residues was placed 8 inches from the bottom of tank, which, on being discharged, left a bed of sands in the bottom, forming an excellent protection to tank bottom and revolving arms in event of rocks or hard lumps of clay being thrown in with tailings. A speed of from eight to ten revolutions per minute gave best results and agitation of pulp and solution was kept up for five hours, then allowed to settle for five hours, after which the solution was syphoned off into one of the percolation vats, where it acted as a weak solution and discharged into gold solution tanks further enriched and perfectly clear.

One advantage of this method was that the solution could be decanted much closer than when run directly into zinc boxes. After first solution was drawn off, an equal amount of water was added and the agitator again run for about one-half hour, the contents allowed to settle, again decanted and residue discharged. In this instance no trouble was experienced in starting up the horizontal arms of the arrastra after pulp had settled. The power for agitation also was furnished from mill boiler and engine, and, mechanically, the cost of agitation above percolation was not over 50 cents per ton.

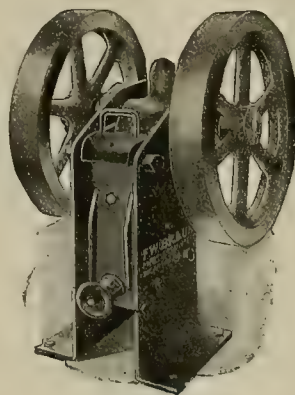
The assay value of arrastra tailings was \$12 per ton; and though about 80% passed through an 80-mesh screen, they were perfectly amenable to treatment by percolation, giving 90% recovery with a four-day treatment. A 0.20% solution KCy was used in vats and 0.15% in agitator. From the latter we obtained an extraction of 70%.

All solutions, including washes, were piped to one gold solution tank and run through one set of zinc boxes. Precipitation was nearly perfect, the pregnant solution averaging about \$9 per ton, the spent 8 cents. Five pounds of lime per ton of tailings was used.

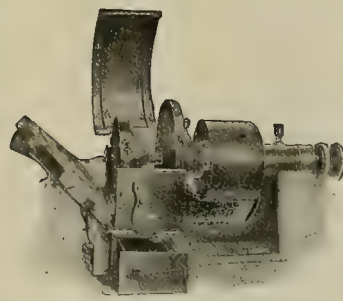
a coil spring, and, by means of an eccentric lever, the blows may be varied at will. The upper and lower buckets may be quickly removed and all portions are readily accessible.

a good place to send samples to ascertain the value of the material.

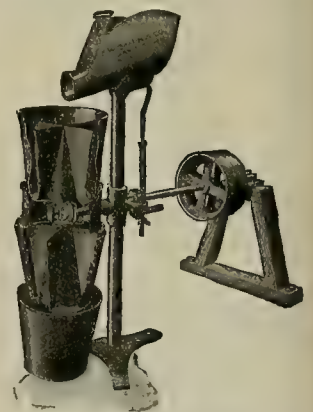
The mineral specimens from Deadwood, Idaho, are



Chipmunk Crusher.



Braun's Disc Pulverizer.



Umpire Power Sampler.

The disc pulverizer with one feeding will pulverize an entire ore sample to any desired fineness up to 200-mesh powder. An 8-ounce sample of ordinary granite rock can be reduced to 100-mesh in one minute.

It may be thoroughly cleaned after each sample and the adjustment altered in a second; it is dust proof; discs wear to place and are renewable. The discs are made of hardened steel with faces ground true. Oil can not enter the pulverizing chamber; it is arranged with tight and loose pulleys.

It is now proposed by an English company to systematically investigate the reported gold deposits on the island of Terra del Fuego, South America.

quartz containing crystals of pyrite, which in the outer portions have been altered to limonite (iron oxide). This is due to a process of slow oxidation during a long period of years, and not due to heat of volcanic rocks. This rock, if gold bearing, should prospect in the pan and should concentrate readily on machines in a mill after pulverizing under stamps. The metallic mineral in grains, coarse and fine, is plain iron sulphide. On roasting they will become dark red or brownish, and when pulverized should show gold in the pan. Of course, there is always the possibility that the gold will be too fine to be seen, in which case the rock must be assayed.

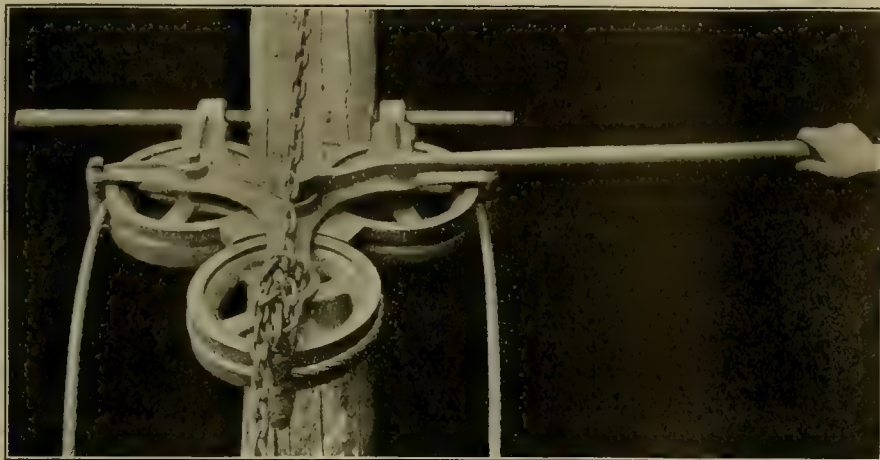
The rock specimen from Ouray, Colo., is liparite, a



variety of rhyolite. This kind of rock, like many other varieties of intrusive and eruptive rock, is not recognized as an ore unless containing valuable mineral. In the Calico district, San Bernardino county, Cal., rock similar in appearance to this Ouray rock, in a few instances, carried sufficient silver chloride to constitute a payable ore, and the best way to determine whether this rock contains values or not is to have it assayed for gold and silver.

### The Go-Devil Controller: A Gravity Tram Block.

A labor saving device recently perfected by A. D. Foote of the North Star Mines of Grass Valley, Cal., is shown by the accompanying illustration to consist



The Go-Devil Controller.

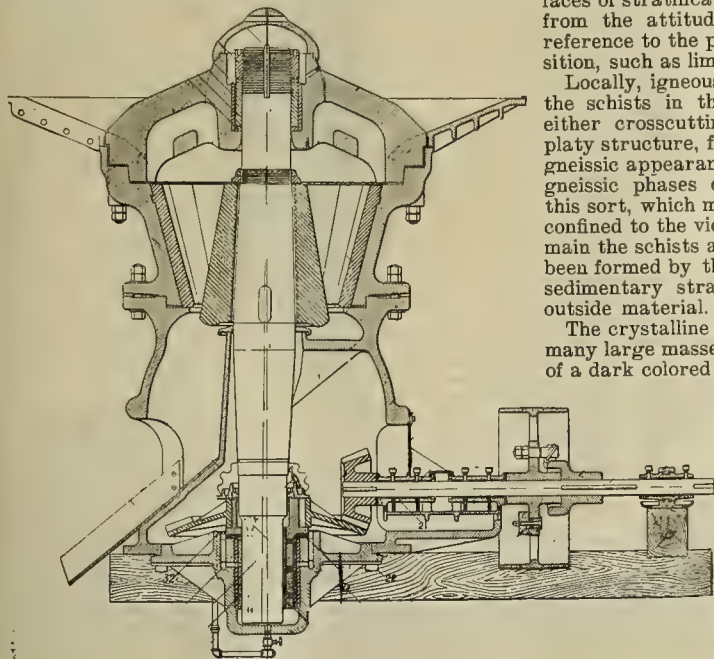
essentially of a mechanism for controlling the speed of the ascending and descending cars of a gravity tram. The wire rope is firmly held, yet easily moved, without undue wear from friction; it passes around three wheels rigidly held in the same plane by a three-armed casting. A block brake, actuated by a long lever, acts directly on the rims of these wheels, checking or stopping the motion of the rope as desired. The whole is attached to a horizontal bar in a wooden stull, and is held in position vertically by a chain. This forms a simple, but powerful means for controlling the speed of gravity tram cars, and may well be applied wherever such are in use.

It was originally designed for the control of the cars used in mining the stopes of the flat veins of the North Star mines. The pitch is enough to allow cars to descend, but without their use repeated shoveling of the ore was necessary to bring it to the chutes at the main tunnels, because the natural slope was not great enough to move the rock.

This block is manufactured and sold by the Roebeling's Sons Wire Rope Co., 117 Liberty street, New York City; 25 Fremont street, San Francisco, Cal.; 171 Lake street, Chicago, Ill.

### The McCully Gyrotory Crusher.

The accompanying cut shows a sectional view of the McCully gyrotory crusher, an important feature of which, say its manufacturers, is that its main shaft and crushing head are suspended from the



Sectional View of McCully Crusher.

spider at the pivot point or point of no gyration. The point of greatest movement is at the lower end of the main shaft. This arrangement permits of a minimum of power being used for the work accomplished and is also claimed to reduce the liability of shaft's breaking. The running parts of the machine are readily accessible and can be examined and oiled while operating without danger to the attendant. The main shaft may be adjusted without altering its "set angle" and its true line of bearing. The manufacturers also furnish the McCully crusher in all sizes with "right angle drive," when necessary—that is, the band wheel may be set on the right or left hand side of the crusher when looking into the discharge spout. By this arrangement the belting and power distribution of the plant may be simplified. Size No. 1 weighs 5800 pounds, with a rated capacity of

five to nine tons per hour; size No. 9 weighs 145,000 pounds, capacity 150 to 250 tons per hour (according to size and character of rock handled). These machines are manufactured by the Power & Mining Machinery Co. of Cudahy, Wis., represented on the Pacific coast by Charles C. Moore & Co., 63 First street, San Francisco, Cal.

### Geology of the Treadwell Ore Deposits, Douglas Island, Alaska.\*

NUMBER II.

Written by ARTHUR C. SPENCER.

**CRYSTALLINE SCHISTS.**—Next to the main intrusive mass of the Coast range, but intricately dove-tailed by its offshoots and outlying arms, there is a series of crystalline schists derived by metamorphism from sedimentary rocks. These are mainly mica, hornblende and garnet-schists, such as would naturally result from the alteration of calcareous and feldspathic sandstones and shales. With them, however, there are some well-defined strata of limestone and quartzite in which the effects of metamorphism are ordinarily less apparent to the eye, though the former are often thoroughly crystalline. The schistosity which characterizes this series follows the surfaces of stratification, as may be seen in many places from the attitude of the secondary structure in reference to the persistent strata of varying composition, such as limestone and quartzite.

Locally, igneous material has been intruded into the schists in the form of small aplite stringers, either crosscutting the schists or following their platy structure, forming in some instances a rock of gneissic appearance, not readily distinguishable from gneissic phases of the intrusive diorite. Rocks of this sort, which may be called injection gneisses, are confined to the vicinity of the diorite masses. In the main the schists are regarded, however, as having been formed by the crystallization of the originally sedimentary strata without important addition of outside material.

The crystalline schists form the country rock for many large masses of diorite, and also enclose dikes of a dark colored igneous rock, which though greatly altered seems originally to have been gabbro. The intrusions usually follow the structure of the rocks rather closely. In places the invading dikes have been mashed and recrystallized, and the gabbros sometimes give rise to hornblende schists which are not distinguishable from others of sedimentary origin, except in cases where gradation from the original into the secondary rocks can be observed. Some of the

aplite-dikes which cut the schists are mineralized, and many independent stringers, gash-veins and lenses of quartz occur, and are often gold-bearing, but so far as observed the prospect of finding productive deposits in the schist band is not particularly encouraging.

The width of the zone of crystalline schists varies from about 3 miles in the transverse section through the Douglas island mines to zero in the vicinity of Berners bay to the north, where it is cut out by the gradual edging over of the Coast range diorite. Toward the southwest, for a distance of several miles, its width is somewhat greater than 3 miles, but it becomes narrower again farther down the coast toward Windham bay. The variation in width of the schist band indicates the amount of crosscutting by the diorite. Excluding the bodies of intrusive rock which it contains, this series has an apparent thickness of about 15,000 feet, no trustworthy evidence of duplication of beds having been detected, though carefully sought.

**BLACK SLATES AND GREENSTONES.**—The outermost of the three principal lithological groups of the region is composed of alternating beds of greenstone and black slate, with occasional lenticular masses of limestone. Up and down the coast as far as observation has extended these rocks occupy all the mainland strip between the band of crystalline schists and the shores of Stephens passage and Lynn canal. They occur also on the adjacent islands of the Alexander archipelago, and though the western limit of the band has not been determined, similar rocks cover all the inland side of Admiralty island which, lying opposite Juneau and Douglas island, parallels the mainland for a distance of 70 miles. The whole band is thus not less than 15 miles wide, but the extreme width of the mainland portion is about 8 miles. From the boundary with the schist on the northeast to the far side of Douglas island the distance is about 7 miles.

In the vicinity of Juneau, four sub-zones, based upon the distribution of the greenstone, may be distinguished. On the inland side there is a band of black slate free from greenstones, a mile or so in width. Next to the slates and dipping beneath them comes a band 1.5 miles wide, composed mostly of greenstone schist, derived from the metamorphism of ancient surface lavas, though with these there are several thin intercalated beds of black limy slate. The third sub-zone, beginning somewhere beneath the waters of Gastineau channel, extends to the base of the mountains back of the relatively low platform on the inland side of Douglas island, and its width is therefore about 1.5 miles. The landward two-thirds is composed of alternating beds of greenstone and slate, with the latter in excess, as may be observed along the upper end of the channel where the strata strike out into Douglas island; while the outer third is composed entirely of black limy slates. These last mentioned black slates form the country rock for a system of syenite dikes, certain of which constitute the Treadwell ore bodies. The rocks of the fourth sub-zone form the mountains on Douglas island. They are basaltic greenstones and greenstone breccias, evidently representing a great series of volcanic flows and agglomerates.

All the different parts of the slate greenstone series lie in parallel position, striking northwest and southeast, and dipping toward the northeast in conformity to the prevailing structure of the region. The rocks are considerably, but not uniformly, metamorphosed. The slates, which now contain large amounts of graphite, were originally carbonaceous shales; the limestone strata are often only partially recrystallized and sometimes give a strong odor of kerosene; the greenstones are locally crushed and changed to chloritic schists. Slaty cleavage and schistosity are normally parallel with the bedding of the rocks, though locally where plication exists there may be wide divergence of primary and secondary structures.

The age of the slates is known to be Paleozoic from the presence of probably Carboniferous fossils in associated limestones at Taku harbor, about 20 miles southeast of Juneau. They therefore correspond in a general way with the Calaveras formation of California, which they closely resemble in lithology, metamorphism and structure. The Calaveras formation likewise forms the country for gold quartz veins later than dioritic intrusions resembling those of southeastern Alaska.

The greenstones are mostly volcanic rocks which flowed out upon the surface at different times during the deposition of the sedimentary strata with which they occur. In their present condition they are similar to the rocks called amphibolites in the U. S. Geological Survey reports on the Mother Lode in California, which have also been considered to be volcanic rocks crystallized under surface conditions.

In the Juneau region the way in which the thick masses of these rocks are built up in layers, sometimes interleaved with thin sedimentary strata, the occurrence of vesicular beds, and of breccias made up of volcanic bombs and fragmental igneous material, all indicate their origin as surface volcanics. There are, however, some green rocks of very similar appearance, which seem to be intrusive, and the two sorts are usually indistinguishable, unless, as rarely happens, the fact of invasion and later origin can be

\* Abstract Am. Inst. Min. Engs



established by evident crosscutting of the stratification.

In the band of slates and greenstones there are occasional masses of diorite related to the main intrusive rock of the neighboring Coast range. In general these are distributed irregularly in all parts of the series, though in the immediate vicinity of Douglas island the only large masses are on the northern end of Glass peninsula, which forms the landward side of Admiralty island opposite the lower end of Douglas island, and on Grand island in Stephens passage near by. A small intrusion occurs back of Sheep creek on the mainland about 2 miles from Gastineau channel, but the only other occurrences known are in the series of dikes which form an important feature in the local geology of the part of Douglas island where the Treadwell mines are situated.

Other intrusive rocks are narrow dikes of basalt or minette usually crosscutting the country, and a series of basic dikes and irregular masses noted mainly in the upper or inland black slate sub-zone of this band, though they are also found in the crystalline schists, as already stated, and they have been recognized in the band of greenstones on the northeast side of Gastineau channel. These dikes which follow the structure of the slates closely, but not absolutely, are usually highly metamorphosed, but they seem originally to have had the composition of gabbro.

**ORE DEPOSITS OF THE REGION.**—The accessible portion of the mainland from Windham bay northwestward to Berners bay, including also Douglas island, is here designated as the Juneau gold belt.

Of the three bands or groups of rocks which occur in this belt, the slate-greenstone band is pre-eminent in the number of quartz veins and other forms of metallic mineralization which it contains. All the proved placer deposits and all the mines and noteworthy prospects of the district are situated in the strip covered by these rocks. The comparative accessibility of the slate-greenstone band may account for the distribution of the active operations in part, but farther inland prospecting in the crystalline schists and in the diorite intrusives has never given equal promise of valuable deposits.

The most prominent economic feature of the slate-greenstone band is a strong lode system or complex of veins, traceable throughout the length of the belt. South of Berners bay all the best placer ground, and all the lode mines which have produced important amounts of bullion, excepting the Treadwell group and its former placers, are on this main system of veins. It compares in a general way with the Mother Lode of California, but follows more closely the structure of the rocks. Its position is in the upper black slate sub-zone of the slate-greenstone

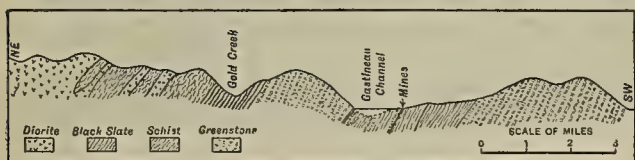


Fig. 4—Geological Section Douglas Island and Mainland Near Juneau, Alaska.

band, just above its contact with the uppermost greenstone beds of the next lower sub-zone (Fig. 4). The characteristics of the lodes may be studied in the Gold creek and Sheep creek mines, which have been producing for many years, but are only now being developed upon the large scale which the extent and importance of the deposits demand.

In the vicinity of Juneau the second sub-zone, composed mainly of greenstone schists, shows considerable mineralization in the aggregate, and there is at least one vein which may be traced for several miles with practical continuity, but to the north and south give more promise.

Observations on the occurrence and distribution of mineralization in the third sub-zone, composed principally of black slates, with some interbedded greenstones, have been confined to Douglas island, where mineralized dikes of albite-diorite intrusive in the black slate form the Treadwell deposits. Outside of these properties there are some stringer leads of quartz and a certain amount of general impregnation in basic greenstones which are probably ancient lava flows, but neither of these types of mineralization is likely to yield workable deposits within this band of rocks.

The greenstones which form the mass of the fourth sub-zone are in part highly mineralized. Southeast of the Treadwell mines in Nevada creek, which is the southernmost of the longer streams on the mainland side of Douglas island, these rocks have been altered to propylite by solutions which have permeated them, and a large mass of the rock has been impregnated with disseminated pyrite carrying small amounts of gold. This mineralized material extends for nearly 1.5 miles parallel with the strike of the rocks and not less than 1 mile across their trend. With the pyrite, lead, zinc and copper sulphides sometimes occur, and when these are present assays show silver and an increased proportion of gold. The richer material is, however, largely concentrated in narrow zones marked by ill-defined fissures, which are ordinarily transverse to the general northwest

trend of the mineralized mass. Only a small amount of quartz is present in the form of vein filling. This area of mineralization has not been thoroughly prospected, and workable ore bodies may eventually be found in it.

Another similar mass of pyrite-impregnated rock occurs in the same band of greenstones opposite the Treadwell mines. Here the altered and mineralized material outcrops in a zone perhaps not over 300 feet wide, and is traceable for at least 1 mile from southeast to northwest. Such prospecting as has been done has not given particularly encouraging results.

In all the outer portion of Douglas island the amount of quartz in veins is small in comparison with that occurring in other parts of the slate-greenstone band, and while other instances of pyrite deposition than those mentioned are known, from present developments none of them seem to be of much promise.

(TO BE CONTINUED.)

## Crushing in Cyanide Solution as Carried on in the Black Hills, S. D.\*

NUMBER IV.

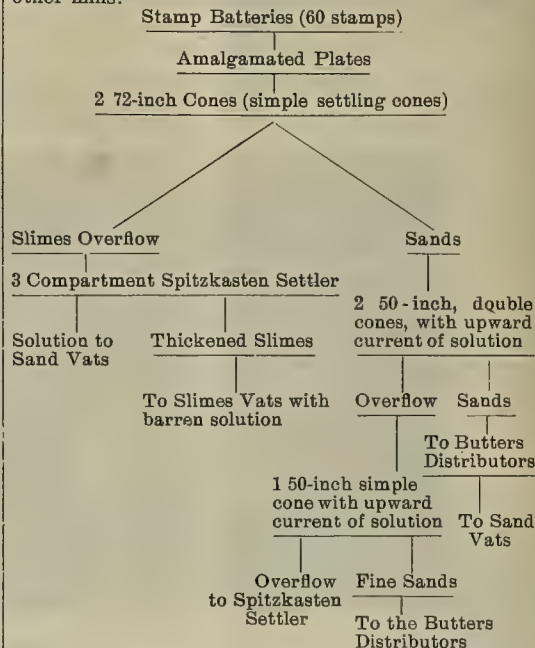
Written by C. H. FULTON.

A very close and satisfactory separation, however, is not possible, first, on account of the inherent defects of the cones used as classifiers, and second, because of the bad effect of the lime in sending slimes with the sands as already mentioned. For these reasons the classification adopted is that of making a clean sand rather than a clean slime, this being the lesser of two evils. For example, at the Maitland mill the sands carry only 1% or 2% of slimes, 5% giving an unsatisfactory leaching rate. In making sands of this kind the slimes run from 15% to 20% of fine sands, but a small portion of which remains on a 150-mesh screen. The proportion of the ore crushed treated as sands and slimes varies at the different mills. At the Maitland mill the average figures for eight months show 48.2% of the ore treated as sands and 51.8% treated as slimes. At the Dakota mill the sands amount to 65% to 70% and the slimes to 30% to 35%. At the Lundborg, Dorr & Wilson mill the sands and slimes amount to approximately 50% in each case. At the Horseshoe mill the slimes amount to 26% to 30% and the sands to 70% to 74%.

A number of different systems of classification by the cones was tried before the system described was adopted. It will be noticed that the system now used reclassifies the sands from the upper cones. Formerly the plan was to reclassify the slimes overflow from the upper cones in the lower cones, but this practice was soon discarded as unsatisfactory, giving in some instances unleachable sands. Double cones were also used, i. e., the regulation cone classifier, but most of the mills now classify with the inner cone removed. The only mill where a double cone with an upward current is used to reclassify the sands is at the Hidden Fortune mill.

Two of the mills, the Lundborg, Dorr & Wilson and the Hidden Fortune, unwater the slimes before they go to the slimes tanks. The first by means of a large sheet iron cone 22 feet in diameter, the top portion sloping 40° and

tanks. The object of unwatering the slimes in this way is to give them an additional treatment with barren solution, for when not unwatering the slimes they go to the slimes vat with battery solution and are settled there for the first time, while with the unwatering device the slimes go to the slimes tanks with barren solution having had one dilution by the time they reach the first slimes tank. The scheme of classification at the Hidden Fortune mill is given below, as it is somewhat different from that of the other mills:



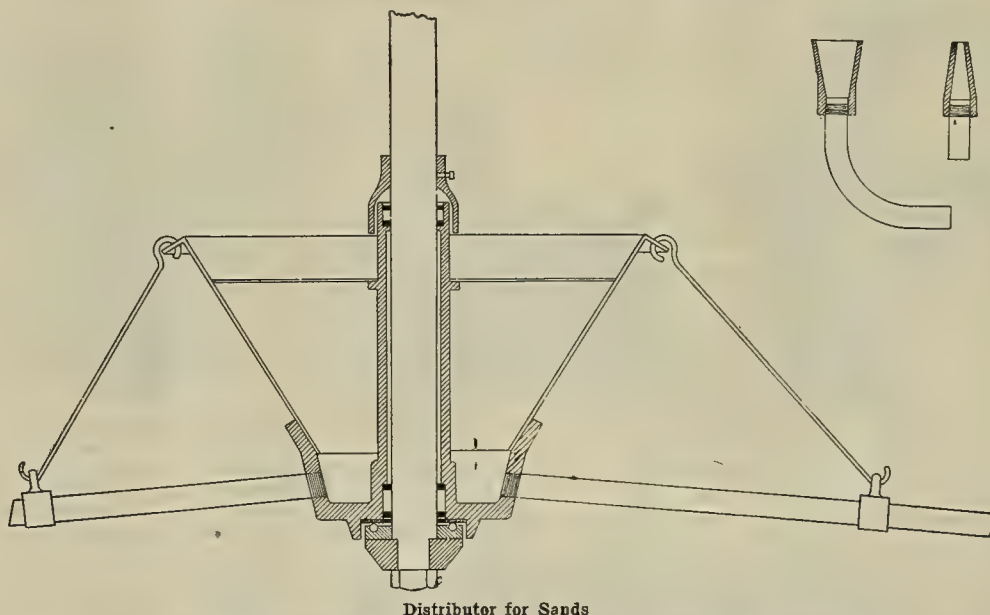
To show the nature of the classification at some of the mills the following mechanical analyses of sands and slimes are appended:

### MECHANICAL ANALYSES OF SANDS AND SLIMES.

Sands at the Dakota mill constituting 70% of the mill product.	Slimes at the Dakota mill constituting 30% of the mill product.
On a 20-mesh screen 13% to 20%.	On a 100-mesh screen 0.3% to 0.4%.
On a 40-mesh screen 30%.	On a 150-mesh screen 12% to 33%.
On a 80-mesh screen 26% to 54%.	Passed a 150-mesh 60% to 87%.
On a 100-mesh screen 7% to 8%.	
On a 150-mesh screen 13% to 18%.	
Passed a 150-mesh 4% to 5%.	
Sands at the Lundborg, Dorr & Wilson mill, constituting 50% of the mill product.	Slimes at the same mill, constituting 50% of the mill product.
On a 40-mesh screen 30%.	On a 60-mesh screen 9.5%.
On a 100-mesh screen 40%.	On a 100-mesh screen 1.5%.
On a 200-mesh screen 24%.	On a 200-mesh screen 18%.
Passed a 200-mesh 6%.	Passed a 200-mesh screen 80%.

It may be noted that a comparison of these products at the different mills is not possible, as the ores differ, and what is a fine sand at one mill according to mesh size may be a slime at another.

The proper separation of the sands from the slimes is a vital question to be solved with the plants of the Black Hills, and is one that has given the mill men much trouble. While the present system is a great improvement on the practice of the earlier mills, there is still much room for further improvement.



Distributor for Sands

the lower portion near the discharge 60°, and the second by means of a three-compartment spitzkasten 40 feet long, 6 feet wide and 8 feet deep. The compartments are charged successively and the thickened slimes drawn off and mixed with solution in the launder that transfers them to the slimes

**THE TREATMENT OF THE SANDS.**—The filling of the sand tanks is accomplished by distributors of the Butters and Mein type, the construction of which is shown in detail in the accompanying drawing. The distributor is suspended from a trolley running on tracks above the sand vats, so that the distributor can readily be transferred from one vat to the other. The sands are fed into the hopper of the distributor

\* Bulletin No. 7, South Dakota School of Mines.



by a launder, which feeds as near the center of the hopper as possible, avoiding the throwing of the feed against the sides, as this causes an irregular distribution of the sands in the vat. The dimensions of the distributors vary according to the capacity required. The slope of the pipe arms is 1 in 12, and the diameter of the pipes varies in the different distributors from 1.5 to 2.5 inches. Generally all the pipe arms in a distributor are of the same diameter, but in the one at the Horseshoe mill the long arms are 3.5 inches, the medium arms are 2.5 to 3 inches and the short arms 2 inches in diameter. The discharge nozzles are usually separate castings, the discharge being controlled by wooden plugs. The number of arms is generally six, although the distributor at the Horseshoe mill has eight arms. In the case of one of the six-arm distributors the following figures give the length of arms—13.25 feet, 11.5 feet, 9.5 feet, 8.0 feet, 5.5 feet and 2.5 feet. These arms are unsymmetrically hung in such a way that their weight balances the distributor. The discharge of the pipe arms must cover the surface of the vat. The hoppers of the distributors are provided with a horizontal screen to keep foreign matter out of the pipe arms. The function of the distributors in the mills crushing siliceous ore is not in part that of a classifier acting with a filled vat in removing slimes from sands, but it acts solely to evenly distribute sand in the vats. The sands are not laid down under water or solution, but the vat is what might be called dry filled, the solution which goes into the vat continually draining off through the filter until the vat is full of sands. The top layer of sands in the vat is always practically dry. This method of filling has the advantage, first, that the slimes in the pulp are uniformly distributed with the sands in the vats, which is not the case when direct filling is employed under water; second, that for this reason it gives a charge that is more percolable, and third, that during the filling a great amount of solution passes through the sands, in this way treatment going on all the time that the vat is filling. The charge laid down in this way is also more porous than when laid down under water. At the Maitland mill the amount of solution passing through a 150-ton charge of sands while filling is 700 tons, or 4.7 tons of solution per ton of sands.

The time of filling a 30 by 6-foot vat at the Maitland mill is 60 hours; at the Lundborg, Dorr & Wilson mill a vat, 18 by 10 feet, is filled in 60 to 72 hours. At the Dakota mill a 115-ton vat is filled in 38 hours.

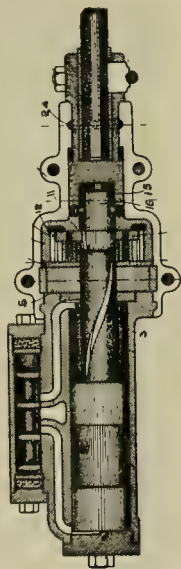
(TO BE CONTINUED.)

## Mining and Metallurgical Patents.

PATENTS ISSUED OCTOBER 4, 1904.

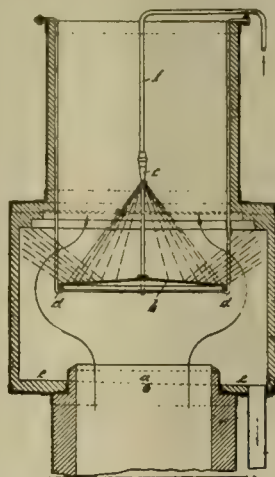
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

COMBINED CHUCK AND ROTATING DEVICE FOR ROCK DRILLS.—No. 771,218; G. H. Gilman, Franklin, Pa.



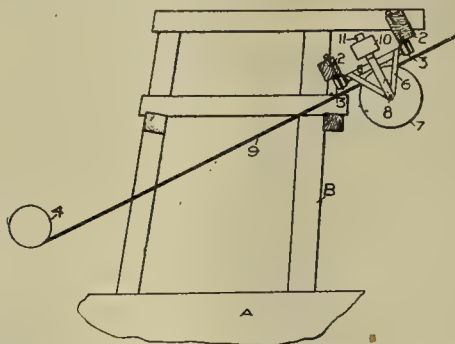
In combined chuck and rotating device for rock drills, piston operably seated in cylinder, hammer of piston, hammer having one or more straight grooves and one or more spiral grooves upon its periphery, cylinder aforesaid, guide plate rigidly mounted in cylinder, there being hole in plate through which hammer is adapted to reciprocate, keys in plate adapted to seat in straight grooves aforesaid, rotating plate rotatably mounted in cylinder, there being hole in plate through which hammer is adapted to reciprocate, spiral flukes in plate adapted to seat in spiral grooves of hammer, whereby plate is adapted to be rotated, in combination with chuck adapted to be rotated by rotating plate.

COOLING DEVICE FOR BLAST FURNACES.—No. 770,910; L. Keyling, Berlin, Germany.



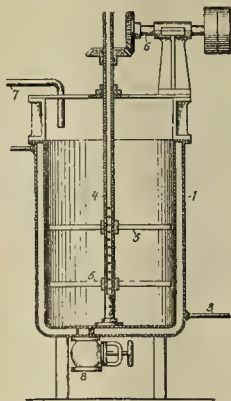
Cooling device for blast furnaces, combination of box in which upper opening of furnace is situated, plate situated in box vertically above upper opening of furnace, diameter of plate being larger than upper opening of furnace, so that edge of plate projects sideways over opening of furnace, water nozzle situated vertically above plate, annular channel around top part of furnace in box and means for connecting channel with outside.

GUIDE SHEAVE FOR HOISTING APPARATUS.—No. 770,857; J. W. Hollenbeck and W. E. Palmer, San Francisco, Cal.



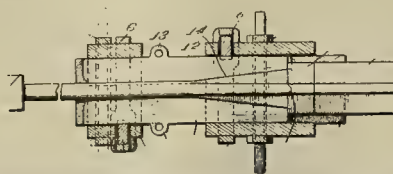
Combination with hoisting apparatus, of rope, means for driving rope, sheave over which rope passes intermediate of its ends, boxes carrying support which is turnable parallel with and above normal line of travel of rope, convergent arms fixed to support and pin upon which sheave is turnable.

PROCESS OF CONCENTRATING ORES.—No. 771,277; A. H. Schwarz, New York, N. Y.



Method of concentrating ores by mixing melted fatty matter which is solid at normal temperatures with ore, solidifying fatty matter, then separating gangue from values entrained in fatty matter while latter is solidified, and finally liquefying fatty matter to separate values therefrom.

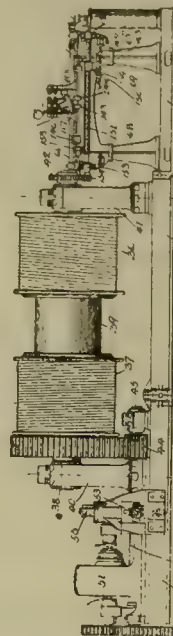
DRILL SHARPENER.—No. 771,737; F. Markwick, Scranton, Pa.



Drill-forming die comprising plurality of forming bars, spacing pieces interposed between bars, sleeve inclosing bars and pieces, sleeve being formed with

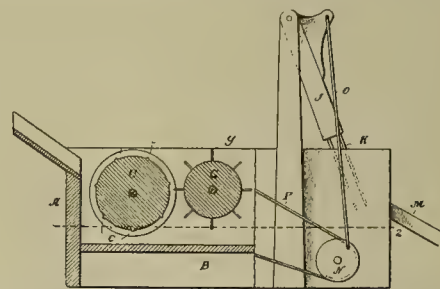
transverse slot, collar surrounding sleeve in plane of slot, and wedge arranged within slot between collar and bars.

ELECTRICAL HOISTING APPARATUS.—No. 771,351; E. B. Clark, Chicago, Ill.



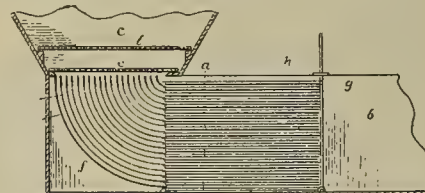
Hoisting mechanism comprising following elements: Hoisting motor, controlling mechanism therefor, automatic mechanism for operating controlling mechanism, manual mechanism for operating controlling mechanism, and means for bringing into use either manual or automatic operating mechanism.

APPARATUS FOR EXTRACTING GOLD FROM AURIFEROUS SAND, ETC.—No. 771,454; R. Blake, Madison, N. J.



In machine combination with tank adapted to contain lower body of mercury and having discharge located in relatively elevated plane, of horizontal cylinder transversely within tank and adapted to have lower portion immersed in mercury, provision for supplying material to tank, in front of cylinder, pivotally suspended arm depending within upper portion of tank at rear of horizontal cylinder and between latter and discharge, arm provided with series of teeth extending transversely across tank, length of arm and teeth conjointly being such that teeth in lowest position will be above mercury, and means for actuating cylinder for immersing material in mercury and causing material to pass beneath cylinder, and for oscillating arm for causing teeth to move back and forth in path of arc solely above plane of mercury surface.

HYDRAULIC FLUME FOR MINING FINE MATERIAL.—No. 771,792; G. W. Wilderman, Portland, Or.



Hydraulic fluming apparatus, comprising hopper or receiver, means for screening and distributing material discharged from same, flume or trough, feeder in trough under hopper, feeder comprising series of curved, parallel plates adapted to mechanically divide pulp and solution discharging from hopper into plurality of thin streams, tier of removable amalgamating plates adapted to provide plurality of parallel channels, so as to allow each of streams of pulp and solution issuing from feeder to pass between two plates of tier; plates being respectively plated with amalgamating film on both their top and bottom surfaces, and supported, one above the other, at such distance apart as to cause top and bottom surfaces of each stream of pulp and solution to be in continuous contact with surfaces of two plates between which it passes; and means for holding amalgamating plates in place.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

The Alaska season for 1904 is closed, as far as shipments to the north are concerned, and boats are leaving for the last trip of the season to Nome, St. Michael, Dutch Harbor, Cook Inlet and other places along the southeastern coast. The gold production of the northern district for the present year is estimated as follows: Klondike, \$11,000,000; Nome, \$10,000,000; Tanana, \$2,000,000; all the other districts, \$3,000,000.

## ARIZONA.

### Cochise County.

At Tombstone the Tombstone Con. mines, being opened under direction of Manager Staunton, reports progress, though they are getting more water than had been expected. They are pumping about 3,000,000 gallons of water per day from the mine and continue sinking. Deepest workings are 810 feet, which is over 250 feet below the water level existing when the pumps were first started. The draining of the basin is proving slow work. The ground is being opened 100 feet below the former water level in three shafts, the Emerald, the Silver Thread and the West Side.

### Gila County.

The Globe M. Co. is exploring the old workings of the Miami mine, near Globe, and at a depth of 135 feet has opened a stope in which is exposed a 20-foot vein of silver and gray copper ore. The shaft has been cleaned out to 235 feet. Ore is being broken.

Machinery for the Pinto Creek M. & S. Co., consisting of an air compressor, drills, etc., are at the mine at Pinto creek, 20 miles west of Globe. Driving the lower tunnel on the Yo Tambien mine will be resumed, says Superintendent Fuller.

### Mohave County.

Superintendent W. A. Fellows is putting in a 20 H. P. hoist on the Tom Reed mine, of the Hilty Anderson group, near Acme, and expects to have it in operation next week. Buildings are being erected. The mines are in Gold Roads section.

T. Ewing of San Francisco, Cal., has bonded the Victor and Virgin mining claims, near Vivian, and will put in a hoisting plant and sink the main shaft to several hundred feet.

H. C. Dayton, superintendent of the Sun Cloud mine, near Signal, says he will resume work on the Sun Cloud and increase development.

About forty men are at work on the Banner group of mines at Stockton Hill, says P. Wiseman, superintendent. Ore is being hauled to Berry from the mines to be shipped to the smelter at Needles, Cal.

### Pinal County.

J. Champion has started work on the Belle, Columbia and Martinez mines in Mineral Hill district and will build a wagon road from the mines to the Phoenix & Eastern Railroad at Price station, 10 miles east of Florence. The mines were formerly the Pinal Con. group, in connection with which the Butte smelter was built. The ores are high-grade lead-silver.

### Santa Cruz County.

The Arizona-Mexico Investment Co. has a working bond on the Golden Rose group of mines, on the west slope of the Patagonia mountains, 12 miles northeast of Nogales. The group includes five claims, one of which has a shaft 135 feet deep, a tunnel and drifts, besides several prospecting shafts, says the Oasis. There are several ledges running through the properties and three of them unite at a point within the ground involved, where the company will start development. These ledges are 3 to 6 feet in width and carry lead, silver and gold.

J. N. Curtis, manager of the Mowry silver mines at Patagonia, reports satisfactory developments. A set of pumps, with capacity of 600,000 gallons per day, are in operation. Men are at work on the 400-foot crosscut. The present pipe gives a 4-inch discharge, but it is expected to put in a set of 8-inch pipes. Two more boilers will be set up, additional sinking pumps installed and sinking continued in the double-compartment shaft to the 500-foot level. The vein is said to be 70 feet thick, averaging \$10 a ton.

### Yavapai County.

D. J. Sullivan, at Congress, says he is running ore from the Alaska mine through the Congress G. Co. mill, \$38 per ton being recovered. He will deliver twenty tons daily of that class of ore. The Congress Co. has a milling power of eighty stamps and is using only forty stamps on its own ores.

### Yuma County.

H. L. McCarn, superintendent of the Planet mines near Planet, south of Kingman, says the mines are being worked by a few men and satisfactory results are being obtained. If the Congress & Colorado railroad is built the company expects to operate the mines on a larger scale and build reduction works on Bill Williams fork.

At Quartzsite the 10-stamp mill has started working on the Belle of Arizona mine, says Manager Darling, with satisfactory results.—At La Cholla, near Quartzsite, the Amalgamated G. M. Co. is putting up a 120-stamp mill and will increase the number of men at work.

## ARKANSAS.

### Marion County.

Yellville reports say J. J. Shaffer and J. T. Vower of Boulder, Colo., owning eighty acres of school land in Mud Springs hollow, have struck payable ore in Buffalo mining district. They drilled on this claim and cut into ore at the depth of 27 feet, showing 17 feet of jack, and they are sinking a shaft on the drill hole. The company will put in a 200-ton plant. The mine is 1½ mile west of Maumee, in the Maumee, Jack Pot, Mud Hollow and Rock Creek mining basin, and is 1 mile north of the Buffalo river.

### Searcy County.

A. J. Riley of Yellville says his Turkey Fat M. Co. has an 8-foot face of high-grade zinc blende showing in the drift, and they are down 20 feet in the winze, 160 feet from drift, and expect to find the same run of ore at 35 feet. He also says that 1 mile west of above, Colorado and Oklahoma men have struck a run of high-grade zinc ore in dolomite.

## CALIFORNIA.

### Amador County.

An oil tank has been built near the Keystone hoist at Amador City and facilities for burning oil are being put in. Oil will be used there entirely.

At the Kennedy mine at Jackson, at the east shaft, the new reels of the hoist are heavier by ten tons than the reels they displaced. Six furnaces keep the hoist supplied with steam, leaving three furnaces in reserve. Sinking has resumed. The shaft is 2640 feet vertical depth, including a sump of 50 feet. It is the intention to sink 300 feet deeper. The sinking will not interfere with mining operations. The mill will be kept running to full capacity. A small engine has been placed at the 1600-foot level to hoist the rock to that point. The 40-stamp addition to the milling capacity is making headway. The building is inclosed; the mortar blocks are completed and work of putting the machinery in place started. A dynamo room is provided at south end of the mill, corresponding to the one at the north end which supplies the power for the sixty stamps now in motion. The forty stamps addition will be operated as an independent mill. A machine and blacksmith shop has been built east of the shaft. The machine shop will include lathe, steam hammer, band saw, etc., in its equipment, says Superintendent Webb Smith.

### Calaveras County.

At the Sonoma mine, at Murphys, bonded by F. Healy of Santa Rosa, the vein is showing 6 feet in width and free gold can be seen, says Superintendent Cunliffe. The company operating the mine is The Sierra Nevada Dev. Co. The ore carries silver values with the gold.

W. H. Cleary is arranging to put up a 10-stamp mill at his mine on Indian creek, near Murphys. The mill will be run by electricity from the Utica power plant.

The Ford mill, near San Andreas, is being torn down and will be put up on the mine bought by R. B. Parks and W. R. Womble at Hodson.

The Gold Divide mine, on Tunnel ridge, near the Calaveras river, formerly known as the Shoe String, is being operated by F. O. Courtmarsh, M. Humphrey and E. Pellaton of Mokelumne Hill. It is a gravel proposition and sinking is in progress. When the channel is "bottomed," drifting and crosscutting will be done. Machinery will be put in to work the mine. The claim comprises eighty acres of land. Operations are under supervision of F. O. Courtmarsh.

### Contra Costa County.

The Pacific Coast Oil Co. has let the contract for grading for the site for an addition to its refinery at Point Richmond. Three steam shovels and a large number of men will be put to work. Several brick buildings will be put up, also car shops for repairing oil tank cars.

### Del Norte County.

The Waldo S. & M. Co., operating at Waldo, Or., through Manager T. W. Draper, has made final payment of \$25,000 on the Monumental mine, of Shelly Creek district, near the Oregon State line.

The Monumental was bonded one year ago and forty-five men are at work. A steam hoist and compressor are up and machine drills are at work in the tunnels and drifts. It is intended to put in a smelter and cyanide plant.

### El Dorado County.

At the Ida Mitchell mine, near Placerville, the electric plant has been completed and the power drills started, says the Mountain Democrat. The mine hoist and pump are operated by steam, and the drills by electrical power.—W. S. Bacon, in charge of the Barbara mine near Gold Hill, says a steam hoist is being set up.—At the Landecker gravel mine buildings are going up. The mill nearing completion will have capacity of treating 100 tons of gravel per day.—At the River Hill mine ore is being taken out at the 1000-foot level. Assays of the ore run \$30 per ton, says Manager T. Clark.

The Kelsey gold and silver mine extends from the South Fork of the American river above Chili Bar, about 2 miles, to Big Sandy near Kelsey. Six hundred feet of tunnel has developed prospects and the owners are starting operations. Pipe lines are to be built, and a 3-stamp mill, and fifteen men have been put to work.

### Humboldt County.

At Quimby creek, in New River district, near Blue Lakes, the quartz deposits of the Quimby G. M. Co. will be developed and machinery is being put in by W. R. Beall and J. A. Brent, principal owners. They will build a sawmill of 10,000 feet capacity per day, and put in three 3-stamp batteries, quadruple discharge, 1000-pound stamps. An aerial tramway, 1500 feet long, will also be installed. The plant is expected to be in running order by Jan. 1.

### Kern County.

(Special Correspondence).—In Mojave mines development is being carried on and four separate companies are working full handed. The mines are 4 miles from Mojave station, where the S. P. and Santa Fe separate after crossing Tehachapi Pass on the same tracks, the former running to Los Angeles, the latter continuing eastward—its main overland line. The four companies are the Exposed Treasure, operating on Bowers' hill; Karma M. Co., Queen Esther M. Co. and Echo M. Co., operating on Soledad mountain, from 1 to 2 miles farther west than the Exposed Treasure.

The Exposed Treasure has twenty-five stamps and amalgamates and cyanides, employing in the details some methods not in common use, the outgrowth of ideas and experiments of Manager DeKalb. He states that his ore is very different from that of his neighbors. He assigns it to a different geological age.

The Karma M. Co. employs twenty stamps and concentrates and cyanides, omitting amalgamation. The mill was started last April under superintendence of R. G. Eckis. Manager J. A. Gerner is also at the property. It consists of five claims, with a total of a mile of work. Thirty-five men are at work and sixty tons per day are treated at a total cost, it is stated, of about \$2 per ton. The management proposes adding thirty stamps. This mine, like all in the district, is entirely a tunnel proposition and the ore silver-gold.

Adjacent to the Karma mill is the mill of the Queen Esther Co., of which S. W. Mudd is manager. The ore is treated by utilizing one Blake, one Dodge crusher and three Llewellyn rolls. About sixty men are worked and 100 tons per day are treated. The group consists of ten claims. It is a large, low-grade silver-gold proposition. About 2000 feet of work have been done.

The Echo M. Co., G. H. Hooper principal owner, consists of fifteen claims. Its 20-stamp mill treats sixty tons per day, and preparations are being made to install ten additional stamps. Also an air compressor is being put in and four machine drills will be used in the mine. There are two veins running the length of the property—the Echo, 2 to 10 feet wide, and the Starlight, 4 to 16 feet wide, parallel and trending northeast to southwest. About 3000 feet of tunnels and raises have been completed. The mill has been in operation eighteen months. The treatment is similar to that employed in the Black Hills, S. D.—the ore is crushed in a weak cyanide solution, sand and slimes separated by a screw separator; the sand is then leached and the slimes are worked in agitators in which there is upward percolation of water; the solution overflows the top and passes to settling tanks; about half of this is again returned to the crusher and the remainder passes through the zinc boxes and is again utilized to leach the slimes. A close saving of values is claimed with a minimum use of water.

The water supply of the Karma, Queen Esther and Echo comes from Cameron, 2 miles, and the Exposed Treasure from Oak creek, 16 miles. These companies are all

close corporations. A large amount of money is being expended and little said about it.

Outside of the four active companies there is little being done and almost no prospecting. On Bowers' hill, opposite the Exposed Treasure, is a property of nine claims, owned by Tate, Parker, Goldsworthy & Ashton, with two shafts, 200 feet and 150 feet deep, respectively, and some drifting. The owners are negotiating its sale.

Mojave, Oct. 12.

### Nevada County.

G. W. Manwell, of Wheatland, reports for fifteen days run at the Black Swan blue gravel mine at Mooney Flat, 10 miles west of Grass Valley, the cleanup amounted to \$1500. Manwell says the mine is improving. They have twenty-three men at work and expect to double the number.

The New York-Grass Valley G. M. Co., says Manager G. W. Root, at Grass Valley, will build a sand plant or a slimes plant to handle the tailings from the mill. Another improvement authorized by the directors is a 100-light electric plant for lighting the underground workings.

### Placer County.

In the Hidden Treasure mine, at Bullion (formerly known as Centerville), 200 men are at work and are taking out a large quantity of gravel daily, says the Colfax Sentinel. A contract was let last week for running the tunnel 400 feet additional. The company is sinking an air shaft which will strike the tunnel in about 2 miles from the mouth, and it is estimated that the depth to sink will be 740 feet. They will start a raise to meet it. A 50 H. P. motor is being set up at the shaft. All the timbers will be sent down the air shaft instead of being hauled down the mountain side for nearly 5 miles and taken in through the tunnel. A sawmill is also to be erected near the shaft. The air pipe, of which there are several miles, will be taken out as soon as the shaft is completed and will give more room in the tunnel. The shaft is now down 120 feet. The Hidden Treasure is a drift gravel mine, has 1700 feet of flume and washes 100 tons of gravel per hour under 250 inches of water. H. T. Power is manager.

The Three Stars and Almont mines, under management of B. F. Hartley, at Ophir, reports progress. The Three Stars shaft has a hoist run with compressed air, while the Almont is a direct-connected water hoist. The ore is hauled on an electric road to the mill in Doty's ravine. Successive floors contain the rock breaker, self-feeders, battery, concentrators, dynamos and air compressors. The sulphurets are sacked at the mill, hauled to Lincoln and sent to the smelter. The mines employ seventy men and 3000 tons of quartz are crushed per month.—The Big Pine mine is near Baltimore ravine, at Ophir, and an Eastern development company is opening up the mine by sinking shafts and running levels. Hoisting and milling plant will be built, says the Placer Herald. Power drills have been put in.—Manager P. Lozano is opening up the Bellevue mine, in Ophir district. The mine is owned by P. Lozano, F. E. Brye, S. Bartlett and A. L. Smith.

### Plumas County.

The Robinson mine in the Granite basin, near Letter Box, 42 miles from Oroville, Butte county, will be worked, says Superintendent Oleson. Supplies are being taken in.

### San Bernardino County.

At San Bernardino, San Francisco men have incorporated the Out West M. Co., which controls mines on the desert. G. E. Bailey, A. E. Moore, W. J. Roth, G. Hubbel, W. C. Bailey, R. F. Bell and S. Dickson are incorporators. Their property shows a ledge carrying free milling ore, which also is said to carry a percentage of copper.

### Shasta County.

(Special Correspondence).—Last spring B. S. Cone and W. A. Fish of Red Bluff, Tehama county, bonded 840 acres of ground along Cottonwood creek to the extent of 4 miles, and about 6 miles south of Igo postoffice. The banks of the creek average 17 feet from surface to bedrock, which is soft slate. This ground has been prospecting by shafts and extensively by a Keystone drill. It is expected a dredge will be placed in the creek.

Igo, Oct. 11.

(Special Correspondence).—About 5 miles southeast of Harrison's gulch, near Redding, J. Wilson, C. Trede, A. J. Bogart and E. Blossom of Red Bluff are prospecting and developing two claims, through which runs a ledge 3 feet in width. A crosscut tunnel in 300 feet opened the ledge. Connection to surface will be made to have ventilation. A double-compartment shaft is being sunk in the ore shoot at breast of tunnel. Ore assays \$20 per ton in gold. The ore is



similar to that of the Midas mine at Harrison gulch. E. Blossom and A. J. Bort own the adjoining two claims or extension.

Cleanup of a week's run of the 2-stamp mill on the mine near Whiskeytown under Superintendent Cross amounted to eighteen ounces of gold. This was of ore from the ledge in the 300-foot tunnel at a depth of 300 feet below the surface. Stopping this winter will be from the tunnel to the surface. The ore is free milling, averaging \$8 per ton.

Redding, Oct. 12.

(Special Correspondence).—The Shasta County Q. & P. M. Co., with headquarters at Corning, Tehama county, was incorporated this summer and acquired, by location and purchase, 350 acres of ground near Whiskeytown, embracing the Murderer's Gulch mines. The banks are from 5 to 20 feet in depth to bedrock and the holdings cross Clear creek. Gold is found through all portions of the dirt and gravel. Clear creek is a swift-running body of water and the company has made application to the Debris Commissioners for permit to use it, as the Sacramento river is 12 miles away. Since July a ditch 11 miles in length has been built, with little fluming. From ditch to working ground is 200 feet and by piping a fall of 500 feet can be had. The officers of the company are J. R. Bryant, president; S. W. Kincaid, vice-president; C. W. Davis, treasurer; P. J. Newton, secretary.

Redding, Oct. 12.

#### Sierra County.

Mining operations are being started at Forest City, reopening the South Fork gravel mine. It has been idle for several years. There is a tunnel 3400 feet in length and it is proposed to drive this tunnel ahead to open the channel. F. W. Kuhfield of Forest is in charge.

#### Siskiyou County.

(Special Correspondence).—W. S. Maggard of Corning, Cal., and Dyer Bros. of Gazelle are owners of a group of three claims and 160 acres of railroad land adjoining on the west and south of the Dewey mine. The formation is granite and gabbro, with ledges 20 feet in width. The main ledge has a course north and south and the others trend northeast and southwest, converging to the main ledge. Development comprises two tunnels, 140 feet each, and several shafts 30 to 60 feet in depth. The ore is free milling, with values of \$30 per ton in gold. W. S. Maggard is sole owner of 200 acres of railroad land, near the Dewey mine, and through it runs a 40-foot ledge of free milling ore. A crosscut tunnel tapped the ledge at 200 feet in and at 150 feet below the surface. Drifting shows shoots of ore assaying \$10 to \$20.

Gazelle, Oct. 11.

A. C. Brokaw and associates of S. Attle, Wash., have taken up the bond on the Advance mine, on Russian creek, reached from the Oregon side. The consideration is \$70,000. The mine will be fully developed and a milling plant built. A tunnel is being driven to tap the ore body at depth. The ore carries free gold.

On south slope of Siskiyou mountains, midway between Happy Camp, Cal., and Waldo, Or., is the camp of the Ricoro G. M. Co., G. G. Mullins, manager. The company is operating the Classic Hill mine and adjoining properties, and has 600 acres of placer ground in one body. A sawmill has been built and they are cutting 10,000 feet of lumber daily and flumes and buildings have started. Three miles of wagon road have been made, extending to the country road on Indian creek. The old ditches, 1½ and 5 miles long, have been cleaned out and enlarged, and he has men at work putting in new flumes. The pen-stock has been completed and pipe line laid. They will have 375 feet pressure and good supply of water out of west fork of Indian creek. The timber used is mostly of white cedar.

R. S. Fagundes and M. Joseph will start work on the Live Yankee mine at Rollin. They have high-grade ore at the mill, to be crushed as soon as water can be obtained to run the mill.—Reed & Ball, owners of the Ida May mine, have men doing development work and getting ready for the water season. The mine is equipped with a 2-stamp mill, 1000-pound stamps. For the last three months' run the ore is reported to have averaged \$60 per ton.

#### Tehama County.

The Fitzgerald farm on Clear creek, northwest of Red Bluff, has been bonded for gold dredging purposes by R. E. Collins, W. D. Watson and A. Hurst. The farm consists of 2352 acres, and extends from the Sacramento river west a distance of 2 miles.

#### Trinity County.

First payment on the option on the Yellowstone mines has been made by M. Manley at Weaverville. The Yellowstone will be managed and worked in connection

with the adjoining Enterprise group of mines.

#### Yuba County.

R. E. Craustor, W. C. Hendricks et al. of Sacramento have bought 1280 acres of dredge mining land at \$100 per acre. The land lies in the Yuba River bottoms and is being mined by the W. P. Hammon Co., which has two dredgers at work and four more under construction. The buyers will put two dredgers at work.

### COLORADO.

(Special Correspondence).—The case of the Interstate Mercantile Co. against the Mine Owners' Association of Cripple Creek is on trial before Judge Marshall. The Mercantile Co. brought an injunction against the Association to prevent them from interfering with their business. The Mercantile Co. is said to be a Western Federation store.

Judge Owers of Leadville took the question of enjoining the Leadville District Mining Association under advisement. It is expected he will render his decision next week. In the meantime the operators are enjoined from putting the card system into use in the district.

The trusts have announced new treatment rates for the Cripple Creek district as follows: Up to half an ounce, \$5.75 per ton; one to one and a quarter ounces, \$8 per ton; one and a quarter to one and a half ounces, \$8.25 per ton; one and a half to two ounces, \$9.25 per ton; two to three ounces, \$10 per ton; three to five ounces, \$10.50 per ton. On high-grade ores carrying values of \$100 or above, a flat rate for treatment will be made plus freight to destination—Denver, Pueblo or Leadville. The freight rates to these points are the same and do not affect the producer. The open or miscellaneous rate will be \$1 per ton, on each and every grade, higher than the contract rate given above. The schedules as set forth apply to all shipments made on and after October 10 and carry with them the withdrawal or cancellation of all special rates which have applied heretofore.

The trust has reduced treatment charges on ores coming from Gilpin and Clear Creek counties, with a view, it is understood, of forcing the independent plant at Golden to withdraw from the field. The independent people state they have made several contracts for large amounts of ore and that the miners and operators are standing by them. They claim to have an outlet for their matte through an Eastern concern, the trust refusing to buy their matte.

Denver, Oct. 10.

#### Boulder County.

(Special Correspondence).—During the past summer the old camp at Caribou has renewed activity. The railroad being run from Sunset to Eldorado passes within 1½ miles of Caribou, and when the Colorado & Northwestern R. R. Co. is ready to operate its branch line it will save a long haul from the mines to Boulder.—H. D. Williams has a lease on the Mount Vernon mine and has opened up a body of \$35 ore at the 40-foot level. Occasionally he gets a pocket that runs 12,000 ounces in silver. The parties operating the St. Louis group are working twenty-five to thirty men and operating their 10-stamp mill. They have 11 feet of ore that runs \$8 per ton. A large percentage of the values is caught on the plates and the balance in concentrates.

The Anchor tunnel is in 500 feet in ore which carries gold and silver. They have sunk a winze 58 feet, and in ore the full size of the winze. The ore averages \$100 per ton.—The Isabel mine has a shaft down 120 feet, showing 14 inches of ore that runs \$200 per ton.

The Old Caribou mine is under lease to Munn & Co. of Denver, C. Carroll manager at the mine. The company will put in an air compressor plant.

The Poor Man mine, which has been idle, is reported ready to resume operations.

Caribou, Oct. 9.

#### Chaffee County.

Shipments of ore have started from the Mercury mine in North Cottonwood mining district, near Buena Vista. This mine has been in operation for eight years. It is intended, says C. I. Sharpe, manager and superintendent, to place more men to work.—Machinery is being placed in position on the Be True mine in Trout Creek mining district at Schwanders, near Buena Vista, owned by N. A. Stratton.—A. Closs, manager and superintendent of the Eureka mine in South Cottonwood district, says he will place men to work. It is intended to start a tunnel farther down the mountain.

#### Clear Creek County.

At Idaho Springs during month of September the Central tunnel was driven 188 feet by Contractor Knowles, making total distance from portal to breast on October 1 of 4179 feet. The Shafter vein will be reached by the tunnel this week and work

will be started on drift to reach a point under the shaft, after which connection will be made with shaft by raise. During September the Home M. & L. Co. drove the east drift on the Edgar vein 62 feet. In the stope they have a 2-foot streak of smelting ore, which is being broken down with machine drills. The raise to connect with bottom of Edgar shaft is driving. A switch and side track have been put in which will facilitate handling of ore and waste. The raise is started in the west drift from main tunnel.

#### Gilpin County.

A two years' lease and bond has been given to J. Beal et al. of Denver on the Smuggler claim in Moon Gulch district, near Rollinsville, and development work started. It is being opened up by shaft and tunnel workings and they expect to ship ore.—The Pronunier mine at Wide Awake has been leased and bonded for one year to E. H. Jeffries. The option calls for sinking shaft 100 feet and driving levels for 200 feet. The property has been idle for several years on account of water inflow. There is a steam plant of machinery.

#### Gunnison County.

(Special Correspondence).—On Quartz creek, ½ mile from Pitkin, A. E. Van Dusen has a lease on the Red Jacket mine. He has sunk a shaft 90 feet and is drifting to strike the contact. The drift will be 200 feet in length. The contact runs north and south. The ore lies between blue and dolomitic lime, with the dolomite on the hanging wall. J. A. Grant is manager.

Pitkin, Oct. 10.

(Special Correspondence).—A. Lajune is driving the Blistered Horn tunnel to cut the Jimmy Mack vein. He has cut one vein, which is 16 feet between walls, at 450 feet depth. The Jimmy Mack has produced \$700,000. Manager Lajune intends starting another tunnel about ½ mile from this property and will put in an air compressor and air drills. The group is on West Gold hill, 12 miles from Pitkin and 18 miles from St. Elmo. Quartz is the shipping point on the Colorado & Southern railroad, which is 9 miles from the mine. They are making 3½ to 4 feet per day in the tunnel by hand. When completed the tunnel will be 3000 feet long and is now in about 1200 feet.

Tincup, Oct. 9.

At Bowerman the Gold Cross and Camp Bird properties, on Copper mountain, are developing free gold veins and a stamp mill to handle the output will be built. On the Gold Cross dump there are 150 tons of milling ore carrying \$50 per ton in gold. This has been extracted in sinking the shaft 28 feet. The Camp Bird vein is ½ mile southeast of the Gold Cross and is larger. Manager G. Brant is putting in a hoisting plant and a stamp mill on Quartz creek, below Pitkin. A wagon road will be built. The Gold-Cross M. & M. Co. has been incorporated to operate the properties.

#### Jefferson County.

On Clear creek two gold dredgers are nearing completion at Placer, 2 miles east of Golden on the line of the Northwestern Electric Railroad. The boats are 110 feet in length by 42 feet wide, and draw, when loaded with their machinery, about 7 feet. The capacity of each is 2000 yards of gravel in twenty-four hours, and it is claimed that expenses of operation can be paid with gravel that yields 3½ cents per yard. The power for operating the machines will be electricity, the poles and wires being already in place. The weight of the equipment of each dredger is about 375,000 pounds. The cost of each dredger, equipped and ready to operate, is given at \$80,000. The National Dredging Co. is owner and operator.

#### Lake County.

The month of September in the Leadville district was one of normal production. September is the month when the large producers do repair work before snow falls, and the Moyer mine took advantage of that to retimber one of its shafts and to put in a new gallows frame. The Yak tunnel changed from the system of steam and mule power to electricity. However, the output for the month reached 70,000 tons of all classes of ore. There were several new strikes. The production of the Yak and other properties tapped by that tunnel was maintained at usual figures. The zinc output of the camp reached 8000 tons.

The Yak tunnel of the Yak M., M. & T. Co. at Leadville, started in 1889 to give the Silver Cord mine an outlet into California gulch, is in 11,000 feet, with several miles of lateral workings. Its head is at the bottom of No. 4 Ibox shaft, at a depth of 1250 feet from the surface. It serves the Ibox M. Co. for drainage and transportation. Diamond drill prospecting has been extensively used by the Yak Tunnel Co., leading to the discovery of sulphide ore bodies, later developed by laterals and shafts. The tunnel has two

such interior shafts or winzes equipped with hoisting plants. The output of the tunnel varies from 3000 tons to 6000 tons monthly. Shipments will, however, increase, as electric haulage has been installed. The ore is divided into two principal classes—lead and iron sulphides in one and zinc sulphide the other. A mill is being built to concentrate the low-grade zinc ore. A. K. Meyer of Kansas City, Mo., is largely interested.

#### San Juan County.

An electric power plant will be built at the Highland Mary mine, near Howardsville. The power to generate the electricity comes from the water supply at head of Cunningham gulch. The capacity of the plant will be 250 H. P., says G. M. Seeley, superintendent. Other improvements will be made.

The Pride of Eureka mine, at Eureka, owned by B. O'Driscoll, was crosscut by Blucher tunnel last week, which is being run by J. L. Estey. The point of intersection was 260 feet with a 300-foot depth, and the vein, low grade, is suitable for milling. The Pride of Eureka and the Blucher tunnel are on Eureka mountain, near the Upper Sunnyside mill.

A tramway is being built at the Neigold mine, Galena mountain, near Silverton. About 1000 feet of the 4000 will be of the Bleichert pattern, the remainder to be two "jig backs" of 1000 and 2000 feet each, which in total connects No. 2 and No. 7 levels of the Galena mountain properties with the landing at the base of mountain.

#### Summit County.

The Colorado & Wyoming Dev. Co., operating on Mineral hill, near Breckenridge, is shipping forty tons of zinc ore to Canon City daily, also a daily product of ten tons of smelting lead ore. The company keeps from four to six teams on the road and employs twenty men.

The Old Union M. & M. Co., near Breckenridge, is increasing developments with thirty men. The Smith shaft is being sunk and drifting down on a new ore shoot 65 feet east from the Montgomery shaft at the 150-foot level. A foot of galena and partly oxidized lead ore is reported. Other levels show smelting ore. The company is driving a 1000-foot tunnel to cut at greater depth ore bodies opened up in the shafts. A concentration mill will be erected by the company at the mouth of the new tunnel.

The capacity of the Mt. Quandary mill, near Breckenridge, will be doubled, and a tramway constructed between mine and mill, says Director Strickler, of the Mt. Quandary Co.

#### Teller County.

At Cripple Creek, S. Morris et al., who have a lease on the Red Umbrella property on Raven hill, have opened up a body of ore in an abandoned shaft at depth of 150 feet from surface and shipments will resume. The vein shows width of 5 feet with average values of two ounces gold per ton. The lessees expect to put in a plant of machinery and increase work of breaking and hoisting ore.

Wyatt & Burnside, who have a lease on the Burns mine of the Acacia Co. at Cripple Creek, have started drifting at the 400-foot level under the Fitch workings. They also are driving on the Wrockloff cross vein to cut extension of the Big Emma vein. They will put in an air compressor.

Cripple Creek reports say the production for month of September exceeds by nearly \$200,000 the heaviest production since the recent strike and indicates that the camp is now producing at a rate of \$24,000,000 per year. This, too, in view of the fact that the Telluride mill at Colorado City was closed down and the production from that source alone shows a decrease of \$100,000. In addition the Dorcas mill at Florence shut down a part of the time owing to repairs, as was also the case in the Sioux Falls plant. The smelters showed a large increase. The total value was increased largely through the Economic mill treating ore from the W. P. H. mine which averaged \$90 per ton. From that property less than a ton of waste is picked out of the ore that is hoisted in a week's time, and the lessees are breaking ore 35 feet in width. Since the strike was started thirteen months ago the output of the camp has been steadily increasing until to-day it is normal, and it is expected that October will show a larger output than September. This can be accounted for by three cyanide mills which will be running during the month that have not been running previously. The Golden Cycle mine will also double its production. The production of September shows increase over August in valuation, but a falling off in tonnage. In August 61,940 tons were treated with a valuation of \$1,790,620. The decreased tonnage is due largely to the fact that the Sioux Falls cyanide mill was closed for the greater part of the month. With this month's figures the total for the nine months of 1904 amounts



to \$16,068,420. The following table is individual statement by the mills and smelters for the month:

Plants—	Tons.	Total Value.
Smelters.....	12,000	\$730,000
U. S. R. & R. Co.....	22,000	660,000
Portland.....	7,500	225,000
Economic.....	2,750	137,500
Telluride.....	3,500	122,500
Dorcas.....	1,900	66,500
Homestake.....	6,000	24,000
Florence cyanid. mill.....	2,700	13,500
Wild Horse.....	2,000	12,000
<b>Totals.....</b>	<b>60,350</b>	<b>\$2,041,000</b>

The production for nine months is:

Month—	Tons.	Total Value.
January.....	51,500	\$1,753,000
February.....	54,500	1,635,000
March.....	54,300	1,743,000
April.....	58,800	1,851,400
May.....	60,500	1,895,800
June.....	52,700	1,607,000
July.....	51,000	1,714,000
August.....	61,940	1,790,620
September.....	60,350	2,041,000
<b>Grand totals.....</b>	<b>505,590</b>	<b>\$16,068,420</b>

At Cripple Creek all the water-flooded mines have been so far drained as to justify deepening the shafts, and the driving of new levels. Bodies of payable material have been opened and partly developed in the last six months. Before the strike of 1903, the Cripple Creek tonnage ran from 35,000 to 50,000 tons per month. Now it reaches over 60,000, with all the older mines in producing condition and new ones brought in. Some of the principal producers in September were: The Vindicator mine on Bull hill sent out 1850 tons of ore, average value \$50. The leasing company operating the Gold Sovereign sent out forty tons per day, average value \$40. From the Doctor-Jack Pot Con. property twelve sets of lessees sent out over 1000 tons, average value, \$50. On the Mabel M. of the Gold Dollar Con., the Milwaukee M. Co. shipped out 220 tons, average value \$40. El Paso, on Beacon hill, sent out fifty cars, returns amounting to \$100,000 for the month. El Paso Co. is employing 165 men, of whom the greater portion are working in ore. The company is also doing development work in the sixth, seventh and eighth levels besides sinking the shaft. The average value of ore runs \$90 per ton. On same estate lessees are sending out two carloads of ore per day, average value \$40 per ton.

Cripple Creek reports say the Blue Flag Co., operating on Raven hill, has resumed operations on the Blue Flag claim and will increase development work. The company has resumed sinking the shaft to the 200-foot point. J. F. Erisman has management of the property.

The Gold Coin Co., which is operating the 11th level of the Gold Coin property, in Victor, is stopping the ore bodies. The ore will be sent to their mill through the tunnel. The Gold Coin mine is operated down to the 10th level by lessees, nearly all of whom are sending out regular shipments of good grade ore. Returns from last shipment of the Stewart lease, operating between the 5th and 6th levels, gave values of \$1000 per ton.

The cyanide mill under construction on the Anaconda mine, at Anaconda, is completed, and the owners, King and Craig, expect to start operations this week.

The Cripple Creek Gold Temple M. & L. Co., working on the Gold Sovereign mine, Cripple Creek, during month of September shipped out average of forty tons of ore per day, which gave returns of two ounces in gold per ton. The company is employing seventy-five men. The shaft is being sunk under contract from 625 feet to 700 feet. A crosscut will be driven south 200 feet.

The Vindicator mine, on Bull hill, at Victor, shipped out during September 1850 tons of ore, average value \$50 in gold per ton. The property is working 135 men, which includes those employed by lessees.

R. B. Woodworth has taken charge of the Gillett cyanide mill at Gillett and will resume treatment of ores.

Among the cyanide plants operating successfully in Cripple Creek district, says the Gazette, the Sioux Falls Co. has a mill on the Fluorine property, on Copper mountain, making a saving of 90% on ores running \$4 to \$12 per ton, treating same at cost of \$3 per ton. Another company is operating on the Magna Charta mine on Ironclad hill. The managers, after working only a short time with a 200-ton mill, started building a plant five times the size, which is progressing. Machinery has arrived and foundations are being put in place for tanks and buildings. Other plants of the same character have been erected on the Lincoln at Gillett, the Anaconda near Anaconda and the Wild Horse near Midway. The Gillett and Wild Horse mills are in operation.

The number of recommendation cards issued by the Mine Owners' Association approximates 5400, says the Cripple Creek Times. The first card was issued April 1. It is estimated that 4800 men are employed throughout the camp. The Hull City, Theresa and the Stratton estate are

working but a few men, but when the properties are opened up 600 or 700 more men will be put to work.

## IDAHO.

### Idaho County.

A. Allardye of Chicago, Ill., manager for the Big Idaho M. & Dev. Co., owning holdings in the Big Creek district, between Dixie and Buffalo Hump, says he will increase development. The company owns 980 acres of undeveloped placer ground for 6 miles along Big creek. In addition it has eleven quartz claims with 1000 feet of tunnel work.

### Latah County.

J. W. Sherer, superintendent of the White Cross M. Co., on Moscow mountain, near Moscow, reports a strike. In driving the tunnel to tap the main ledge 300 feet below the upper workings, they cut a blind lead that contains payable ore. An air compressor is being set up.

### Washington County.

R. H. Kleinschmidt of Helena, Mont., interested in the Peacock, the Helena and the White Monument mines in Seven Devils district, near Mineral, says they are being worked under lease by C. W. Jones and are showing well. The Blue Jacket group is being worked by the company of which S. Dorsey is manager, and ninety-seven tons of copper mined from the Blue Jacket in August netted the company \$6000. The Queen, in same group, shows face of ore 15 feet wide that averages 5% copper.

## MICHIGAN.

### Keweenaw County.

The Mohawk mill, near Allouez, is running to full capacity. There is room for a fourth stamp, which will be put in. The mine is furnishing 1500 tons of rock daily.

## MISSOURI.

The output of the Joplin lead-zinc district (including southeastern Kansas and northwestern Arkansas) for the nine months of 1904 ended Sept. 30 is reported by the Joplin News-Herald at:

	Pounds.	Value.
Lead.....	48,702,560	\$1,324,450
Zinc.....	386,719,490	6,500,790
<b>Total value.....</b>		<b>\$7,825,240</b>

## MONTANA.

### Madison County.

The mill at the Revenue mine, near Pony, is expected to be finished this week. The ditch from North Meadow creek, which will supply the water for the mill, has been completed, also work on the power line from the Madison Canyon Power Co. plant.

### Powell County.

At Emery, near Deer Lodge, the concentrator is about finished. The hoist at the works of the Montana United M. Co. is working. The shaft is down 300 feet and a station being cut from which a crosscut will be run to the lead, says Superintendent H. I. Cobb.

### Silver Bow County.

Butte reports say the Mountain View mine, owned by the Boston & Montana C. & S. M. Co., will be equipped with a hoisting plant capable of working to depth of 3000 feet and is also to have another battery of boilers. Work of putting it in place has started. The shaft on the Mountain View is 1800 feet deep. To supply the hoist with steam a battery of new boilers will be set 200 feet from the present battery, the location being near the railroad track east of the engine house. The steam will be piped from there to the hoisting engine. The Mountain View is well timbered and developed. It contains two veins of copper-silver ore. Its daily yield runs between 800 and 1000 tons of ore.

## NEVADA.

### Esmeralda County.

To build a railroad between Tonopah and Goldfield a company has been organized with J. Brock president, T. L. Oddie and C. G. Heller. At first it was thought that a railroad between the two places would not pay, but the development of mines at Goldfield and the demands of the traveling people are said to have made it necessary to extend the line to Goldfield. The new line has been surveyed and contracts for construction will be let.

Operations have been started at the Homestake mine at Silver Peak and grading for the mill has begun. C. H. Fuller, president of the company, says a 5-stamp mill will be set up with a cyanide plant. C. McCarthy is superintendent and E. Knapp will be in charge of the mill.

### Eureka County.

H. C. McTerney, superintendent of the Eureka Con. and Richmond mines in Eureka, says arrangements are being made to unwater those mines. Developments will be resumed.

### Lincoln County.

V. Dockleitch will put men at work on the Dockleitch mine, which joins the DeLamar-Bamberger ground, at DeLamar. There is one tunnel 600 feet, another 400 feet on a ledge that shows values. A 200-foot shaft also shows ore. It is now proposed to open up another vein that shows on the surface.

The Half Moon mine and mill at Pioche has been leased by Gordon and Nesbit, and leaching of ores on the dump will be started. Gordon says the rock will average \$8 gold with three ounces silver per ton. To recover this the mill will be equipped with cyanide leaching tanks.

Foundations are made for the two new batteries for the Quartette mill, at Searchlight. The increased milling capacity will necessitate other improvements, among them an electric tramway from the crusher in the gallows-frame to the mill. Work has started on the road-bed, which will be both broad and narrow gauge, the narrow gauge being for waste. The road will be equipped with 5-ton cars. Ore from the 700-foot level will be shipped to the smelter. The ore averages \$1 gold, 17% copper and 25% lead. A power grinder and sampler, run by electricity, are being set up in the assay office. A second raise is being run between the sixth and seventh levels, at 225 feet east of the shaft, says Superintendent Harrington.

H. A. Perkins, manager of the New Era M. Co. at Searchlight, says the company now has its pipe line completed and water is flowing from the Boland well to the tanks at the mill. By Nov. 1 the stamps will be dropping.

Caliente reports say J. J. Morrow of San Antonio, Tex., and G. D. French of Denver, Colo., have an option on the Lone Star group of gold claims on Virgin river for \$10,000. There are twelve claims in the group. Assays of \$30 have been obtained from an 18-inch vein of honey-combed quartz in a 35-foot shaft.

A. B. Hall will work the Quartette tailings at the river mill of the company, near Searchlight, on a royalty. It is estimated there are 16,000 tons in the pile, and 2000 tons a month is the capacity of the plant.

A 43-foot body of coal is reported found a few miles south of Virgin river, near Caliente, by McEntire and Forrest of Caliente, who have located four claims. The bed is near the line of the San Pedro Railroad.

### Nye County.

The South Tonopah M. Co. has changed the name of the company to the Tonopah-Wilmington G. M. Co. E. Hirschler, president of the company, has let a contract to sink a shaft on an oxidized quartz outcrop, which yielded values. A contract was also let to crosscut from present shaft. The company owns seven claims 3½ miles south of Tonopah, on the Gold Mountain road.

L. G. Wheeler et al. have incorporated the Wheeler Gold-Turquoise M. Co., which has bought the Dolores group of six claims at Ray, north of Tonopah, from which turquoise has been mined. The gems occur in a decomposed volcanic matrix, which also carries free-milling gold in values of \$12 per ton. Chicago, Ill., and Milwaukee, Wis., men are interested and work will be started next week.

At Tonopah the Free-Gold M. Co. hoisting plant, comprising a 15 H. P. gasoline hoist, having been set up and timbering of the shaft completed, sinking has resumed.

## NEW MEXICO.

### Grant County.

The Arizona & Colorado Railroad Co. has been incorporated to build a north and south railroad in western New Mexico with termini at Durango, Colo., and Clifton, Ariz. The company has filed on 20,000 acres of coal lands in western New Mexico and will have its headquarters at Tucson, Ariz. The road has been surveyed. A subsidiary corporation, the Arizona & Eastern Railroad, 50 miles long in New Mexico, and with headquarters at Lordsburg, is also incorporated. The coal of southwestern Colorado and western New Mexico is said to be wanted for the smelters at Clifton, Morenci, Bisbee, Nacosari and Douglas, Arizona.

## OREGON.

### Baker County.

A. P. Smith of Baker City has bonded the Emma claim, Cracker Creek district, for \$10,000. The property adjoins the Esmeralda and is across the gulch from the Mountain View. The Emma will be developed by a drift on the ledge and a shaft. Its ore bodies are large.

In the Greenhorn mountains, near Sumpter, the Heppner group of fifteen claims is owned and operated by the Heppner M. Co., D. B. Stalters of Heppner president and manager. On the Illinois a 6-foot vein of high-grade milling ore has been opened. It is intended to build a stamp mill. Ore has also been opened in

the Mayflower and in the Pride of Heppner.

### Clackamas County.

In Shena Creek mining district, 53 miles east of Portland, on a tributary of Salmon river, development work is being done. The district is 7 miles southwest of Mount Hood. The Northern Light M. & M. Co., composed of Clackamas county and Portland men, has run 600 feet in tunnels and work will begin on another, says A. Hornecker of Portland, superintendent. Assays show gold, \$1.44; silver, \$58; lead, \$10; copper, \$12. The officers are: President, E. Renfer of Portland; O. Meinig of Sandy, T. S. West of Portland. A small vein of ruby silver has been found on one of the claims. The group of eight claims owned by the company covers 160 acres. In addition they have a millsite and a water right, including a natural water fall.

O. F. Olsen of Portland, treasurer of the Financial M. Co., owning a group of quartz claims in Bald Mountain district, says \$16,000 will be spent in developing the properties. There are four groups of claims. The Esther shows 12% copper, \$3 in gold and \$6 in silver. A 3-foot vein is shown by an open cut 1400 feet below the apex. The Oklahoma has a vein 50 feet wide and averages \$5 per ton free gold. The main lode is a 10-foot vein, and shows 3% copper, \$4 in gold and \$7 in silver.

### Columbia County.

E. A. Sessions of Portland, of the Cascadia M. & Dev. Co., says a railroad will be built to the St. Helens mines. The road which promises to tap the mines is the Tacoma & Eastern, which has its terminus at Ashford, in northern Lewis county, 20 miles from St. Helens. Surveys have been made for the road. Coal properties belonging to the railroad in that district have been partially developed and show workable coal.

### Coos County.

Coquille reports say fire is raging in the coal mines of the Spreckels Brothers Co. at Beaver Hill, near Marshfield. The bulkheads have been closed. The fire had its origin in an explosion on the sixth level. The mine has only recently been developed and employs about 200 men. This is said to be the second experience of the company with fires at Beaver Hill. The old mine there, which was a producer, had to be abandoned on that account.

Gold in Coos county is reported by Superintendent Whitney of the Commandery M. & M. Co. of Seattle, Wash., which has 160 acres 30 miles south of Myrtle Point. It is said the ground runs 25 cents to the cubic yard. The company has two No. 3 giants with deflectors and other equipment. These will mine 4500 yards per day.

### Jackson County.

(Special Correspondence).—The Hawkeye-American mine on Lanes creek, 2½ miles south of Gold Hill, is being worked under management of L. T. Pockman. This is a low-grade proposition, the body of ore being 25 feet in width between walls of porphyry and slate. Development is by tunneling, with breast of tunnel 100 feet below the surface. Ore values average \$4 per ton free milling. San Francisco parties are principal owners.

The Shump mine on Lanes creek, owned by A. M. Allison of Iowa, is proving a high-grade proposition, as ore from a pocket gave returns up to \$1000 to the ton. Development is by 300 feet of tunneling.

Gold Hill, Oct. 11.

The Cohen mine of Sucker Creek has been bought by A. Gainer of Portland. Gainer has cleaned out the old workings, retimbered the tunnels and drifts, and is driving deeper into the mountain, uncovering a body of ore.

J. A. Whitman of Medford says he has bonded the Mixer placer mining property on Steamboat creek, in Sucker Creek section, south of Ashland, and is fitting it up for operation during the winter. This is a few miles north of the Briggs find. He has built a ditch.

### Josephine County.

(Special Correspondence).—In Galice mining district, W. H. Moore, N. P. Hansen and J. C. Mattson of Moro own four claims which are at 4000 feet altitude, in schist, the ledges being about 4 feet in width and the ore chalcocopyrite, assaying 25% copper, \$6 gold and \$1 silver. There are 350 feet of tunnels, the longest being 275 feet, beside several shallow shafts. Development is being increased.

The Rand M. Co. of Ballingham, Wash., owns five claims on the Big Yank ledge, in the Galice mining district, 20 miles west of Grants Pass and near Rogue river. The formation in general is diorite. Tunnels and drifting amounting to 1000 feet have been done, giving a vertical depth below surface of 300 feet. The ore carries values of \$17 gold and copper. The company platted a town site of 100 acres on



the banks of the river, and, with the sawmill in operation, erection of buildings will begin. The officers of the company are: F. J. Barlow, president; D. L. Smith, secretary and treasurer; L. B. M. Simons, manager.

The Galice Con. M. Co. owns 700 acres of gravel land along the banks of Galice creek a distance of 4 miles above its emptying into Rogue river, and in width varies from 600 to 1200 feet. The banks are from 6 to 20 feet in depth from surface to bedrock. Equipments include two No. 1 giants, two No. 2 giants and a Campbell hydraulic elevator. There are over 12 miles of ditching and 1000 feet of piping. The 4-mile ditch carries 2000 inches of water to near the river, where the elevator is set. By extending the ditch from the north fork to the south fork another elevator can be put in and the season lengthened. There is a sawmill plant in connection with the property. The company is composed chiefly of Portland men. A. B. Cousins is manager and E. F. Terry superintendent, at the mines.

Galice, Oct. 11.

At the Hammersley quartz mine in Jump-off-Joe district, between Jacques creek and Brass Nail gulch, near Grants Pass, the 5-stamp mill is ready for operation. F. H. Osgood is operator.

Transportation of ore from the Queen of Bronze and Lytle copper mines, which, with the Cowboy, are supplying ore for the Takilma smelter at Takilma, is to be solved by building a cable tram. Survey has proved the grade sufficient to operate a tram by gravity, says Manager C. Tutt. More bins are also being built at the smelter, both for ore and coke. Teams are hauling coke from Grants Pass to the plant, as it is desired that a supply will be on hand when the rains make heavy hauling impossible.

## SOUTH DAKOTA.

### Lawrence County.

The new shaft of the Hidden Treasure G. M. Co., on Deadwood gulch, near Deadwood, is 150 feet deep and still in ore. A temporary shaft house has been built and will suffice until the horse whim is replaced by a steam hoist, says W. Lawler of Lincoln, Neb., manager.

The Clover Leaf G. M. Co. with headquarters at Beulah, Wyo., and operating at Roubaux, proposes further improvements on its property, including additional stamps at its mill, increasing the capacity from 60 to 100 stamps. The main shaft is being sunk to the 1000-foot level, and to expedite this work without interfering mining a small hoist has been placed on the 700-foot level, to be operated independently of the main hoist. Heavier pumps have been put in. A Corliss engine has been set up in the mill and steam machinery will be set up for framing mine timbers. The present 60 stamps of the company are working and two clean-ups are made each month, says President P. Wibaux.

## UTAH.

### Davis County.

Manager Perkins of the Farmington group in Steed canyon, near Farmington, reports development work started. The tunnel will be continued to 1200 feet to cut the ledge at depth of 500 feet from surface. Gold and copper values are found in the outcrop. An air compressor and machine drills will be put in.

### Grand County.

Basin reports the Grouse Mountain M. Co., composed of Huntington, W. Va. men, is driving its tunnel to cut the McCoach vein. It has reached a depth of 350 feet and expects to crosscut the vein at 400 feet. J. H. McCoach is president. The company will build a 100-ton cyanide plant.

### Juab County.

The Beck Tunnel Con. M. Co., near Eureka, will put in an air compressor plant and will conduct a pipe line from Homansville to bring water to the mine, says President J. Knight of Provo. A winze is being sunk in the tunnel, following a shoot of copper-stained quartz, in which copper and silver ore occur. The winze is down 150 feet from the tunnel and 550 feet from the surface.

Ore shipments from Tintic mining district for month of September amounted to 467 carloads, the following mines being the producers:

Bullion-Beck	30
Gemini	83
May Day	3
Centennial-Eureka	150
Eagle & Blue Bell	29
United Sunbeam	13
Star Con.	1
Yankee Con.	18
Uncle Sam Con.	9
Lower Mammoth	2
Mammoth	63
Grand Central	71
Ajax	4
Victor	4
Carliss	7
Godiva	19
Osborne leave	1

South Swansea	1
Totro	2
Total, cars	407
CONCENTRATES.	
Uncle Sam mill	18
Eureka Hill	8
Total, cars	26

### Plute County.

Manager A. E. Hyde, Jr., of the Annie Laurie mine of Gold Mountain district, near Marysville, reports the mill is running.

At the Mammoth mine at Robinson the main shaft is down 1950 feet and will be sunk to the 2100-foot level. The mill has started. Sixty men are employed. The bins are full of ore and shipments of high-grade ore and concentrates will be resumed.

The J. A. Hunt fractional claim, embracing two acres of ground between the May Day and Uncle Sam mines, has been sold to the May Day company for \$2000.

A larger pump has been set up on the 1300-foot level of the Gemini mine at Eureka. The pump has capacity of handling 250 gallons a minute.

### Plute County.

(Special Correspondence).—G. F. Dalton of Marysville has men on development work at his group of iron claims, 3½ miles north of Marysville. The ore is hematite, of which there appears to be a large body.

J. S. Baler has a car of high-grade lead-silver ore ready for shipment from the Bully Boy mine. Work is being increased and regular shipments will be made.

H. Bradburn, manager of the Bradburn M. Co., operating on the south fork of Cottonwood, reports that men are working on a shoot of ore in the upper tunnel. —The Aldebaran, also in Cottonwood canyon, under the management of B. T. Ashby, is making satisfactory showing. A pocket of native gold and silver was opened up last month. Missouri men are interested.

The Wedge mine, in Horse Heaven district, has a body of high-grade ore. J. F. Lyons, principal owner, states that a bond and lease will be given to Eastern men.

L. W. Bartholomew is taking out ore from the Copper Belt mine. —The Standard group, on Bullion creek, which is under bond and lease, is showing up values. F. M. Haughey is the principal owner.

The Franklin & Gold Development Co., running two tunnels from the Cottonwood and Bullion creek sides, is increasing work. F. M. Murray is secretary and O. Larsen superintendent. —M. Munroe has a group adjoining the Deer Trail mine, which he is developing.

Arrangements are being made to put in a steam hoist on the Out of Sight group, owned by R. De Witt and New York men. —B. Reynolds and J. Blum have 3 feet of ore on South Bullion creek, and are putting up buildings preparatory to winter work.

In the Quicksilver mine at Marysville the ore carries selenide of mercury (tiemannite). Formerly this property was worked for the quicksilver values, which were high grade. The property was worked by a tunnel and the vein is a strong one, but, a fault having taken place, they failed to recover the vein and work was discontinued. Specimens of the ore are in demand for museums and colleges.

The Rio Grande Western Railway has its terminus at Marysville and the several mining districts are easy of access. Marysville, Oct. 10.

### Summit County.

Work on the Martin mines in Thaynes canyon, near Park City, is progressing under the supervision of A. F. Martin. The tunnel is being driven. Work will be continued during the winter.

A 30 H. P. gasoline locomotive is being built for the Daly-Judge Co. at Park City to replace the mules in hauling ore trains through the tunnel. Superintendent M. J. Dailey of the Silver King says if it proves successful he will put one or more in the Alliance tunnel.

Vice-president J. D. Wood says the shutting down of the Quincy hoisting works and connecting up of the lower workings with those of the Daly-West M. Co., at Park City, will make a saving in operating expenses of \$5000 monthly.

### Tooele County.

During September at the mill and mines of the Con. Mercur, at Mercur, bullion was recovered from 21,000 tons of gold-bearing rock which maintained a satisfactory average. At the Manning mill there were leached during the same period 400 tons of gold-bearing tailings daily. Operations will continue at this plant until cold weather makes it necessary to suspend for the winter. Conditions under ground, says Manager Dern, are satisfactory. Old ore channels have been tapped on lower horizons, the metallic average is satisfactory and the vol-

ume large. The payroll has been reduced and the cost of operation is less.

H. Hoersch, president of the Flying Dutchman Con. M. Co., operating in Erickson district, near Vernon, reports taking out copper ore carrying gold and silver values. The company has four claims at Sheep Rock, and more men will be put on development work.

Superintendent Galliger of the Stockton mine, at Stockton, reports construction on the mill progressing.

The Wild West M. Co. of Provo has been incorporated by S. K. Roberts president, J. K. Bishop, M. Trope et al. of Provo. The company owns mines in Erickson district, near Vernon.

## WASHINGTON.

### Chelan County.

Near Chelan supplies have been shipped into the Junk group of mines on Park creek, owned by J. T. Davis and J. Donahue of Tacoma. They have a tunnel which will be continued to crosscut the ledge at depth of 200 feet. The ledge is 10 feet wide, carrying silver-lead values. A smelter and drills will be put in.

### Ferry County.

J. L. Harper et al. of Spokane propose to build a smelter on West Fork of San Poil river, 14 miles from Republic. Start will be made with a copper matting furnace and a lead stack.

E. L. Tate et al. have bonded the Copper Key mine, near Republic, and are shipping ore. A mill will be built.

Near Keller, the Manila has been sold to J. L. Harper et al. The ore is of copper, with gold and silver values.

Shipments are going out from the Belcher mine at Republic, says J. L. Harper, resident manager. They will haul ore until the rainy season sets in, discontinue until the snow season, then resume and get out a heavy tonnage of ore while sleighing lasts. They will begin tests in concentrating the gossan that overlies the Belcher vein. A hand jig will be put in, while concentrating tests will be carried on at Spokane. The gossan, which is of red oxide of iron, is several hundred feet in length, about 80 feet in width and 100 feet in depth, and will return \$3 per ton in free gold, says Harper. —The Copper Key mine, owned by E. L. Tate et al. of Spokane, is delivering sixty tons of ore per day at the Lambert railroad siding.

Near Keller, the Keller & Indiana Con. S. Co. is building a dam across the San Poil river. The houses, blacksmith shop and sawmill have been completed.

### Okanogan County.

Conconully reports say at the Mineral Hill mine an air compressor has been put in and machine drills are in operation. An ore crusher to handle 200 tons daily is another addition. An engine house, 26x36 feet, containing the boiler, air compressor, fans, etc., has been built. A lathe and a complete outfit for a machine shop will be put in. Near the mouth of the tunnel two ore bins have been erected. Below these and connected by chutes are the crushing plant and store house. A pump will be lowered in the winze and work there continued, says Manager J. May of Bridgeport, Conn. —R. R. Hargrove, manager of the Mineral Zone property, 2 miles west of Conconully, has development work under way. —Work on the Salmon River M. Co. property, on Peacock mountain, is progressing and ore is being produced, says Manager Hutchinson of Spokane. This property adjoins the Ruby mine.

C. H. Morrison and R. L. Platt of Denver, Colo., hold an option on the Yankee mine, near Methow, and will start operations this month.

### Pierce County.

The report for month of September of the Tacoma Smelter Co. at Tacoma shows imports of ore amounting to \$208,827.35; merchandise, \$1340; lime and limestone, \$2295. Exports in the form of furnace products amounted to \$334,862.39. The company is at work on a plan by which it can save the mineral lost in the smoke from the chimneys, as about \$20,000 a month is said to be lost in this way, besides the residents near the smelter complain about the smoke killing trees and shrubbery. The company expects to filter the smoke, so as to catch and save the mineral.

## WYOMING.

### Albany County.

(Special Correspondence).—The Hecla M. Co., about 25 miles northwest of Cheyenne, at Granite canyon, has opened up high-grade copper smelting ore in the 160-foot level. Two shifts are working. They will overhaul the mill and resume ore treatment. The company intends remodeling the smelter, which has been idle. H. Schwartz is president and manager. Hecla, Oct. 9.

At the Keystone mine, near Holmes, the Ideal M. Co. is putting in machinery.

A 100-stamp, a 500-ton cyanide plant, an electrical plant and a sawmill will be installed.

### Carbon County.

It is said the Battle Lake T. S. M. Co., operating the Doane & Rambler mines at Rambler, will build a reduction plant. Water and fuel supplies are at hand. J. L. Powell is superintendent. —The Dill G & C. M. Co. has put in a boiler and hoist at its mine north of Rambler and is sinking a two-compartment shaft.

Dillon reports say the Anchoria (Kel-say) mine, 2 miles below Copperton, near Dillon, will be further developed. The company will sink the shaft to determine the extent of the vein. The Anchoria dump is said to contain copper values. H. O. Granberg, principal owner, is director and manager. A whim is being used for hoisting.

### Sheridan County.

The Carny Coal Co. mines, 5 miles from Sheridan, have been opened up and 500 miners are at work. A daily output of 1000 tons is being made. An electric railroad system, 150 houses and other equipment in connection with the camp have been completed. The mining plant has a capacity of 2000 tons a day, and the output is to be increased to this amount.

## FOREIGN.

### AUSTRALIA.

#### Queensland.

The Dee River gold field the first of September completed its first year of existence. The total weight of nuggets reported found is 4350 ounces, of value of £18,000.

#### Western Australia.

The Lake View Consols mine, at Kalgoolie, during the past fiscal year treated 101,960 short tons ore for 51,431 ounces fine gold. The tailings during that time were brought down to average of 1 dwt. 16 grs. per ton. The cost of treatment was 14s 10.29d per ton, and the total working costs 17s 7d per ton; whereas the costs for the preceding year were 23s 7d per ton.

### BRITISH COLUMBIA.

#### Boundary District.

S. Curtis of Rossland and Grand Forks men have organized a company to operate the Strathmore mine, on which the company has a working bond. Considerable development work has been done. Ore values are in silver and gold.

At Greenwood the Montreal & Boston C. Co. has blown in two furnaces and a third will be installed. Ore is coming in from the Brooklyn, Stenwinder, Rawhide, Athelstan and Sunset—all the company's holdings. The ores vary in character, and will be shipped in proportions to make a desirable smelting combination and a high-grade matte.

The Dimond Fraction claim, east of and adjoining the Providence mine at Greenwood, has been sold to the Providence M. Co. The Providence main lead is said to have been traced to the line of the property.

#### East Kootenay District.

In Windermere camp the Paradise continues working full number of men and several teams are hauling ore to the river landing. Manager H. C. Hammond and Engineer S. S. Fowler will build a concentrator and a 4-mile tram from the mine to Pinehurst this fall. —P. Farnham, manager of the Ptarmigan mines, expects to operate it again this winter. Six properties are working. The Delphine, leased by Stoddart & Beatty, is shipping eighty tons of high-grade ore. P. Mickelson is working the Tilbury mine. Forty tons of ore are on the way to the smelter. The Pretty Girl, the Tecumseh, the Charlemont and the Bunyan are shipping. Other properties are doing development work. —The Lead Queen group on No. 3 creek has been bonded to B. F. Holcomb for the American P. & T. Co. of Boston, Mass., for \$75,000, in payments covering two years.

#### Rossland District.

At Rossland the Rossland Power and the White Bear concentrators have under way flume lines that will solve the water supply problem for both mills and will largely increase the daily average of ore crushed. The Spitsee mine has concluded its treatment arrangements and will start mining on a larger scale. The force will be increased to thirty men. The Velvet-Portland mine has a 50-ton addition to its concentrator under way.

#### Slocan District.

A lease and bond on the Cowboy and Texas group of claims on Spring creek, near Kaslo, has been taken by H. Newcomb, D. W. Moore and J. A. Whittier for \$20,000. Work has started.

T. McGuigan, manager of the American Boy M. & M. Co. at Sandon, says he will start up the mine, and will put on men as soon as supplies are packed in. The



American Boy has been closed down since spring.

#### Vancouver Island.

The Britannia C. Syndicate, Ltd., at Howe Sound, near Vancouver, G. H. Robinson of Salt Lake City, Utah, manager, reports work progressing on the aerial tramway and other equipment. Water power under 1000 feet head will be used, direct-connected to two 3-phase alternating current, 200 kilowatt, 6600 volt generators. The transmission line will be 3 miles long. Ten induction motors will be used, the largest being 150 H. P., which will drive the compressor. An electric locomotive will haul ore and freight between the ore bins and the dock.

#### West Kootenay District.

A strike of ore has been made on the Silver Dollar group on Mohawk creek, 3½ miles from Camborne. The Silver Dollar group consists of three claims and two fractions comprising 175 acres, which is well timbered. The group is owned by the Elwood Tinworkers G. M. Co. of Elwood, Ind., and development work is progressing. Four separate leads are reported opened, each carrying payable values in gold and silver. A compressor plant is being set up.

T. E. Erehart of Schenectady, New York, manager of the Lucky Boy mine at Trout Lake, in the Lardeau section, says he is resuming operations. The ore carries lead and silver values.

In the Lardeau the mill at Five Mile, owned by the Silver Cup Mines, Ltd., has been hampered from shortage of water, due to unusually dry season. However, water has been obtained from the creek which runs near the mouth of the Nettie L. lower tunnel by a series of dams, flumes and ditches to the mill, a distance of 1½ mile. The twenty stamps are dropping steadily and more men are being put on.

#### CANADA.

##### Ontario.

Near Wabigoon mining operations will resume at the Big Master mine, says Superintendent Shovell, and he has started preliminary work.—At the Ideal mine in same belt, mining operations are progressing with satisfactory results. The shaft has reached 95 feet, from the bottom of which ore carrying free gold has been taken.

#### MEXICO.

The mining products of the republic during fiscal year 1903-1904, says the Chihuahua Enterprise, amounted to \$150,000,000, divided as follows:

Silver	\$82,300,000
Gold	32,500,000
Copper	19,600,000
Lead	6,600,000

During the past three years Mexico has exported, mainly to the United States and the Far East, over \$21,000,000 gold, \$128,000,000 silver (gold value) and \$400,000,000 of other metals (gold value).

##### Chihuahua.

J. Lago has made "blanket" denouncement on 25,000 pertenencias (about 60,000 acres) between Placer de Guadalupe and Placer de Santo Domingo on the Conchos river, near Santo Domingo, to prospect for emeralds in the volcanic rocks. Aqua marines (an inferior beryl) are reported found in the volcanic pumice.

The Calera M. Co., near Minaca, is shipping zinc ore to Colorado.

The Encinillas M. Co. at Ciudad Camargo will increase its machinery equipment.

##### Durango.

The American Mexico M. & Dev. Co. is grading for its 200-ton plant at Velardena and expects to start the plant by Feb. 1, 1905, when the company will do custom work as well as treating its ores.

The smelter of the Luster M. Co., which operates a gold-copper group at El Oro, has been blown in. It has a daily capacity of 150 tons.

The American M. Co. has been organized at Victoria, Tamaulipas, to operate the Fauro mine, covering fifty pertenencias, adjoining the Penoles M. Co. at Mapimi.

More machinery will be added to the equipment of the Mexican Con. M. & S. Co. at San Pedro. D. McVichie of Salt Lake City, Utah, is consulting engineer.

##### Jalisco.

The Bolanos M. Co. has been organized in St. Louis, Mo., to operate the Bolanos mines in northern Jalisco. The officers are: W. C. Smith, president; C. W. Simmons, treasurer, with J. B. Izabal of Guadalajara, manager. Work will be started this month.

H. M. Sunde et al. of Mascota propose to build a concentrating mill and a power plant at Agujas mountain, near Mascota. Water power will be obtained from the Tatoani river.

##### Sonora.

The Klondyke mine, near Magdalena, has been unwatered and the mill is run-

ning on free-milling ore. Development work is also progressing.

Tunnels aggregating 6415 feet in length have been completed at Cananea to connect the Veta Grande, Oversight and Capote mines of the Greene Con. C. Co.

The old smelter at Nacozari has completed its work and shut down, and is not expected to resume reduction of copper in that camp. The concentrating mill owned by the Moctezuma C. Co. will be continued and all ore requiring concentration will receive treatment there, the product of the mill being shipped to Douglas, Ariz., and smelted in the furnaces of the Copper Queen. The Nacozari smelters were erected eleven years ago. J. S. Douglas is manager of the mines and reduction works.

The San Blas M. Co., operating a mine near Caborea, in Altar district, will build a mill. The company is proceeding with development work and using a 3-stamp mill for sampling and testing purposes.

J. Henley, manager of the Hays Con. M. & L. Co. at Campo Hays, in the Pinito mountains, 12 miles east of Quijano station, reports operations progressing satisfactorily and the 20-stamp mill crushing pay ore. The company also owns timber and grazing lands in Magdalena district.

J. M. Morrison, manager of the Richfield M. Co., near Ures, says he has men on development work and improvements will be made.

##### Tamaulipas.

The San Carlos C. Co. railroad has only the last 14 kilometers to build from Linares on the Mexican Central to the company's mines and smelter at San Jose. The contractor building the road has 300 men at work. E. D. Self is manager of the mines.

##### Zacatecas.

At Zacatecas the San Rafael el Grande mine will be unwatered. The mine is owned by the Stillwell Co. A. F. Nathan is manager.

Near Jimulco, the Zacatecas M. Co. will put in more machinery at its copper mines.

##### Vera Cruz.

The Oil Fields Co. of Mexico, which has developed a flowing well near Misantla, will build 9 miles of railroad, oil storage tanks of a total capacity of 100,000 barrels, and increase its drilling equipment.

#### TASMANIA.

The Mount Lyell M. & R. Co. at Mount Lyell reports from August 18 to September 14 a total of 30,347 tons of ore treated, being 22,324 tons from the Mount Lyell mine and 8023 tons from the North Mount Lyell mine. In addition, there was treated 489 tons of purchased ore and metal-bearing fluxes. The converters produced during the same period 618 tons of blister copper, containing: Copper, 610 tons; silver, 58,202 ounces; gold, 1760 ounces.

#### Commercial Paragraphs.

THE Redfield Drill Co., Denver, Colo., report the sales of their hand drills to Elgin, Or.; Folsom, Cal.; Jefferson, Colo.; and two of their electric drills to Ouray, Colo.

THE Brown Corliss Engine Co. of Corliss, Wis., have an order from the Jones & Laughlin Steel Co. for one 30 & 60x48-inch tandem compound condensing Corliss engine, to replace another make of engine in their rolling mill plant at Pittsburg, Pa.

THE Englebach Machine Manufacturing Co., Leadville, Colo., have orders for the Englebach sample grinders as follows: Two to Monterey, Mexico; two to Douglas, Ariz.; one to Anaconda Copper Co., Anaconda, Mont. (this company has six of these sample grinders in use); one to Crofton, B. C.; one to Rossland, B. C.

LARSON & GREENOUGH of Mullan, Idaho, have recently installed a Stromberg-Carlson telephone system at their mines, and write the manufacturers as follows: "We installed one of your mine telephones several months since, and wish to say that it has given the best of satisfaction. It is a surprise to us that we ever got along without it."

THE Rand Drill Co. of New York have recently sold through their Denver, Colo., agency—Cary & Fielding—one six-drill compressor to the Butterfly-Terrible mine; one twenty-drill compressor to the Mogul Co. at Silverton, Colo.; one eight-drill compressor to the Sunnyside mine, Eureka, Colo.; one thirty-drill compressor to the Dives-Pelican mine, Georgetown, Colo., all of the Imperial type.

THE Wellman-Seaver-Morgan Company, engineers and manufacturers, with general offices at Cleveland, Ohio, and plants at Cleveland and Akron, Ohio,

announce that on October 1st they opened a New York office, having taken a suite of offices at 42 Broadway. Mr. Geo. B. Damon, who is a well known and able engineer, has been appointed New York manager, and any inquiries addressed to the New York office will have the immediate and personal attention of Mr. Damon.

THE C. O. Bartlett & Snow Co. of Cleveland, O., report the following recent sales: Buckeye Reduction Co., Findlay, O., one Triumph steam dryer; S. Mendelson, Elyria, O., one Triumph steam dryer; Sinns' Stucco Retarder Co., Uhrichsville, O., one Triumph steam dryer; Daniel H. Grandin, Jamestown, N. Y., belt conveyor and other machinery; Ohio Sand Co., Conneaut, O., elevating and conveying machinery; Crown Dryer Co., Cleveland, O., elevating and conveying machinery; I. E. Boomer, Detroit, Mich., one Triumph gravel excavator and digger; Lowe Bros., Detroit, Mich., four special paint machines with motor drives; Morillon G. & C. Co., Cooney, N. M., special grading machinery; Jas. W. Ellsworth & Co., Cleveland, O., coal elevating and conveying machinery.

#### Personal.

W. E. DEFTY of Phoenix, Ariz., is making mine examinations in Montana.

R. S. BAVERSTOCK has returned to Los Angeles, Cal., from eastern Oregon.

H. BANFIELD is manager of the Rainbow mine at Drew, Douglas county, Or.

F. O. COURTMARSH is manager of the Gold Divide drift mine, near Mokelumne Hill, Cal.

H. B. KAEDING has returned to San Francisco, Cal., from mine examinations in Oregon.

W. SAUNTRY is president of the Columbus Con. G. M. Co., operating near Deadwood, S. D.

J. F. ERISMAN is manager of the Blue Flag Mining Co., operating at Cripple Creek, Colo.

C. C. NEPPLE has resigned as superintendent of the New York mine, near Sumpter, Or.

F. W. KUHFIELD is in charge of operations at the South Fork gravel mine at Forest City, Cal.

C. MCCARTHY is superintendent of the Homestake mine at Silver Peak, Esmeralda county, Nev.

T. E. EREHART of Schenectady, N. Y., is manager of the Lucky Boy mine at Trout Lake, B. C.

R. O. JONES, chief engineer Jeanesville Iron Works, has returned to Hazleton, Pa., from California.

G. M. SEELEY is superintendent of the Highland Mary mine near Howardsville, San Juan county, Colo.

J. C. DEVINE is assistant superintendent of the Troy-Manhattan C. Co. at Troy, Pinal county, Ariz.

C. B. GAMMON of Carthage, Mo., is manager of the Opal Wonder M. Co., operating at Webb City, Mo.

G. L. MOATS of Salt Lake City, Utah, manager of the Latham M. Co., has gone East on company business.

N. H. CLARK is manager of the White Knob C. Co., operating at Mackay, Idaho, vice P. L. Fearn, resigned.

P. D. AHIER is manager of the Idaho-Alamo Con. M. Ltd. at Sandon, B. C., vice W. S. Jenkins, resigned.

W. L. AUSTIN is consulting engineer for the White Knob C. Co., operating at Mackay, Custer county, Idaho.

W. F. SNYDER of Salt Lake City, Utah, president of the Western Exploration Co., is in the East on company business.

F. H. TIBBETTS has been appointed assistant in civil engineering at the University of California, Berkeley, Cal.

T. RUSSELL has resigned as superintendent of the Western Fuel Co. collieries at Nanaimo, Vancouver Island, B. C.

W. S. JENKINS has resigned as manager of the Idaho-Alamo Con. M. Ltd. at Sandon, B. C., and will go to Scotland.

G. E. VOORHES, JR., of Santa Barbara, Cal., owner of Las Vegas copper mine at Coyame, Chihuahua, Mex., is at the mine.

J. R. MURRIN is superintendent of the Gold Coin mine in Cracker Creek district, near Sumpter, Or., vice J. Doyle, resigned.

P. L. FEARN has resigned as manager of the White Knob C. Co. at Mackay,

Idaho, and has gone to New York City, N. Y.

DONALD WOODRUM, of San Francisco, Cal., is examining mining properties in eastern Oregon for a Portland, Or., company.

H. M. ROCHE of Pasadena, Cal., is superintendent of the Little Tonopah mine of the Electro-Geodetic M. Co. at Tonopah, Nev.

W. SKYRME has resigned as superintendent of the Moonlight and High Ore mines at Butte, Mont., and will go to California.

J. DOYLE has resigned as superintendent of the Gold Coin mine in Cracker Creek district, near Sumpter, Or., and in Portland, Or.

W. S. THOMAS, formerly assayer at the Gwin mine in Calaveras county, Cal., is assayer for the Jumper Mine Syndicate, Ltd., at Stent, Cal.

A. A. COLE, chemist and assayer of the War Eagle and Center Star mining companies at Rossland, B. C., returned last week from the East.

SUPERINTENDENT CUSICK of the I X L mine, near Sumpter, Or., has also been given charge of the New York mine, vice C. C. Nepple, resigned.

W. N. WILLIAMS is manager of the North Sheba G. & Exp. Co., Ltd., operating in north De Kaap district, near Johannesburg, South Africa.

S. C. HOLMAN, superintendent of the Mother Lode mine, at Deadwood, B. C., returned there last week after a trip to Alaska and to Eastern points.

W. S. BACON, recently with the Ida Mitchell mine, near Placerville, Cal., is superintendent of the Barbara mine, near Gold Hill, in the same section.

J. M. MORRISON of Washington, D. C., manager of the Richfield M. Co., is superintending operations at the company's mines near Ures, Sonora, Mex.

C. A. DOREMUS has resigned as professor of chemistry in the College of the City of New York, to engage in practice as consulting engineer and chemist.

W. E. PROCTOR has resigned as superintendent for the Darien G. M. Co., operating La Mina Espiritu Santo at Cana, Colombia, and will locate at Sutter Creek, Cal.

W. FRITCH of Ishpeming, Mich., has accepted the position of manager of the United States M. Co. at Salt Lake City, Utah. R. S. Holden will continue as managing director.

H. LOWE, who has been assistant superintendent of La Mina Espiritu Santo of the Darien G. M. Co., at Cana, Colombia, is superintendent, vice W. E. Proctor, resigned.

W. J. KEOUGH, formerly superintendent of the Red Roy mine, Baker county, Or., is superintendent of the Mount Baker M. Co.'s property in Mount Baker district, near Whatcom, Wash.

ARTHUR WINSLOW of Boston, Mass., manager of the Liberty Bell mines at Telluride, Colo., and of the Combination mines at Goldfield, Nev., has been examining mines at Nevada City, Cal.

#### Obituary.

H. P. LILLIBRIDGE, principal owner in the Red Umbrella, Mayflower and other Cripple Creek, Colo., mines; died on the 5th inst. at Detroit, Mich. Deceased was formerly interested in the Mollie Gibson and other mines at Aspen, Colo. He was 62 years of age, and was at one time United States Consul-General at Hawaii.

W. F. THOMPSON of Denver, Colo., a pioneer miner and millman of Colorado, died at Denver October 5th. Deceased was born in Westchester county, New York, May, 1838. He crossed the plains in 1861 and spent some time in Black Hawk and vicinity, prospecting and milling. Later he went to Wyoming and engaged in the sawmill and lumber business.

A. B. KNIGHT, a pioneer mining engineer of Montana, died at Butte, Mont., September 27th. For the past year or more deceased was with the Bismarck-Nugget Gulch M. Co., near Sheridan, Mont., as consulting engineer. He was born in Livingston county, New York, February, 1844. He moved to Michigan, where he graduated from the State University at Ann Arbor. He was a Civil War veteran. In 1901 he was professor of mining engineering in the Montana State School of Mines at Butte.



## Latest Market Reports.

SAN FRANCISCO, October 14, 1904.

## METALS.

**SILVER.**—Per oz., Troy: London, 26<sup>3</sup>/<sub>4</sub>d (standard ounce, 925 fine); New York, bar silver, 57<sup>3</sup>/<sub>4</sub>c, refined (1000 fine); San Francisco, 57<sup>3</sup>/<sub>4</sub>c; Mexican dollars, 47c San Francisco, 45<sup>1</sup>/<sub>2</sub>c New York.

**COPPER.**—New York: Standard, \$13.00; Lake, 1 to 3 casks, \$13.25; Electrolytic, 1 to 3 casks, \$13.10; Casting, 1 to 3 casks, \$13.00; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £59 18s 6d spot per ton.

Copper has shown a slightly upward tendency the past two weeks, the 13-cent mark having been passed. Lake now being quoted at \$13.25. This upward movement has been anticipated for some time past. This upward tendency of the copper market is due to heavy buying, particularly in Europe. The constant and growing demand for copper in electrical installations has much to do with the heavy consumption of the metal. In London the price of spot copper is now as high as it was a week ago for the metal on three months delivery. In consideration of the present condition of the market a somewhat higher price may be anticipated.

**LEAD.**—New York, \$4.30; Salt Lake City, \$3.50; St. Louis, \$4.12<sup>1</sup>/<sub>2</sub>; San Francisco, \$4.50, carload lots, 4<sup>1</sup>/<sub>2</sub> 1000 to 4000 lbs.; pipe 6<sup>1</sup>/<sub>2</sub>, sheet 7, bar 5<sup>1</sup>/<sub>2</sub>; pig, \$4.85. London: £12 2s 6d long ton.

**SPELTER.**—New York, \$5.20; St. Louis, \$5.00; London, £22 15s per ton; San Francisco, ton lots, 6<sup>1</sup>/<sub>2</sub>; 100-lb. lots, 7c.

**TIN.**—New York, pig, \$28.00@28.50; San Francisco, ton lots, 29c; 500 lbs., 29<sup>1</sup>/<sub>2</sub>c; 200 lbs., 30c; less, 31c; bar tin, \$32<sup>1</sup>/<sub>2</sub>@35c. London, £129 12s 6d spot.

**PLATINUM.**—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

**QUICKSILVER.**—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

**BABBITT METAL.**—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6<sup>1</sup>/<sub>2</sub>c; extra, 17<sup>1</sup>/<sub>2</sub>c; genuine, 31<sup>1</sup>/<sub>2</sub>c; Eclipse, 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 16c.

**ZINC.**—Metallic, chemically pure, \$3.10, 50c; dust, \$3.10, 10c; sulphate, \$3.10, .04c.

**NICKEL.**—New York, 40@47c per lb.; ton lots, 40@47c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

## STRUCTURAL MATERIALS.

**IRON.**—Pittsburg, Bessemer pig, \$12.75 @12.85; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3<sup>1</sup>/<sub>2</sub>c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c per lb.

**WHITE LEAD.**—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6<sup>1</sup>/<sub>2</sub>c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, 1<sup>1</sup>/<sub>2</sub> c per lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, 4c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6<sup>1</sup>/<sub>2</sub>c; do. in kegs, 7c.

**LUMBER.**—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

**NAILS.**—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

**LIME.**—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

**CEMENT.**—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

## GENERAL SUPPLIES.

**ANTIMONY.**—New York, Cookson's, 7c; Hallett's, 6<sup>1</sup>/<sub>2</sub>c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8<sup>1</sup>/<sub>2</sub>c; 100-lb. lots, 10<sup>1</sup>/<sub>2</sub>c.

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15<sup>1</sup>/<sub>2</sub>c; less than one ton, 17<sup>1</sup>/<sub>2</sub>c. No. 1<sup>1</sup>/<sub>2</sub>, 60%, carload lots, 13<sup>1</sup>/<sub>2</sub>c; less than one ton, 15<sup>1</sup>/<sub>2</sub>c. No. 1<sup>1</sup>/<sub>2</sub>\* 50%, carload lots, 11<sup>1</sup>/<sub>2</sub>c; less than one ton, 13<sup>1</sup>/<sub>2</sub>c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9<sup>1</sup>/<sub>2</sub>c; less than one ton, 11<sup>1</sup>/<sub>2</sub>c. No. 2\* 30%, carload lots, 9c; less

than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

**CAPS.**—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

**FUSE.**—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 11<sup>1</sup>/<sub>2</sub>c per set; 14 oz., 40s., 10c.

**CHEMICALS.**—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 23@23<sup>1</sup>/<sub>2</sub>c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3<sup>1</sup>/<sub>2</sub>c per lb.; caustic soda, in drums, 3@3<sup>1</sup>/<sub>2</sub>c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2<sup>1</sup>/<sub>2</sub>@2<sup>3</sup>/<sub>4</sub>c; powdered sulphur, 2@3c; flour sulphur, French, 3<sup>1</sup>/<sub>2</sub>@3<sup>3</sup>/<sub>4</sub>c; alum, \$2.00@2.25; California refined, 1<sup>1</sup>/<sub>2</sub>@2c; sulphide of iron, 8c per lb.; copper sulphate, 5<sup>1</sup>/<sub>2</sub>@5<sup>3</sup>/<sub>4</sub>c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1<sup>1</sup>/<sub>2</sub>@2c per lb.; nitric acid, carboys, 8c per lb.

**OILS.**—Linseed, boiled, bbl, 53c; cs., 58c; raw, bbl, 51c; cs., 56c; Lucol oil boiled, bbl, 50c; cs., 55c; raw, bbl, 48c; cs., 53c. Kerosene—Pearl, per gal., 19<sup>1</sup>/<sub>2</sub>c; Astral, 19<sup>1</sup>/<sub>2</sub>c; Star, 19<sup>1</sup>/<sub>2</sub>c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20<sup>1</sup>/<sub>2</sub>c; cs., 24c; Mineral Sperm, cs., 26<sup>1</sup>/<sub>2</sub>c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22<sup>1</sup>/<sub>2</sub>c; 86" Gasoline, bulk, 25c; do., cs., 31c; 83" Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19<sup>1</sup>/<sub>2</sub>c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

**ALUMINUM.**—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

**BORAX.**—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

**BONE ASH.**—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

**RED LEAD.**—500 lbs. and over at one purchase, \$3.10, 7c; less than 500 lbs., 7<sup>1</sup>/<sub>2</sub>c.

**LITHARGE.**—Pure, in 25-lb. bags, 8@9c per lb.

**MOLYBDENUM.**—Best, \$2.75 per lb.

**CHROMIUM.**—90% and over, \$3.10, 80c.

**PHOSPHORUS.**—American, \$3.10, 70c.

**SILVER.**—Chloride, \$3.10, 90c@91.00; nitrate, 55c.

**MERCURY.**—Bichloride, \$3.10, 77c.

**MAGNESIUM.**—Pure, N. Y., 60c.

**MANGANESE.**—\$3.10, 75c.

**SODIUM.**—Metal, \$3.10, 50c.

**BISMUTH.**—Subnitrate, \$3.10, \$2.10.

**URANIUM.**—Oxide, \$3.10, \$3.50.

**FIRE BRICK.**—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

**FIRE CLAY.**—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

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## Books Received.

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Under title of "Mineral Resources of the United States for 1904," the United States Geological Survey has issued:

"Production of Copper;" "Production of Zinc."

"Report of the United States Naval 'Liquid Fuel' Board" on tests of relative efficiencies of coal and oil as fuels under forced and natural draft has been issued by the Bureau of Steam Engineering, Navy Department, Washington, D. C.

Among recent publications of the United States Geological Survey received, are professional paper No. 24, "The Zinc and Lead Deposits of Northern Arkansas," by G. L. Adams, A. H. Purdie and E. F. Burchard; professional paper No. 25, "Copper Deposits of the Encampment District of Wyoming," by A. C. Spencer; professional paper No. 26, "Economic Resources of the Black Hills," by J. D. Irving, S. F. Emmons and T. A. Jaggar, Jr.

This paper is one of the most complete descriptive works on ore occurrence in this important mining region; professional paper No. 27, "A Geological Reconnaissance Across the Bitter Root Range and Clearwater Mountains in Montana and Idaho," by W. Lindgren; bulletin No. 232, "A Gazetteer of Virginia," bulletin No. 233, "A Gazetteer of West Virginia," bulletin No. 241, "Experiments in Schistosity and Slaty Cleavage," by G. F. Becker.

## Trade Treatises.

The Chapman Valve Manufacturing Co., Indian Orchard, Mass., send a sumptuous setting-forth of their makes of valves and giving a classified list of their recent customers.

A CATALOGUE from the Cyclone Drilling Machine Co., Orrville, O., illustrates and describes their drilling machinery for coal, water, oil, gas and placer mining. They furnish complete outfits for prospecting and proving ground for gold dredge mining, etc. They will supply on request a special catalogue on any one of the following: Coal prospecting, contractors' drills, water well drills, oil and gas well drills, placer mining drills.

Catalogue No. 2 from the Vulcan Iron Works, San Francisco, Cal., of standard size (6x9 in.) and typographically excellent, is devoted to ice-making plants (can or plate system), and refrigerating machinery in general, comprising both the direct and brine system. Ammonia fittings and valves, condensers, return bends, etc., are illustrated and described in detail. The Vulcan Iron Works build insulated cold storage rooms of any size, insulated with mineral wool or sheet cork. They manufacture the Vulcan cold storage room doors, specially designed to insure an air-tight joint, and provided with bevel jamba rubber packed, and with heavy hinges and clamping handles. They carry mineral wool in stock for immediate shipment.

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING OCTOBER 4, 1904.

771,760.—TREATING SEAWEED—D. M. Balch, Colorado, Cal.  
771,596.—POWER WHEEL—A. C. Bates, Oakland, Cal.  
771,452.—BURIAL APPARATUS—J. H. Beattie, Tacoma, Wash.  
771,526.—MOTOR—W. Blackburn, S. F.  
771,412.—CREMATING FURNACE—Brett & Benton, Los Angeles, Cal.  
771,711.—LUBRICATOR—E. Clark, Winslow, Ariz.  
771,703.—SPRING MACHINE—C. A. Connan, Los Angeles, Cal.  
771,623.—KILN—D. H. Gibson, Seattle, Wash.  
771,797.—STEAM BOILER—Heberer & Hyne, Alameda, Cal.  
771,730.—CUFF—W. F. Howell, S. F.  
771,475.—ELEVATOR—J. J. Jordan, Tonopah, Nev.  
771,455.—HAND STAMP—S. W. Metcalf, Sisson, Cal.  
771,742.—CALENDAR—T. O'Shaughnessy, San Jose, Cal.  
771,495.—BARREL BUSHING—F. M. Pfleger, Portland, Or.  
771,268.—ARTIFICIAL LIMB JOINT—G. Reinhardt, Elmhurst, Cal.  
771,555.—CAR BRAKE—E. Stevens, Monroe, Wash.  
771,296.—BURIAL ALARM—G. A. F. Streuber, Seattle, Wash.  
771,792.—HYDRAULIC FLUME—G. W. Wilderman, Portland, Or.

## DELINQUENT SALE NOTICE.

**ORLEANS CONSOLIDATED MINING COMPANY.** Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice—There are delinquent upon the following described stock on account of assessment (No. 2) levied on the 6th day of August, 1904, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	Shares.	Amt. 1904.
Geo. P. Thurston, Trustee.....	232	1000	\$75 00
J. C. Diamond.....	474	50	3 75
J. C. Diamond.....	475	53	3 97 <sup>1</sup> / <sub>2</sub>
D. F. Bell.....	206	76	5 70
J. F. Lang.....	209	15	1 12 <sup>1</sup> / <sub>2</sub>
John Jose.....	219	2 <sup>1</sup> / <sub>2</sub>	19

And in accordance with law and an order from the Board of Directors, made on the 6th day of August, 1904, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company at San Francisco, California, on MONDAY, the 31st day of October, 1904, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

W. H. SMITH, Secretary.  
Office—Room 10, No. 324 Pine street, San Francisco, California.

**SAN FRANCISCO ARTIFICIAL LIMB CO.**  
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**BEST IMPROVED ARTIFICIAL LIMBS**  
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738 Mission St., San Francisco, Cal. (Room 407).  
Measurement Blanks for Self-Measurement Free.

Artificial Limbs Repaired with skill and dispatch. Correspondence by U. S. to furnish Limbs on Government orders.

**THE CALIFORNIA DEBRIS COMMISSION**  
having received application to mine by hydraulic process from N. H. Burger, in Dry Gulch Gravel Mine, near Pleasant Valley, El Dorado County, Cal., draining into Clear Creek which reaches Cosumnes River, gives notice that a meeting to receive any protests will be held at Room 96 Flood Building, San Francisco, Cal., Oct. 31, 1904, at 1:30 P. M.

**THE CALIFORNIA DEBRIS COMMISSION**  
having received application to mine by hydraulic process from E. J. Gordon and P. McElroy, in Messer Mine, near Mountain House, Plumas County, Cal., draining into Spanish Creek, which reaches Feather River, gives notice that a meeting to receive any protests will be held at Room 96 Flood Building, San Francisco, Cal., Oct. 17, 1904, at 1:30 P. M.

LET US PUT IT BEFORE YOU PLAINLY.

Say the cost of oil at your plant is \$300 per annum. If you used a

## CROSS OIL FILTER

you would SAVE THE COST OF OIL.

at \$150, which is the interest at 6% on \$2500. Don't you think it worth while to order a Cross Oil Filter to-day? Sent anywhere on thirty days' approval.

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Largest Mfrs. Oil Filters in the World,  
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## SITUATIONS WANTED.

## A FOREMANSHIP OR SUPERINTENDENCY.

Twelve years' experience, practical mining. Possesses technical knowledge necessary for economical ore extraction. Address Edward W. Ralph, 602 W. Broadway, Butte, Montana.

**CYANIDE CHEMIST DESIRES POSITION AS**  
Cyanide Superintendent; 8 years' experience; understands milling; good assayer; best of references. Address "Cyanide," Box 1822, Denver, Colo.

**EXPERT MINE FOREMAN WANTS POSITION.**  
Competent to handle arduous difficult conditions underground. Address "Limestone," Room 602, 830 Market St., S. F.

**MINE SUPERINTENDENT WANTS POSITION.**  
Capable miner, mill man, cyanide man and assayer. Address R. F., this office.

**MINING COMPANIES AND MINING ENGINEERS**  
installing steel cyanide tanks and desiring a first-class boiler maker familiar with class of work to do the erecting and riveting for them, address Box 25, this office. Best of references.

**MINING ENGINEER, GRADUATE MASS.**  
Institute of Technology, 1885, with wide mining experience, also electrical training; over two years with one of our largest electrical companies; speaks Spanish; can handle labor, and will go anywhere; is open to engagement. Address Robert Shea, Exposition Headquarters, American Institute of Mining Engineers, Block 74, Mines Building, St. Louis.

**PRACTICAL PROSPECTOR AND PROSPECT EXAMINER.** Have your work done by me and you will know where and when to invest your money. Address A. J. Davis, Pine Flat, Sonoma Co., Cal.

**POSITION DESIRED BY AN ELECTRICAL**  
and Gas Engineer; technical graduate; three years' experience in electrical work, eight years' experience in the operation of gas engines; will accept position in either line, but prefer to combine the two. Address R. W. Shoemaker, 613 E. Sixth St., Los Angeles, Cal.

**WANTED—POSITION AS SUPERINTENDENT**  
or assistant supt by a practical man; first-class chemist and assayer. Specialty: Reduction work, milling and smelting. Address X, this office.

**WANTED—POSITION BY EXPERIENCED**  
Mining Stenographer, Bookkeeper and Assayer, with reliable mining company. Address A. R. Wistrand, Wrangell, Alaska.

**THE ENGINEERING AGENCY, CHICAGO,**  
furnishes free to reliable employers information leading to employment of Mining Engineers, Draftsmen, Mine or Mill Superintendents, Assayers, Chemists, Cyanide Men, Electricians, etc. In successful operation eleven years. Let us know your need and competent, high-grade men whose complete professional and personal records have been thoroughly investigated will be referred to you at once.

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positions furnished to employers without charge. Experienced men wanting such positions should write for terms. Cleveland Engineering Agency, Rose Building, Cleveland, O.

## ASSESSMENT NOTICES.

**GOLDEN WEST MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of September, 1904, an assessment (No. 2) of one (1) cent per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 207 Battery street, Room 15, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of October, 1904, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of November, 1904, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
CHAS. BOVONE, Secretary.  
Office—207 Battery street, Room 15, San Francisco, California.



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GAS** in  
**MINES.**



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**STAR PATTERN** for Heavy Pressure.  
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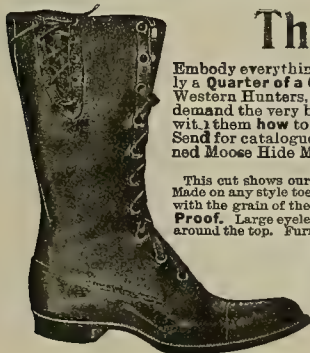
We warrant them for all service where a quick, reliable action is required. It will pay you to investigate. Full particulars from any jobbing supply house, or direct from the manufacturers.

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This cut shows our No. 678 Three Quarter Boot, (14 inches high) Bellows Tongue. Made on any style toe desired. Uppers are Special Chrome Tanned Calf Skin, tanned with the grain of the hide left on (our special tanning) making the leather **Water Proof**. Large eyelets and wide leather laces, also laced at side to fit the boot tight around the top. Furnished in Black, Brown or Straw Color. Sole, Light, Medium or Heavy. The sole is genuine Hand Sewed (making it soft and easy), and made of the best Water Proofed Oak Sole Leather. Made to your measure and delivered to any part of the U. S. for \$7.50. Send for order blank showing how to measure your foot.

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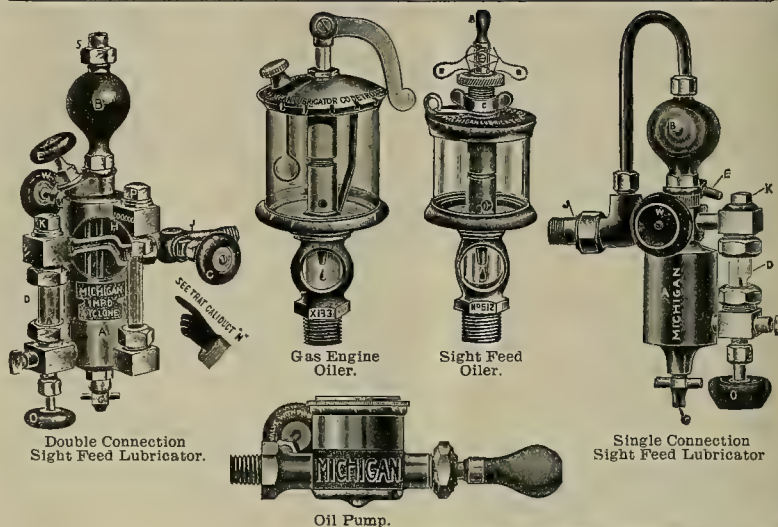
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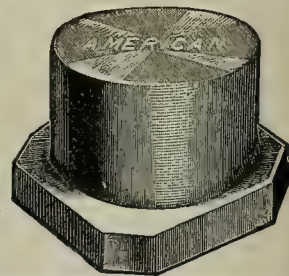
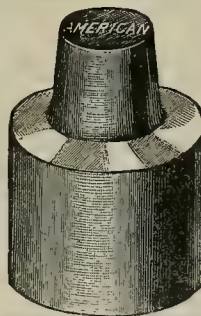
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ALL KINDS OF  
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# MINING AND SCIENTIFIC PRESS

Whole No. 2309.—VOLUME LXXXIX.  
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SAN FRANCISCO, CAL., SATURDAY, OCTOBER 22, 1904.

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## Greater Economy.

In these days of rapid progress in every branch of industry, the one object is to reduce production cost while maintaining or increasing output. It applies to no industry more directly or completely than to mining and metallurgy. Economy of production is sought in the introduction of labor-saving machinery, in the making of valuable by-products of what was previously waste material and thrown away as such. Some reduction works have found it profitable to utilize the waste sulphurous gases of their furnaces in the manufacture of acid. Among these may be mentioned the Broken Hill Co. of New South Wales and the Mountain Copper Co. at Keswick, Cal. The magnetic separator is saving the values of complex ores previously thrown out on the waste dump. Wherever it is possible to gain advantage by increasing capacity this is being done, and usually without material increase in the working force. This is being largely accomplished by labor-saving machines in every department. Machine drills cut the holes for blasting; machines load the broken ores, rock and coal into cars, and mechanical haulage of some description



The Mazeppa Mine, Mother Lode, Tuolumne County, Cal. (See Page 271).



Melones Flume, Cal., Capacity 6000 Inches. (See Page 272).

transports the material to the shaft or to the surface. If to the shaft, it is dumped automatically, hoisted, and dumped again automatically, and here it goes through the various processes of treatment, by gravity or power, all without human interference, until the finished product is secured. The separation of mine and reduction works by a few feet or several miles is no longer a matter for serious contemplation.

If it be a short distance, a belt conveyor or a short tram line does the business. If a long distance, an electric railroad or an aerial tramway fills the requirement.

Although it sometimes seems as though the limit had been reached, the appearance of some new device to

more quickly and cheaply accomplish that which we had considered only possible by the means of hands, shows that the end has not been reached and that there really is something new under the sun.

## Cost of Dredging.

The matter of the cost of recovering gold by dredging is being investigated by numerous engineers and others with a view to possible investment. It is evident upon a moment's reflection that this must fluctuate considerably with the varying conditions found in the many dredging fields. One important factor is the size and capacity of the dredge, and another is the character of the material to be dredged. In addition to these there are numerous other important considerations, among which are the character of the bedrock and the depth of the deposit. Power, too, is not always obtainable at the

same rate per horse power. It is expected, as a matter of course, that a large dredge will operate more cheaply than a smaller one, as its assumed greater capacity will reduce working costs per yard of material treated, but it goes without saying that a smaller machine working under favorable conditions may be operated as cheaply as a larger one where the conditions of operation are difficult, with a consequent loss in capacity. The report of the Oroville, Cal., Gold Dredging and Exploration Co. for 1903 showed that 474,610 cubic yards of gravel were dredged and washed at an average cost of \$0.0648 per cubic yard. As the material dredged was soil, loose gravel and sand, it may be assumed that a dredge operating on coarser material would be unable to show as low a cost sheet.



The Bracket Flume of the Miocene Mining Company, Butte County, Cal. (See Page 272).



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IN concentrating the object is always to eliminate the worthless (usually the lighter) material from the more valuable and heavier. In mills this is effected on various types of tables, belt machines and jigs, all having some sort of mechanical movement. Water is also employed in each of these various types of machines. Thus far, however, no machine has been introduced which makes a complete separation of the various kinds of sulphides—lead, zinc, iron and copper—one from the other, although many of the mechanical devices employed make a remarkably clean separation of the sulphides from the gangue. By the use of the electro-magnetic separator zinc can generally be separated from its associated sulphides, but the iron, copper and lead still continue to be collected together. Experimenters are working on this problem and it is not unlikely considerable advancement will be made in this direction.

THE present condition of the copper industry and its prospects for the future are promising. The price has steadily advanced for several weeks past—in small fractions, it is true, but it has been an advance, nevertheless, and a healthy one, based evidently on the relative production and consumption. A large amount of the metal has been shipped to Europe, but the home demand is strong, and under this condition the price continues to advance. The copper output of foreign producers is not as heavy as formerly in some instances, and the supplies in foreign countries are getting lower, particularly in Japan. A large amount of copper is used in England annually in the manufacture of copper sulphate, and the statement is made that during the next six

months at least 15,000 tons will be required there for this purpose alone. Those who are familiar with the copper stocks on hand and production of the various nations predict a still higher price for the metal. The total stock on hand early the present month was only about 7500 tons, a gain of only 2000 tons since January 1st last.

## Mount Morgan Report.

The annual report of the Mount Morgan gold mine of Queensland, Australia, for the year ending June 1, 1904, shows some interesting facts in connection with the extensive mining operations carried on there. The output of the mine comprises several classes of ore—the straight gold ore, both oxidized and sulphide; a copper-gold ore, and an ore treated for sulphur or its products. In the open cut there was mined 118,139 tons of oxidized ore and 123,599 tons of waste rock. The overburden removed amounted to 305,625 tons. Underground there was mined 416 tons of oxidized ore, 117,523 tons of sulphide gold ore, 3466 tons of copper-gold ore—a comparatively recent production at this mine—and of the "sulphur" ore 1147 tons were produced. There was also mined 153 tons of limestone for flux in the furnaces. Waste rock was mined underground to the amount of 16,702 tons, making a total of 240,691 tons of ore. The waste handled made a total of 445,926 tons, or nearly twice as much as all the ore treated. A great part of the surface waste—overburden—was removed by means of steam shovels.

The company has carried on vigorous deep prospecting by means of diamond drills. The introduction of steam shovels into the mining operations at Mount Morgan is pronounced by the management a success, and the intention is to add another shovel of still larger capacity, the bucket having a capacity of lifting ten tons at each load. The development of the copper-gold zone has gone on satisfactorily during the year, and the amount of ore now determined by diamond drill bore holes is estimated at over 500,000 tons.

The Mount Morgan is one of the largest mining concerns in Australia. Extensions of plant and innovations in ore treatment have been of frequent occurrence there and are watched with interest by mine managers everywhere. Old ore piles are leached for copper and the cement metal produced is 77% pure copper. The water used in leaching, after passing to the precipitation boxes, is pumped back for sluicing out the leaching tanks. In almost every department improvements are being made in operating methods, with a reduction of costs. At present the company is experimenting with the gold-copper ores with a view to their less expensive reduction.

THE revival of an old mining camp at Reveille, Nye Co., Nev., is an instance of the energy with which the mining industry is being urged in that State. Reveille was an old and practically abandoned camp thirty years ago. During its early days in the latter sixties it was a shipper of high-grade ores, but the rich spots were not numerous enough for the times and gradually mining in that district came to a standstill. Now, however, with a railroad at Tonopah, only 50 miles away to the westward, new conditions have developed for Reveille district just as they have for many other districts, both old and new, in Nevada and Utah. The veins of the district are large and well mineralized, and the probability is that some of the new undertakings will become profitable and long continued producers, while some of the old ones will share in a measure this revival of prosperity. The camp is only another illustration of how time and changing conditions make the unsuccessful and poverty stricken camp of to-day the rich and prosperous one of to-morrow.

IN the Lake Superior region, somewhat of an innovation is being undertaken in employing compressed air to run the heavy stamps of the "Ball" type instead of steam. The power is to be generated by electricity, which will be transmitted some distance to the compressors. There seems no good reason why the air should not work under proper conditions as satisfactorily as steam. Experiments have been in progress for some time past in this direction, and now the idea will be put to practical test at the Victoria mine in Ontonagon county, Mich.

## The Barometer in Mining.

Some time since W. Lindgren of the United States Geological Survey, while engaged in the resurvey of the Cripple Creek district, found that the atmospheric conditions, as indicated by the readings of an aneroid barometer, had a direct influence upon the conditions of the air underground in mine workings. The normal barometric reading at 10,000 feet, which is approximately the elevation of Cripple Creek, is 20.48 inches. When the barometer indicates a lighter pressure than the normal at any of the mines it is found that the heavy carbon dioxide settles in the workings and is moved less readily by the ventilating fans, or other means of ventilation. At the Anchoria-Leland mine a barometer is daily consulted to note any material change in atmospheric pressure. When the night shift leaves the mine there are no workmen underground for several hours. It is the duty of the watchman to note the barometric reading, and if it is lower than the normal he turns steam into the workings at intervals, which has the effect of absorbing the carbon dioxide, and the atmosphere underground is purified.

There are many mines in Cripple Creek in which the air is so bad at times as to seriously interfere with work. At the Anchoria-Leland there has been much loss of time due to bad air. At one time when driving a level the gas entered the mine from fissures in the rocks as to render further work for the time being impossible. The expedient of lining the drift with tin was tried, but this afforded only temporary relief. Since the introduction of the barometer and the blowing of live steam into the workings at such time as is indicated by low readings of the barometer, the conditions have materially changed for the better. Doubtless there are many places where this ingenious method of watching the air circulation of underground workings may be adopted with equally satisfactory results.

THE "dry season" in some of the mining counties of California has been short this year, not owing to extra vigilance of the water companies, or to more progressive improvements in impounding larger amounts of water, but to a greater amount of rain during the spring months and heavy early fall rains and snow in the mountains. For many years past the mining industry has suffered from a shortage of water, but little effort has been made to remedy the conditions further than to install electric plants for distribution of power, which has enabled some mines to dispense with water power. Very few mines now own water power plants, and still fewer own electric plants, consequently the greater number depend wholly on the companies owning water and large distributing electric plants, for both power and water, without either of which the mines cannot be operated. Generally large companies own both water and electric plants, and a shortage of water results in cutting off the water supply at the mills, though usually power can be supplied, but power without water in a stamp mill is useless. It would seem that the past years of experience would suggest the necessity and good business policy of enlarging the reservoirs, or otherwise conserving an amount of water to meet the needs of a dry summer, but as yet the matter has not received the serious attention which it justly deserves by the owners of the large water systems which supply the mines with water and power.

THE search for valuable mines is not always promptly rewarded by the discovery of that for which search is so earnestly being made. The Pittsburg Steel Company have been engaged for more than a year in prospecting with diamond drill and otherwise for iron ore in the Baraboo range in northern Wisconsin. Until recently their efforts were fruitless. Now they are developing a rich deposit of iron ore found by means of a diamond drill. This illustrates the need of perseverance under certain circumstances. The engineers were satisfied that the geological conditions were favorable to the occurrence of ore, if only they could find the locality. By persistent effort they have discovered a valuable deposit. Had they discontinued drilling operations, the entire vicinity would probably have been abandoned as an unpromising field in which no iron was likely to be found.



## CONCENTRATES.

FROM the description, the bucking of the trolley car is probably caused by moisture on the car commutator.

THE electric conductivity of wires of the same substance is inversely as their lengths and directly as their sections.

"NATIVE" nickel, or nickel in a free state, is as rare as platinum in place. It is usually found combined with sulphur, iron, arsenic or cobalt.

THREE PARTS of firebrick, crushed to 8-mesh, added to one part of fireclay makes a quick-drying cement for furnace muffles that will not crack or scale.

NO COPIES of this journal prior to 1865 can hereafter be supplied. With some exceptions, a copy of any issue since February 18, 1865, can still be furnished.

ASPHALT is considered to be superior to bituminous rock for street paving. It costs considerably more at the start, but, properly mixed and laid, is durable.

TO BEND a small brass pipe without causing it to kink or break, stop one end with a cork or other object and fill the pipe with sand, then closing the other end the pipe may be bent slowly without breaking or kinking.

OIL TANKS should be provided with tap holes in or near the bottom for the purpose of drawing off the water and washing out the sand which always accumulates in them. The oil is taken out at a point above the water line.

ONE-SIXTEENTH OF AN INCH of scale on the inside of a boiler necessitates the burning of 12% more fuel to generate the same amount of steam; one-fourth of an inch requires 38% more fuel; three-fourths of an inch causes a 90% loss of fuel.

WALLS, ARCHES, ETC., when built of concrete can usually be constructed much more quickly and cheaply than if made of brick or masonry, and if the concrete be properly made and of the best materials are as enduring as either brick or masonry.

THE mineral used as the main supply for manufacture of arsenic compounds is arseno-pyrite ( $\text{FeAsS}$ ) or "mispickel." Arsenic compounds are used principally as vermicides, particularly arsenious oxide ( $\text{As}_2\text{O}_3$ ), in preparation of paris green.

BETWEEN parallel conductors, one of which carries a current, an opposing current is induced upon approach, and a current similarly directed upon withdrawal from the first conductor. When a conductor is moved near a magnet, the induced current depends upon the manner of cutting the magnetic curves.

CANADA annually imports about \$1,500,000 of mining and smelting machinery. About half this amount is from the United States. "Concentrates" has been unable to ascertain the exact percentage on which duty is paid, but it is believed about 10% is dutiable, the remainder being free of import duties.

IT is extremely unsafe to go with an open light, such as a candle, into a tank which has been previously used as a receptacle of crude petroleum, but from which the oil has been removed, as explosive gas is almost certain to be present, and an explosion will probably result. Such tanks should be inspected or repaired in the day time, or by means of either electric light or a miner's safety lamp.

AN acetylene lamp will burn in a mine in the presence of foul air when a candle cannot even be lighted, but such experiments are dangerous, as the miner has little warning of the treacherous conditions about him, which are so plainly evidenced by the blue flame and final extinguishing of the caudle. When the air is so bad that a candle cannot be coaxed to burn it is time for the miner to leave.

SKIPS are used for bailing, and hoisting rock as well, generally throughout California, to some extent in Colorado, and almost universally in the Rand in South Africa. Many mines in Montana and in the Lake Superior region are substituting skips for cages. In the issues of the MINING AND SCIENTIFIC PRESS of April 25 and May 2, 1903, is an article dealing in detail with the problem of hoisting water with skips.

THE life of mine timbers depends upon the kind of timber and its condition when placed in the mine; on the condition of the air in the mine. Timber lasts longer in a pure atmosphere than in one reeking with foul gases, moisture and heat. Much depends upon whether the timber will be constantly soaked with water or only partly so, or whether alternately wet and dry. If constantly wet they will not rot; if alternately wet and dry, decay results quickly. The cost of timbering varies with conditions, location and methods employed. In some

large mines the cost of timbering does not exceed 20 cents per ton. In others it is over 50 cents. This is something that cannot be answered without full knowledge of the situation viewed from every point.

TRANSFORMER OIL should contain neither water nor acid. To test the presence of water take a few crystals of copper sulphate (bluestone), drive off the water of crystallization by roasting. To the white powder that is left, add a small quantity of the oil to be tested. If there is water in the oil, the powder will again turn blue. Acid in the oil can be detected by blue litmus paper, which, when touched with acid, turns red.

A DRY BLOWING MACHINE, suitable for treating dry placer sands, can be built at small expense. There are a variety of types of this sort of machine, but all depend upon a shaking motion, and the intermittent puffs of a bellows for their operation. The machine can be built of wood provided with perforated iron screens, canvas aprons and canvas or leather bellows. The movement is usually derived from the operation of an eccentric, actuated by a hand wheel. They are only applicable to dry, light soil or gravel, such as is found in the desert regions.

WHEN roasting iron sulphide to test for gold by panning it is not necessary to use salt. The chemical effect of salt in roasting is to cause the chlorine gas freed by decomposition of the salt to unite with the fine particles of gold, and more or less loss of gold always results from volatilization. A plain roast is all that is necessary, followed by grinding preferably under water. If no gold results that can be seen in panning it is advisable to have the rock assayed in order that it may be detected if present, as gold-bearing sulphides do not always yield gold upon panning.

LIME is used in the cyanide process to neutralize acidity of the ore, and in slimes treatment also to flocculate the slimes and cause the solution to clarify. The amount of lime to be added must be predetermined, as too little is ineffective and too much interferes with the subsequent precipitation of gold in the zinc boxes. It is claimed by James, in his "Cyanide Practice," that at some mills on the Rand in South Africa the addition of lime to the battery facilitates amalgamation and in some instances has increased the saving of gold on the plates to such an extent as to render the slimes too low grade to pay for treatment.

THE function of a tightening pulley is to increase the tension upon a loose belt. It also increases the arc of contact on both driving and driven pulley. The tension upon a belt should be no greater at any time than that which will keep the belt from slipping. When the tension is greater than this the belt wears rapidly. With high-speed belts it is necessary that the tightening pulley be kept in its proper position. When the tension on a belt is removed by withdrawing the tightening pulley the driven pulley will come to a standstill. The belt should then be removed from the driving pulley, or damage will result to the belt from friction.

THERE is nothing of value in the instruments known as the "dowsing rod," "divining rod" and other names given to the more or less elaborate forked devices for finding ore, which depend for their success upon the intervention of some person, but instruments of electrical design have been made, and are said to be in successful use as an aid to locating certain ore deposits which consist of large amounts of mineral like iron, copper, lead, zinc, etc., but these instruments, as far as known, have not as yet been successfully utilized in locating quartz veins, either large or small, which do not contain a high percentage of the sulphides or oxides of the base metals.

THE main source of antimony obtained in the United States is in "hard lead," a by-product in smelting and refining lead-silver ores. Due chiefly to the removal of the import tax on crude antimony in April, 1902, there has been no commercial production of the metal from domestic antimony ores since 1901. Antimony is used chiefly in the manufacture of alloys with lead, tin, zinc, et al.—for type metal, pewter, britannia metal, babbitt and anti-friction metal. The red pigment used in vulcanizing and coloring rubber is antimony penta sulphide ( $\text{Sb}_2\text{S}_5$ ). Tartar emetic, an antimony-potassium tartrate, is used in medicine and as a mordant in dyeing vegetable fiber.

ANDESITE is a volcanic rock containing plagioclase feldspars, hornblende and pyroxene. It was first studied in the Andes mountains, South America, whence the name. Andesine is an essential constituent of andesite and is a lime-soda feldspar. In composition, it is between oligoclase and labradorite. Andesite has a limited amount of glass base, with a ground mass of minute crystals of plagioclase, hornblende, biotite and augite, sometimes rhombic pyroxene (eustatite or hypersthene). Quartz is sometimes present, and, if as phenocrysts (crystals visible without being magnified), the rock is called dacite. Usually phenocrysts of andesite are of plagioclase (andesine) and any or all of the other constituents mentioned.

LARGE working shafts are located in various positions with reference to the strike and dip of the rocks through which they must pass. Some engineers prefer the shaft

to have its longer axis parallel with the strike of the rocks. Others consider it more economical to locate directly across the strike, and still others believe it an advantage to set the shaft diagonally across the formation. If the conditions encountered were constant there might be some advantage in one of these several ideas, but as the hardness and other physical conditions found in sinking are subject to frequent changes, it is doubtful if any one method has a very decided advantage over either of the others.

IN the case of a mining partnership, the copartners owe to each other the same degree of fidelity, good faith and fair dealing as is exacted from ordinary partners, and one of the partners may not carry on the business in any way detrimental to the interests of his partners, or acquire for his own benefit property which rightfully belongs to the partnership (Kimberly vs. Arms, 129 U. S., 512), but so far as the disposal of his own interest in the property, or the purchase of another's interest, where the partnership agreement does not extend to the selling of the property, but only to its development and operation, neither of the partners is under legal obligation to consult with the others. One may sell his interest to a stranger, who thereby becomes a partner, whether the other partners be willing or not.

QUARTZITE often carries values in lead, iron, copper, zinc, etc., as well as gold and silver. Ore bodies occurring in quartzite are usually in the form of infiltrations, rather than as replacements of the original material by ore, by what is known as metasomatic replacement. If a clean quartz sand be infiltrated with a solution of lead, and the lead be deposited in the interstitial spaces as lead sulphide (galena), a cubic foot of such ore would contain about 100 pounds of quartz and 200 pounds of lead sulphide, or about 63% lead, the remainder being sulphur. It is possible to conceive of a richer lead ore than this in sand rock (quartzite) by assuming that a portion of the grains consisted of some soluble material, such as calcite or granules of limestone, and that these had to be replaced by lead sulphide by metasomatism.

BROMINE occurs in nature associated with chlorine, the latter being usually found associated with sodium (for which it has a great affinity), as sodium chloride or common salt. Bromine occurs as sodium bromide or as magnesium bromide in some rock salt beds. It also is found in some artesian salt wells. The principal source of bromine is the mother liquors at salt works. When the two salts, sodium chloride and sodium bromide, are together in solution, by evaporation the solution becomes saturated and sodium chloride is first deposited. Then the mother liquor is drawn off and the bromine with some chlorine is deposited. Bromine is separated from the sodium in the same manner that chlorine is liberated from the salt by treating it with sulphuric acid. Manganese dioxide is usually mixed with the salt before treatment with the acid. The sodium and manganese form sulphates liberating water and bromine—hydrobromic acid. Bromine dissolves in water in the ratio of 1 to 33.3 at 15° C.

A TIMBER-CUTTING ACT was passed June 3, 1878, which provides that citizens of the United States may cut and remove timber from mineral lands for mining purposes. The Act applies to the States of Colorado, Nevada, Montana, Idaho, Wyoming, North Dakota, South Dakota and Utah, and the Territories of New Mexico and Arizona. Following is an abstract of Land Office regulations concerning this Act: "The land from which timber may be felled or removed under the provisions of this Act must be known to be strictly mineral in character. \* \* \* Those cutting and removing the timber must be prepared to prove that the land from which the timber is taken is mineral within the meaning of the Act. \* \* \* The use of the timber is limited to 'building, agricultural, mining or other domestic use. None for smelting purposes. \* \* \* No such timber may be removed for sale or traffic, or to manufacture into lumber for merchandising purposes. No timber so cut may be transported out of the State or Territory where procured. \* \* \* No growing trees of any kind whatsoever less than 8 inches in diameter are permitted to be cut. \* \* \* All of each tree cut must be utilized as far as possible, that there may be no waste." On March 3, 1891, an Act was passed, which was amended July 1, 1898, which permits the cutting of timber on the unreserved public non-mineral lands, under permit of the Secretary of the Interior, for mining and domestic purposes. With the exception of Wyoming, Idaho and Montana, timber so cut must be utilized in the State where it is cut. This cutting of timber, it will be understood, is merely a privilege, and not a right, and this privilege may be enjoyed by a large class of people, miners and others, on both the mineral and non-mineral unclaimed lands. It is not confined to locators or even owners of mineral lands. In the case of cutting timber on claims located on what is alleged by the owners to be mineral land, but which is disputed by others to be of such mineral character, the party adverse to the claim locator must be able to prove that the land is valueless for mineral—a thing sometimes difficult to do in a mineral country, as the courts are very lenient as to what is mineral. And if a locator is willing to do the assessment work required by law on an unprofitable mineral claim, he can probably hold it against all comers and remove the timber.



## Mining in Oregon.

Written for the MINING AND SCIENTIFIC PRESS by H. B. KEADING.

The lower Rogue River valley of Oregon may be taken as that portion of it lying between the mouth of Mule creek and the Pacific ocean; here the river passes between high mountains through what is more a canyon or gorge than a valley, to within 10 miles of its mouth, where it widens a little and presents more the appearance of a valley, with some ranch land. This lower valley lies entirely in the county of Curry, in the State of Oregon, and is about 60 miles long; the country is too mountainous, and taxpayers too few to support a county road, and the entire distance, with the exception of 5 miles at the mouth of the river, must be passed over by means of a very poor and dangerous trail; this necessitates the packing of all machinery and supplies on mule back, except at certain times of the year when boats can be worked up the river. The river is swift and deep, with numerous rapids and stretches of "white water," but is navigable for canoes under an experienced hand for about 40 miles, except at lowest water in the fall.

Deer, grouse, salmon and trout abound; the mountains are covered with dense growths of red, yellow and white fir, some yellow pine, white cedar and sugar pine, and a little spruce. The undergrowth is dense and, in places, impenetrable; the ground is moist, and covered with ferns the year around, and water is abundant, every ravine running with plenty of good water.

Evidences of copper deposits are to be found, but, as yet, nothing permanent has been discovered. Thirty miles from the mouth of the Rogue river the Illinois river empties into the Rogue, and in the country drained by the Illinois are to be found several superficial deposits of carbonate of copper ores, and also some metallic copper. This region is also crossed by the contact between the slates and granitic rocks, with occasional intrusive dikes of rhyolite, and in places on this contact true gossan occurs in deposits of considerable size, but no work has been done on these deeper than 50 feet and at that depth no copper was found.

Several small, and occasionally rich, seams of gold-bearing quartz have been opened on the Rogue river, which are found to occur in the granitic rocks, no veins having yet been discovered on the slate-granite contact. As yet none of these quartz veins have been shown, on development, to have permanency. On the headwaters of Mule creek some local people have been following a promising vein, and encountered some very good ore, and they are starting to install a 5-stamp mill, but on endeavoring to cut the ledge at a depth of 200 feet they failed to find it, and it now seems probable that it was merely a lens of ore in the granite.

Just above what is called Big Bend are what are known as the "Mule Mountain" mines, owned by Portland men, and now under the management of E. B. Burns. These comprise twenty or more claims, and on one of the claims there was a small lens of high-grade ore, which was extracted and shipped, but the lens was small and the supply soon exhausted. This company, however, is pushing development work, in the hope of finding something, and has a 3-stamp mill strewn along the river in various stages of transportation from the mouth, and hope to have the same in operation by next fall.

These two properties are the only ones in this region that have had any work done on them, and as far as the outlook at present is concerned, there is evidently nothing to be expected from these small seams in the granitic rocks; but should veins be discovered on the slate-granite contact they should prove more permanent.

The region, however, abounds in deposits of auriferous gravels. From Mule creek to the mouth of the Rogue river is a succession of gravel bars, and portions of the old channel that show up well. Several of these have been worked by hand with rocker and sluice, and have yielded well; one was worked by hydraulic some time ago, and gave a good yield in bullion, although inexperienced management caused so much needless expenditure that the net profit was small. One mile below the Big Bend is the claim known as the Gold Bar mine, owned by parties living in southern Oregon. These people have been at work for six or seven months ditching and fluming, and hope to begin operations this fall; they are the only ones operating at the present time.

Between the Big Bend and Mule creek is what is known as Paradise bar, and on this is located the Royal Flush mine; this comprises about 110 acres of the old channel, and while no work has been done on the claim except the cutting of two ditches, the outer rim appears to be intact, and this mine is as promising as any in the region. On all of these bars the gold is fairly coarse—"cucumber seed gold"—and while naturally the bulk of the mineral is on the bedrock, colors can always be found in the top dirt. The volume and considerable fall of the Rogue river, as well as the abundant water available in the creeks, timber, etc., make this region one in which hydraulic mining can be carried on under most favorable conditions.

All the ocean beaches, from Bandon to Crescent

City, are rich in gold, platinum and iridosmine, which is present with the black sand; many of these beaches are being worked in winter with sluice, and pay well, despite the fact that much of the precious metal is lost by crude methods. There is little water to be had for beach mining and extensive operations would necessitate a pumping plant taking the water from the surf.

## The Mother Lode in Tuolumne County, California.\*

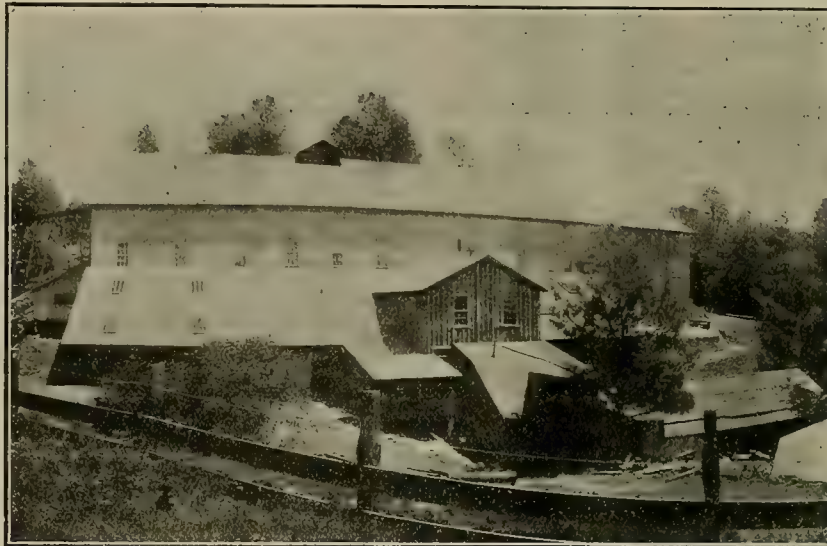
NUMBER V.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

Southward from Quartz mountain the large ankerite lode disappears for an interval of several hundred feet, as it does north of the Dutch mine, where, as previously explained, the lode is not in evidence for about half a mile. The next appearance of the great vein southward from the Santa Ysabel property is on Golden Rule hill, half a mile south of the town of

going southward extending through the New Era claim and into the Jumper. The Golden Rule, New Era and Jumper are all owned by the Jumper company. (See accompanying illustrations).

In the Jumper mine proper the diabase dike is much larger than in the Golden Rule claim, but the general geological conditions are much the same. The superintendent of the Jumper, M. B. Kerr, states that recent developments in the Jumper mine have shown that the calcite seams occurring in the dike, and in the amphibolite schist (forming what are known to pocket miners as "crossings"), have in this mine a definite strike and dip, and that the occurrence of the calcite seams are responsible for the coarse gold deposition characteristic of the mine. The general strike of the lode in the Jumper is nearly N.-S., and these calcite seams strike N.W.-S.E. across the ore body, the seams becoming small and indistinct as the hanging and foot walls are reached. Usually the dip of these seams is 45° to the northward, but occasionally a series of seams is found dipping to the southward. This has encouraged the Jumper company to undertake new explorations in both the north and south series of veinlets in search



Jumper 100-Stamp Mill, Stent, Tuolumne County, Cal.



Jumper Mine, Stent, Tuolumne County, Cal.

Stent. Here it forms another of the ridges characteristic of its course. The foot wall of the main lode is diorite, which is separated from the lode for some distance by a serpentine intrusion which in places is 100 feet wide. A heavy gouge marks the line of separation of the serpentine from the ankerite. The ankerite is soft and much altered and contains abundant mariposite. The large ankerite mass is divided by a dike of diorite similar to the diorite of the west wall. The eastern zone of ankerite is similar to that of the western portion. Large quartz lenses occur in the ankerite, and also gold and auriferous pyrite, but the principal ore-bearing zone is found east of the ankerite in amphibolite schist. This zone of schist is silicified, and in it are veinlets of quartz and calcite, often rich in gold. Along the foot wall of this zone is usually found a narrow vein of quartz and calcite with a small gouge—evidence of movement—and this vein is frequently rich in coarse gold. A dike of diabase has been intruded into this zone also. Often the dike contains a reticulated mass of quartz and calcite veinlets, and when this occurs the dike is treated as ore. These conditions prevail

\* See illustration on front page.

of additional enrichments. Although the Jumper mine has been generally considered a pocket mine, still it has produced a large amount of milling ore, though the greater part of the value is from coarse gold found under the peculiar and interesting geological conditions above mentioned.

This occurrence of gold in connection with seams of calcite which diagonally traverse the lode resembles somewhat an occurrence near Colorado, in Mariposa county, about 7 miles northeast of the town of Mariposa. Here a dike of granulate, or aplite, much altered, and lying between clay slate walls, is traversed by small veins of quartz, much the same as the calcite veins at the Jumper, extending from wall to wall and dipping with more or less regularity. These seams occur at vertical intervals of about 2 feet. The gold is coarse and is found on one wall or the other, where intersected by the quartz seams, and seldom elsewhere in the vein.

Southward from the Jumper mine the next property is the Mazeppa. (See illustration front page). There are three distinct zones of mineralization in the Mazeppa mine, all in the amphibolite schist, and on each of which more or less development work has



been done, and in the main workings considerable gold has been found, chiefly in the form of pockets. The geological conditions, however, are different from those at the Jumper group. There still remains a large amount of ground to be explored at the Mazeppa. The ankerite vein is not in evidence on the surface in this property as far as known to the writer.

(TO BE CONTINUED.)

### Flumes and Their Construction.\*

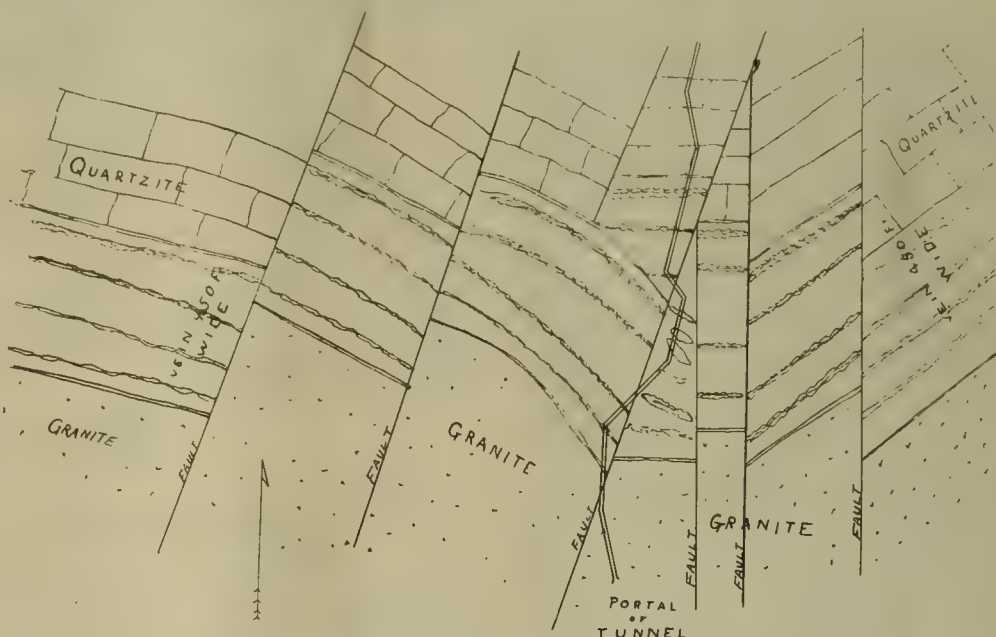
There is nothing so essential to the operation of mining property as water. In fact, without it there are only a few mines that could exist at all, and even these—high-grade shipping mines—must have a domestic supply. The next most important matter is the conveying of water from its bed in the bottom of a canyon to a point where it can be utilized to advantage at the mine, mill or smelter. The largest consumers of water are hydraulic mines. These employ from 750 to 7500 cubic feet of water per minute, and sometimes more, according to the magnitude of operations. The next largest consumer of water per ton of material treated is a concentrating mill; but mills and reduction works of every kind must have water for metallurgical operations, and mines and mills frequently employ water under pressure as a means of motive power, either directly applied or

line, or the topography of the country, which latter condition nothing could better illustrate than the engraving on the front page, for which we are indebted to the courtesy of the Sunset Magazine. It illustrates one of the most noted flume constructions in the world, and shows how a serious obstacle to the construction of a large canal was ingeniously overcome by W. H. Bellows, who constructed it for the Miocene Mining Co. in Butte county, Cal. The water had been conveyed in a ditch for several miles, and, turning around the side of a mountain, the line was run several hundred feet up the canyon, where it

hand a mine systematically developed with large reserves of payable ore is the surest and withal the most satisfactory investment one can make, and this is coming to be appreciated more and more.

### The Need of Geological Knowledge.

TO THE EDITOR:—I send you a sketch of a badly faulted copper vein showing the results of "going it blind" in mining. Here is a large contact vein 450 feet wide and visible along the surface for a number



Series of Block Faults Dislocating Copper Vein.

came up to a perpendicular cliff of andesite. A flume was built, nearly 100 feet high, when this mode of construction was abandoned for what is known as the "bracket flume." To construct this, men were lowered in slings over 200 feet from the top of the cliff to the flume level (118 feet above the foot of the cliff), and along this level holes were drilled into the volcanic rock. Into these holes the ends of brackets, made of 30-pound railroad iron bent in the shape of the letter L, were inserted. The longer arm—10 feet in length—was placed horizontally and secured in the drill hole, the other end turning upward. Upon this line of brackets, 8 feet apart, the flume was built. The upright end, 2 feet high, was provided with an eye, into which was inserted a hook at the end of an iron rod, the upper end of which was soldered into holes drilled into the cliff above the level of the flume. The flume is 4 feet wide, 3 feet deep, and has a carrying capacity of 2000 cubic feet per minute. On this same ditch line is one flume over 1000 feet long and 80 feet high, and another flume was built 136 feet high, which is unusually high for a flume of such large capacity.

The accompanying sketches (Figs. 1 and 2) show the usual methods of flume construction under the varying conditions usually met with in the mountains. The bases are usually built on sills of timber and in some instances on blocks of masonry or concrete. Where the rocks are rough, and neither ditch nor tunnel work is advisable, the flume is built as shown in Fig. 2, or some modification of it. There is always more or less latitude allowable in a construction of this character. Where the flumes become very high, the understructure must be built with great care, and much extra bracing must be provided, as the flume must not only be strong enough to carry the weight of lumber and water, but must be able to withstand the severe stresses due to heavy winds.

Two flumes of the same dimensions may have greatly differing carrying capacity, due to their respective grade. Some of the California power flumes are of large size. An illustration on the front page is that of the Melones Co., near Robinsons, Calaveras county, Cal., which carries 6000 miners' inches (about 4000 cubic feet) per minute, built at a grade of  $\frac{1}{8}$  inch per 16 feet—about 35 feet per mile. A. J. Bowie gives as the cost of construction of the Milton ditch in California—flume 28,056 feet long: Cost of excavation, 67 cents per linear foot; cost of lumber, labor, etc., \$2.12 per foot; total cost, \$2.79 per running foot. This flume was built on the plan indicated in Fig. 2. The grades of various large flumes and ditches in California are said by Bowie to be from 4 feet to as much as 32 feet per mile. Heavier grades admit of smaller excavations or flumes. The Milton ditch grade varies from 16 to 32 feet per mile, and carries 3000 miners' inches. The ditch was built 7.65 feet on top, 4 feet bottom, and  $3\frac{1}{2}$  feet deep.

AN undeveloped mining property, no matter how promising, always involves an element of uncertainty and speculation, and there are many who prefer this kind of an investment, but on the other

of miles. The vein matter is diorite and mica schist containing a number of quartz ledges from 1 to 30 feet wide, carrying chalcopyrite of low grade. The ore was evidently deposited in the ledges before the faulting occurred and was consequently very badly broken up for perhaps 50 feet each side of the faults. The foot wall is red granite and the hanging wall a hard, white quartzite. The surface is entirely barren of vegetation, so the formation and faults were easily traced. The original locators put down a number of holes from 20 to 60 feet on the surface outcrop, then decided to run a crosscut tunnel from the base of the hill. After accomplishing about 1000 feet of tunnel, with no good results, they sold to a company who drove the tunnel to a point about 1700 feet from the portal with very little success in finding ore of any value or quantity, having followed so closely the worst fault fissure in the whole system. There is a reasonable probability that if the tunnel had been run on the original line as started, much better ore bodies would have been found. There was a 50-ton concentrator, boarding and bunk houses, shops and stables, and including development and surface improvements, an outlay of about \$75,000. The property has been idle for three years, lacking funds, but in all probability if the work had been directed by a competent superintendent, much better results would have been obtained.

PH. REARDEN.

### Explosion of a Powder Thawer.

TO THE EDITOR:—The article on powder thawing in your issue of October 8th is interesting for the facts presented, but I may be permitted to say that it is dangerous for the advice it gives. No dynamite thawer should ever under any circumstances have direct heat from a candle, stove or hot coals, applied to it while the dynamite is in the thawer. The number of accidents from failure to observe the rule are exceedingly numerous, usually reaching about fifty in England annually (where exact statistics are kept), and exceeding that number in the United States, according to private records, which are necessarily incomplete.

Dynamite is liable to leak nitroglycerine during the process of thawing, if the dynamite is old stock, or has been damp, causing efflorescence of the contained sodium nitrate. Consequently the thawer gradually accumulates nitroglycerine in the tubes, or in the inner bucket, if the gluepot type of thawer is used, causing great danger of accidental explosions. Thawers should be regularly and thoroughly washed every day with a warm strong solution of sodium carbonate (sal soda), which destroys the nitroglycerine.

Thawers should be of large size, the water-containing portion especially being of ample size to hold enough hot water to thaw the entire batch of cartridges. This means that the thawer should be much larger than those commonly offered for sale. Thawing in front of stoves, or over open fires, is exceedingly perilous. Only the remarkable skill and scrupulous honesty of explosive manufacturers in making explosives of the purest chemicals, and with the most careful attention to the details of manufacture, save

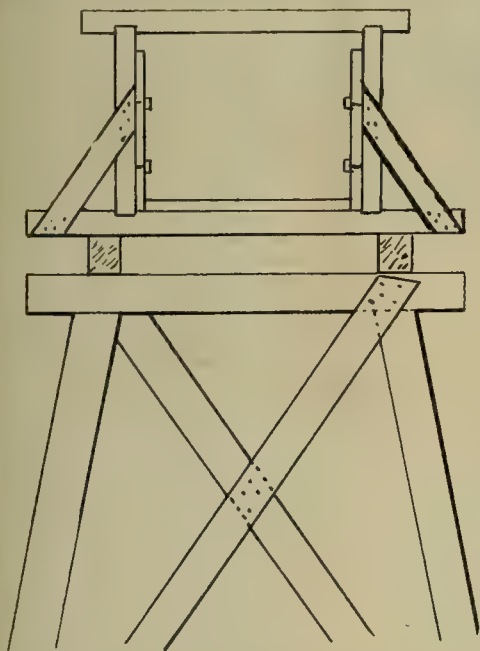


FIG. 1.

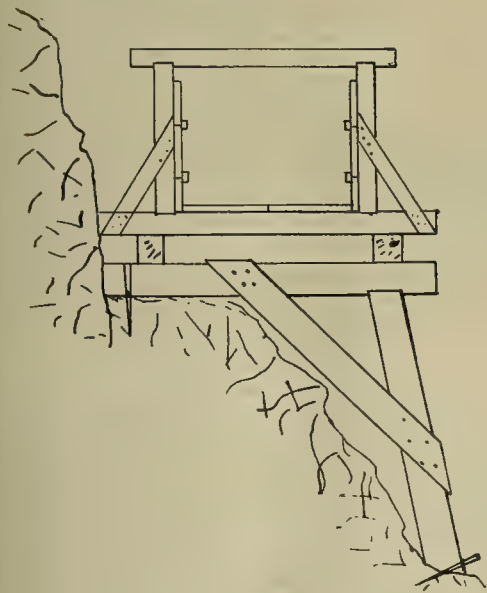


FIG. 2.

indirectly through the medium of electricity. To bring the water from the canyon bed to a point several hundred feet higher than the mine works or mill requires usually several miles of conduit of some sort. The cheapest method of conveying water is by means of a ditch excavated along the mountain side, in earth or rock, but at times there are found conditions which make a ditch more expensive than some other means of conveyance, such as a flume or pipe line, owing to the hardness of the rock on the ditch

\*See illustrations on front page.



the majority of dynamite users from paying with their lives for their reckless disregard of ordinary precautions in the handling of powders.

A MINING ENGINEER.

## Crushing in Cyanide Solution as Carried on in the Black Hills, S. D.\*

NUMBER V.

Written by C. H. FULTON.

The method of filling formerly employed at the first wet crushing plants of the Hills, the Portland and the Dakota mills, was the indirect method, settling boxes with two compartments being used, these compartments alternately discharging their contents into the sand vats below, where the charges were raked over and leveled off. At the Dakota mill double treatment of the sands was also resorted to, but discarded as unnecessary after a year's trial. The settling boxes were found to be such inefficient classifiers that the cone system described was evolved and the sands charged at some of the mills, by distributors into the sand vats filled with solution. All of the plants, however, soon adopted the method of "dry filling" described as more satisfactory.

The general method of the treatment of the sands is the same at all of the mills, although the amount of solutions and the time of treatment varies. The treatment of the sands is determined as far as extraction will permit by the problem of handling the mill solutions, which in a plant of the type under discussion is quite complex as might be expected.

The following table shows some of the details of sand treatment:

NAME OF MILL.	Capacity of Tank, Tons.	Amount of Solution While Filling, Tons.	Amount of Battery Solution, Tons.	Amount of Battery Solution, Tons.	Amount of Wash Water, Tons.	Total Time, Days.
Maitland..	140	700	900	450	15	16
Dakota.....	115	.....	86	63	20	5
Horseshoe..	350	400	.....	.....	.....	8

Solutions are leaching through the sands continually, there being no "contact" or solution standing on the ore as in dry crushing mills. There is also no strong solution properly so called, although the battery solution and the barren solution differ slightly in strength, in some mills the barren solution being the stronger, while in others the battery solution is the stronger. At the Maitland mill the battery solution carries 1.20 to 1.30 pounds of cyanide per ton, and the barren solution 1.50 to 1.60 pounds per ton. At the Horseshoe mill the battery solution carries 1.4 pound of cyanide per ton and the barren solution is somewhat stronger, though of indefinite strength. At the Horseshoe mill the overflow solution from the slimes vats, while these are filling, is standardized in a sump tank up to three to four pounds of cyanide and then run through the sands. At the Dakota mill the battery solution contains 2.2 pounds of cyanide per ton and barren solution two pounds per ton. At the Lundborg, Dorr & Wilson mill, the battery solution contains two pounds of cyanide per ton, and at the Hidden Fortune mill it contains 1.3 pound per ton. The amount of wash water varies but little at the different mills, amounting to 0.1 to 0.2 ton per ton of sand. Little wash water is required, as the cyanide solutions are all weak and such large amounts of solution are passed through the sands in most of the mills. The deficit of solutions in the mills is made up mainly from wash water added in the slimes treatment.

The following figures show the result on sands obtained at the Dakota mill, over a period of 5.50 months: The average value of the ore was \$4.75 per ton. The sand tailings averaged \$1.22 per ton. This gives an extraction of 74.25% on the sands. The moisture going out with the sand tailings had a value of 40 cents per ton. During May, 1904, the average value of the ore was \$4.55 per ton. The average value of the sand heads as charged into the vats was \$2.60 per ton, the average value of the sand tails unwashed was \$1.06 per ton, giving an extraction of 76.7% on the sands. Comparing the original value of the ore, the sand heads and the sand tails, it is evident that 42.8% of the extraction takes place in the batteries and cones and 33.9% during the sand treatment proper.

At the Hidden Fortune mill the extraction on the sands averages 75%. For the extraction on the slimes and the total extraction reference is made to the figures given under slimes treatment.

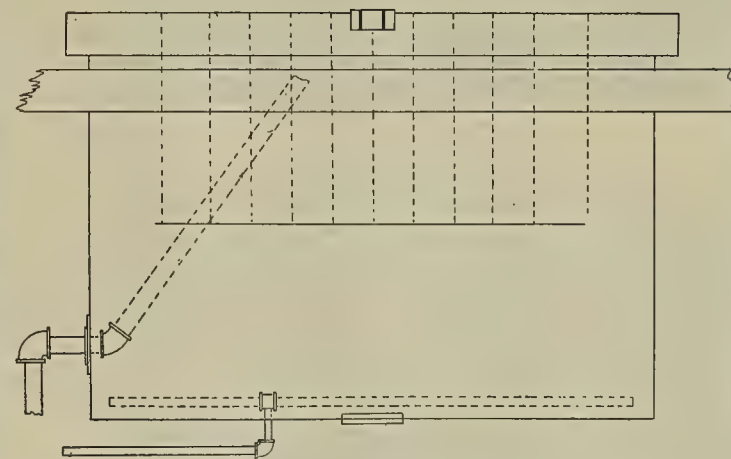
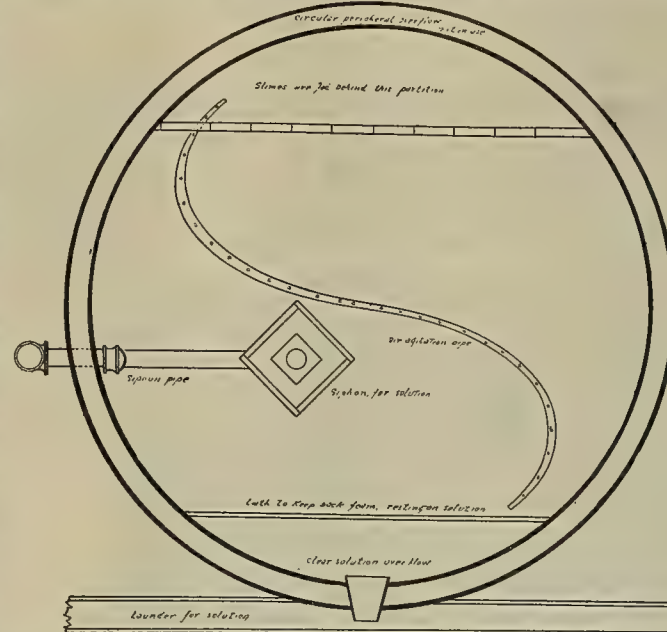
THE TREATMENT OF THE SLIMES BY AGITATION AND DECONTANTION.—There are two systems of slimes treatment practiced in the Hills.

1. That in which the treatment of the slimes is completed in the vat into which they are originally charged, and in which most of the agitation is performed by compressed air.

2. That in which the slimes are successively trans-

ferred from one vat to another, there being generally three to four transfers before the slimes are discharged. The agitation in this case is done by means of centrifugal pumps.

The first method is practiced at the Horseshoe mill as follows: There are sixteen slimes tanks, 14 feet in diameter and 10 feet deep, and two 30 feet diameter and 16 feet deep. The arrangement of a slimes tank is shown in the accompanying figure. A partition curtain runs down to nearly the bottom at one side of the tank behind which the slimes are charged as they come from the cones. Before charg-



Slimes Vat and Accessories.

ing slimes the vat is filled with barren solution, then the slimes are run in, the surplus solution running off clear at the lip, any foam being held back by a strip of wood or lath resting on the surface of the solution. Four to six pounds of lime are added per ton of ore at the batteries for the coagulation of the slimes, this being the only addition of lime made in the mill. The addition of lime must be somewhat nicely adjusted, as too little lime fails to coagulate the slimes readily and too much gives trouble in the precipitation of the values later on. The slimes settle rapidly and the solution usually runs off clear at the lip until the slimes have accumulated to the extent of about 50 inches, equivalent to about twenty-five to thirty tons of dry slimes. When the solution at the lip becomes cloudy the slimes charge is turned into the next tank and the slimes in the tank just filled are permitted to settle. This settling takes about ten hours. While the slimes are settling the supernatant solution is decanted off by means of a decanting device, which is a simple wooden frame with a pipe at the center, which is connected with a take-off pipe about 18 inches from the bottom of the vat. (See lower sketch). It is important to permit the slimes to settle as low as they possibly can and to decant as closely as possible without taking any of the muddy solution. The object of the slimes treatment in the main is to remove by successive dilutions the dissolved values, so that it is evident, unless the decantation is as close as possible each time, it partly fails in its object. The solution can usually be decanted within an inch of the settled slimes. When the decantation is complete a wash of barren solution is added, amounting generally to forty tons, and during the addition of this charge is agitated by compressed air at forty pounds pressure per square inch. The air is introduced on the bottom of the vat through two S shaped pipes crossing each other, and having

0.12 inch perforations. The only agitation the slimes receive is that obtained by the air. The agitation by air alone is a weak point, in that it fails to move all of the material, especially the heavier portion of the slimes and the fine sands at the bottom of the vat. For that reason on discharging a vat it is not sluiced out, but what slimes will run out by the bottom gates are let go, and the heavy thick slimes remaining, amounting to two to four tons per charge, form again a portion of the next charge, thus getting two treatments. Each charge of slimes gets four to six washes with barren solution and one wash

with water, each wash amounting to forty tons. This gives 6.5 tons of barren solution and 1 to 1.6 tons of wash water for each ton of dry slimes treated.

The slimes as discharged contain very close to 50% moisture. From ore averaging \$8 to \$9 per ton dried slimes tailings average \$1.75 per ton, 30% to 40% of which still existed as gold in solution. This gives the washed slimes tailings a value of \$1.24 per ton and the solution discharged as moisture, a value of 50 cents per ton.

In the treatment of slimes by successive dilutions for the extraction of the values where, in the total treatment a definite amount of solution is used per ton of dry slimes, it is theoretically required in order to get the maximum extraction, to use the amount of solution in a comparatively large number of dilutions of small amount each time, rather than a few dilutions of large amount each time. Thus, in treating a ton of slimes with six tons of solution, it is theoretically better to give six dilutions of one ton each, rather than two dilutions of three tons each. If any one dilution is larger than the other it should, of course, be applied when the slimes are highest in value. It must be borne in mind, however, that in the slimes treatment there is a solution of values constantly going on during the treatment, so that while the solution is being reduced in value by dilution it is constantly being augmented by the solution of new values, so that the solution finally discharged as moisture with the slimes tails will never be as low in value as the dilution calls for. Since the cost of applying a dilution of definite quantity to the slimes is the same, no matter what the value extracted by the dilution is, it will be seen that the economic limit is soon reached where further dilution will not pay. Few of the mills can afford to apply more than four

to five dilutions profitably. It must also be borne in mind that with an increased number of dilutions the amount of solutions to be handled in the mill will increase. As it is, at present the mill handles a great quantity of solution per day. The application of an extra water wash to the slimes would, however, not be so objectionable if the decantations from the last wash were run to waste through a large zinc box in which the poorer grade of shavings and the dust from the lathe could be utilized. The saving made in this way would probably be appreciable.

(TO BE CONTINUED.)

THE White Knob Copper Co., of Mackay, Idaho, furnishes another object lesson in too hasty equipment with reduction plant of an undeveloped property. The smelter has a capacity of 600 tons of ore daily. This the mine supplied for a time, but it was unable to keep up with the demand, and the property has now passed into the hands of a receiver who will continue to operate the mine, first doing the necessary development work to insure a supply of ore. The smelters have been run spasmodically since 1902, blowing in and blowing out repeatedly.

A REMARKABLE discovery of tin is reported at Port Darwin, Australia, said to be owned by two half-caste Chinamen. The tin had been found some distance from Port Darwin, and the field promises to be rich. A steamer lately took from Port Darwin sixty tons of tin ore, consigned to Sydney, which was said to be 75% pure tin, and is worth about £80 per ton. It is stated that the whole of this tin had been taken from an area of ground not covering more than 25 yards, which has been worked to a depth of 4 feet. This open out-work is below an outcrop of quartz, thickly studded with tin ore.



## Geology of the Treadwell Ore Deposits, Douglas Island, Alaska.\*

NUMBER III.

Written by ARTHUR C. SPENCER.

**NATURE AND DATE OF VEINS.**—The instances of veining and the sulphide deposits which have been cursorily noted indicate that the region in which the Treadwell mines are situated is one of the very generally distributed mineralization. Most of the occurrences of metallic sulphides which carry gold or silver, or both, are in veins largely composed of quartz, or in limited impregnations of the country rock adjacent to such fillings. All the deposits thus far productive throughout the whole belt are of this nature, and the more detailed descriptions which follow will show the Treadwell ores are closely related to the same type. The gold quartz veins are regarded as of essentially contemporaneous origin throughout, because in general the pre-mineral fractures are nearly all referable to two or three simple, but extensive, systems of fractures, and detailed examinations have not furnished evidence of more than one period of vein deposition, such as reopening of fissures or faulting of veins by distinctly later fillings.

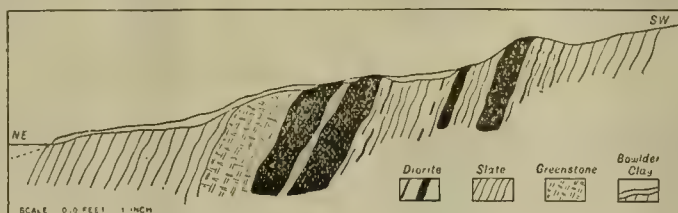


Fig. 5—Cross Section Through Alaska-Treadwell Mine, Douglas Island.

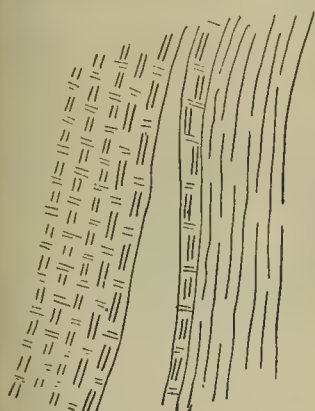


Fig. 7—Ore Dike in 700-Foot Mine.



Fig. 8—Mineralized Diorite in Treadwell Mine.



Fig. 6.

The only other type of metallic impregnation which has been recognized is exemplified in the altered and mineralized masses of greenstone on the outer side of Douglas island. Here the mineralization is regarded as mainly due to hydrothermal action, involving addition of materials, rather than to dynamic metamorphism bringing about a concentration of materials already present in the rocks.

The occurrence of segregated veinlets in the otherwise thoroughly impregnated rock requires either a period of migration and reconcentration, following that of first deposition, or a second distinct period of mineralization. Known data do not permit a close correlation of either of these features with the widely distributed metalliferous quartz veins of the region, though on the face of things the original mineralization is more likely to correspond than the secondary veining.

Without presenting the necessarily extended chain of circumstantial evidence involved in our present knowledge of the geological date of the gold veins in southeastern Alaska, it may be stated that they are later than the great diorite intrusions now regarded as younger than the middle Jurassic. They therefore correspond, in a general way, with the similar gold and silver veins occurring throughout the Sierra Nevada mountains of California and the geologically similar regions in Oregon, Washington and British Columbia. Their deposition is referred to a period of active water circulation more or less directly consequent upon the invasion of the dioritic rocks occurring in the Coast range and outlying intrusions.

**GEOLOGY OF TREADWELL DEPOSIT.**—The Treadwell ore bodies consist mainly of mineralized albite-diorite, occurring in the form of intrusive dikes in black slates, the structure of which they closely follow. These slates are metamorphosed shales in which both original bedding and slaty structure strike northwest and southeast, and dip about 50° on the average toward the northeast (Fig. 5). The ore-bearing dikes belong to a series of intrusions which appear interruptedly along the strike for a distance of about 3 miles, in a zone approximately 3000 feet wide. In the greater part of the intruded area ex-

posures are few, and only small dikes outcrop on the side toward the center of the island. On this side the zone seems to be irregularly limited, but next to the shore of Gastineau channel the border is defined by a heavy bed of greenstone running parallel with the slates and the intrusive dikes, and dipping with them toward the adjacent channel. The mineralized dikes which constitute the known minable ore occur just beneath this greenstone, which thus constitutes the hanging wall both of the intrusion zone and of the ore bodies. Many of the dikes of albite-diorite away from the hanging wall have been greatly altered and impregnated with pyrite, but the workable ore bodies have not yet been discovered in them.

The strike of the different rocks is regular in the main, and, being slightly oblique to the channel, the outcrops of the ore bodies recede from the shore toward the northwest (Fig. 6). The base of the greenstone hanging wall strikes the shore of the island about 1 mile below the Ready Bullion mine, at first running inland, and then back to a point below high water just beyond where the southernmost body of diorite is exposed in the open pits of the Ready Bullion mine. Reappearing within a few hundred feet, it bends sharply and is next exposed in the southeast pits of the Mexican mine. From this point it is traceable in a nearly straight line through the Seven Hundred Foot and Treadwell workings, and

tion and structure. In the vicinity of the Ready Bullion mine the rock is granular, consisting mainly of coarsely crystallized hornblende, though it contains a great deal of magnetite and some pyrite. A specimen from the Mexican workings, which might be called andesite, contains porphyritic crystals of plagioclase and augite in a decomposed ground mass, which seems to have consisted largely of small prismatic feldspar crystals. The secondary minerals are chlorite, epidote, serpentine and calcite. Beyond the workings toward the northwest the greenstone is a fine-grained diabase.

The greenstone was called gabbro by Becker, who regarded it as later than the rock of the ore bodies, but there is now sufficient evidence to establish the opposite age relation, and reasons exist for doubting its intrusive nature. The inclusions of light-colored rock fragments in the greenstone, which form the basis of Becker's conclusions, are represented in his collection by a specimen and a thin section, showing a distinctly outlined fragment of grayish granitoid rock enclosed in greenstone; but the diagnostic value of this occurrence is open to doubt, since at several points in the region pebbles and fragments of similar mineral occur in the volcanic greenstone breccias at different horizons in the series of interbedded slates and greenstones, showing the existence of an available source of granitoid prior to the deposition of the slates and the outpouring of the contemporaneous lavas.

In the open pits of the Seven Hundred Foot and Mexican mines the exposed lower part of the greenstone bed is very schistose, and this slaty rock forms both walls of the ore body. Between the ore and the black slate usually forming the foot wall there is a plate or layer of chloritic schist of somewhat variable thickness, evidently identical with the schistose or slaty greenstone of the immediate hanging wall,

for a distance of several miles beyond.

In the vicinity of the mines there are no dikes of diorite on the channel side of the greenstone, but about 1 mile to the northwest two croppings have been noted, and Juneau island, in Gastineau channel about 2000 feet from the foot wall, is composed of similar rock, which is somewhat impregnated with pyrite.

Besides the mineralization of the igneous dikes, the black slates of the same general belt on both sides of the greenstone band contained occasional veins and systems of quartz stringers following the structure. Veining of this sort has been particularly noted along the foot wall of the Treadwell greenstone for a distance of several miles beyond the mines. Assays of about \$6 per ton in value have been obtained in some places, but there has been no systematic attempt to develop these stringer leads, and their value is doubtful.

The rocks occurring in and near the mines, which will now be described in greater detail, are the following: The greenstone hanging wall; the slate country, enclosing both greenstone and ore bodies; the dikes and lenticular masses of diorite, some of which constitute the ore; and a few small dikes of basalt.

**THE GREENSTONE.**—The hanging wall greenstone forms a prominent bed or stratum about 300 feet in thickness where measured in the mines, but varying somewhat from this figure in different parts of its outcrop. So far as can be determined, it follows the structure of the slates, striking with them from southeast to northwest, then dipping northeast toward the near-by channel, beneath which it has been followed to a depth of 900 feet in the lowest workings. The outcrop is practically continuous for 4 miles northward from where the greenstone first appears on the shore of Douglas island. Then the bed thins out and is wanting for a few hundred feet, but it soon reappears and may be followed for an additional 2 miles, until it is lost beneath a heavy covering of vegetation.

As a rule, the rock is greatly altered, and in places it is even schistose or slaty, but portions are sufficiently unchanged to indicate the original composi-

and the latter grades off into the massive rock (Fig. 7). This relation suggests that the locally developed schistosity of the greenstone existed before the intrusion of the diorite dikes, or was produced at the time of their invasion, and in either case the greenstone must be the older rock. More definite evidence in the same direction was noted in an old stope above the 220-foot level in the Treadwell mine. Here the main mass of diorite lies below all of the greenstone, but the latter is somewhat schistose, and a narrow offshoot from the diorite cuts across this secondary structure for a distance of about 3 feet, and then follows the schistosity parallel with the wall of the large ore body (Fig. 8).

(TO BE CONTINUED.)

## THE PROSPECTOR.

The prospector should make himself acquainted with the laws relative to mineral lands, and the manner of acquiring them by location. The laws are plain and need only be followed carefully to avoid litigation. The locator should always bear in mind the fact that his claim, when first located, has only speculative, if any, value, and that mines are made, not found. It is advisable, therefore, to follow closely the requirements of the statutes in order to protect a claim which may become very valuable upon development. It is then his troubles will begin unless he has complied absolutely with the law.

The mineral sample from Cerrillos, N. M., is specular hematite, a variety of iron oxide. It is slightly magnetic; valuable as an ore of iron if in large quantities; when pure, contains 70% iron, 30% oxygen.

The ore samples from Williams, Ariz., are: 1. Malachite (a fibrous variety), green copper carbonate. 2. Iron oxide, with a little azurite (blue copper carbonate).

The rock specimen from Vanderbilt, Cal., is not turquoise, but chrysocolla (copper silicate).

\* Abstract Am. Inst. Min. Engs.

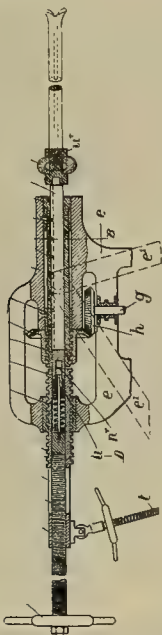


# Mining and Metallurgical Patents.

PATENTS ISSUED OCTOBER 11, 1904.

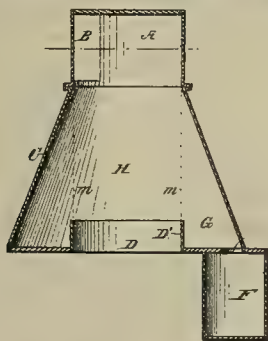
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ROCK DRILLING MACHINE.—No. 771,625; C. Gillieron, Vierge, Switzerland.



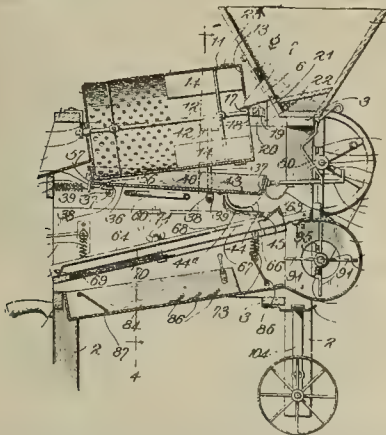
Rock drilling machine, comprising combination of rotative shaft for carrying drill; independently controlled advance screw; and spring controlled coupling device connected with opposing extremities of shaft and advance screw, coupling device transmitting to shaft longitudinal movements of screw in both directions.

METHOD OF SEPARATING DUST FROM DUST-LADEN AIR.—No. 771,691; W. E. Allington, Saginaw, Mich.



Method of separating dust from initial current of dust-laden air, which consists in continuously and rapidly rotating central column of dust-laden air within outer surrounding continuously rotating body of air of less velocity receiving impulse from column and into which dust separated from column is driven, and continuously delivering dust from body of low velocity by action of body while purified air continuously escapes from one end of column of high velocity.

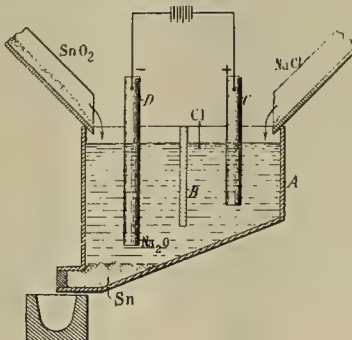
DRY SEPARATOR.—No. 771,805; F. O. Bloom, Helena, Mont.



Combination in dry separator of coarse screen for separating fine particles from coarser, drier disposed beneath screen and having discharge opening for dry material, means for simultaneously imparting

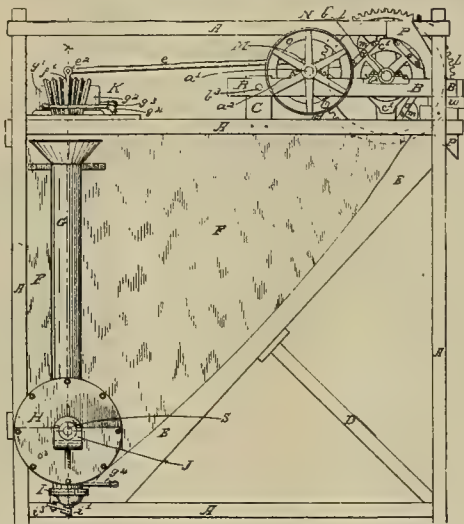
movement to screen and drier, sieve mounted on under side of drier beneath discharge opening, and finer screen disposed beneath sieve.

PROCESS OF OBTAINING METALS.—No. 771,646; F. von Kugelgen, Holcombs Rock, Va., and H. Danneel, Breslau, Germany.



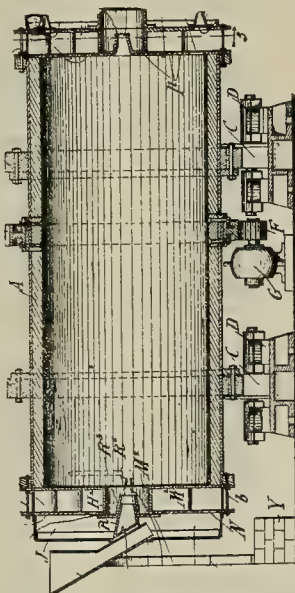
Process which consists in electrolyzing a haloid of alkali in presence of oxide of metal, thus obtaining metal, oxide of alkali and halogen, and maintaining a supply of haloid and oxide by adding fresh quantities thereof as they are decomposed.

PNEUMATIC GOLD SEPARATOR.—No. 771,857; W. Broadbent, Salt Lake City, Utah.



Combination with tank of two side casings with feed openings therein, depression provided with opening and closure therefor in bottom of each side casing, shaft extending through side casings and tank carrying adjustable conveyor blades within side casings, sprocket wheels on shaft for driving from second shaft, and carrying perforated buckets, and means for delivering short puffs of air within side openings near bottom of depressions.

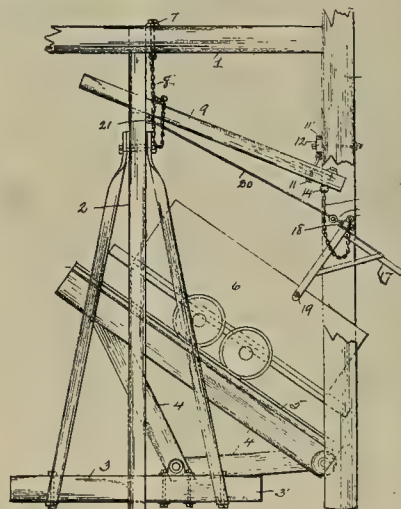
TUBULAR BALL MILL.—No. 772,077; M. F. Abbe, New York, N. Y.



In tubular ball mill, combination with cylinder provided with spiral feedway at either end for entrance and discharge of material, of feed chamber exterior to spiral feedway provided with central opening, stationary hopper passing through central opening and discharging into feed chamber, and bifurcated pipe provided with oval-shaped openings at one end, one

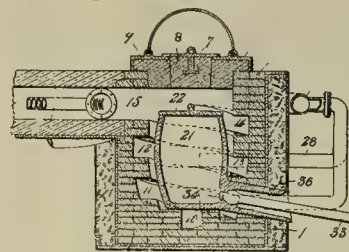
opening arranged at either side of stationary hopper, and with one circular opening at other end terminating in central part of spiral feedway for conducting air from exterior to interior of cylinder.

DEVICE FOR OPENING THE END GATES OF MINE CARS.—No. 772,268; S. W. Ault, Glencoe, and P. K. Reed, Warnock, Ohio.



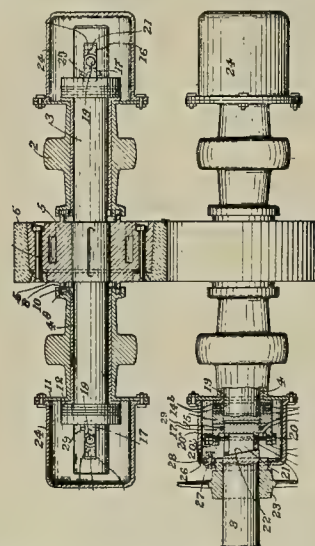
Device for automatically opening end gates of mine cars, combination consisting of self-dumping car provided with hinged end gate, beams 9 hinged to frame above and means for supporting same, beam 16, loosely connected to beams 9, connecting rods 20, ends of which are attached to beams 9 and cross-beam 16, in manner that, when rear ends of beams 9 are elevated by contact with ascending cage end-gate of car will be opened.

CRUCIBLE FURNACE AND CRUCIBLE.—No. 771,675; G. L. Smith, Newport News, Va.



In crucible furnace, combination of crucible having gravity discharge spout, means for stoppering same at inner extremity, body of resistant material inclosing crucible provided on inner surface with continuous spiral passage and pierced by series of burners disposed tangentially to crucible distributed throughout extent of spiral and sealed into body, annular space between crucible and body and removable cover in top of body located centrally of crucible and smaller in diameter than crucible to permit access to crucible without exposing interior of furnace to air or operator to heat radiated by walls of furnace.

LONGITUDINALLY ADJUSTABLE CRUSHING ROLLS.—No. 771,887; J. A. Thomas, Los Angeles, Cal.



Combination with journal boxes, of shaft rotatably and longitudinally movable therein, roll fixed on shaft, shaft provided with transverse perforations or slots, gibs in slots adapted to exert pressure against journal boxes, keys bearing against gibs and against shaft, and means operatively connecting gibs and keys whereby same may be operated to move shaft longitudinally.



## The Genesis of the Diamond.\*

NUMBER III.—CONCLUDED.

Written by GARDNER F. WILLIAMS.

Owing to the cost of the material to be experimented upon, however, Herr Luzi was unable to determine positively what chemical action took place during the time the diamonds were heated in the complicated silica flux. The fact that diamonds can be absorbed by being placed in molten blue ground tends to prove that the blue ground was not thrust up through the earth's crust in a molten state.

If the diamond is unable to withstand the corroding influence of the silica magma at the comparatively low temperature given above, how could it possibly have retained its forms of crystallization and perfect faces at the far higher temperature and pressure which must have existed under the igneous theory?

It seems a pity that Herr Luzi did not state the exact weight of the diamonds upon which he experimented, both before and after his experiments. The burning or absorption of the diamonds in its matrix is a strong argument against the contention that the blue ground was once a molten lava. If a diamond placed in a graphite crucible containing melted blue ground, which is subjected to a temperature of only 1770° R., changes in shape, could diamonds be found perfect in shape, without a flaw, and with clear transparent faces, so smooth that they have the appearance of having been polished?

3. Some years ago a diamond weighing 28.5 carats, found at Kimberley, attracted the attention of the valuator. Its external surface was smooth and crystallized, showing no other mineral except the diamond itself, but the interior was white and not transparent. Noticing this peculiar appearance, the valuator broke the stone in order to satisfy his curiosity, and found that a small perfect octahedral diamond was enclosed in the center of the larger stone. Nor was this all. There were flakes of a white mineral, not diamond, attached to the fragments of the broken diamond. In appearance the flakes were white, translucent and crystalline and about as hard as steel. When heated in a closed tube, moisture was given off. It fused readily on platinum wire to a white bead. A few grains of this white mineral were collected, and by analysis it proved to be apophyllite, a silicate of lime and potash with 16% of water.

If a mineral which is fusible at the ordinary temperature obtained with a blow pipe, and which contains 16% of water, was formed at the same time that the diamond crystallized, it is certain that this did not take place under an enormously high temperature. How, then, one may ask, did the apophyllite become a part of this diamond?

Herr von Tschudi describes a beautiful crystallized Brazilian diamond in the center of which was a leaf of gold. He obtained the information from Dr. Mills Franco, who claimed that there was no doubt or deception as to the identification of the gold.

Occurrences of this nature tend to veil in additional mystery the genesis of the diamond.

4. Professor T. G. Bonney obtained from the Newlands mines, 40 miles northwest of Kimberley, specimens of a coarsely crystalline rock studded with garnets, technically called holo-crystalline, and allied to eclogites. At a meeting of the Royal Society, he presented his conclusions:

The blue ground is not the birthplace, either of the diamond or of the garnet, pyroxenes, olivine and other minerals, more or less fragmental, which it incorporates. The diamond is a constituent of the eclogite, just as much as a zircon may be a constituent of a granite or a syenite. . . . I had always expected a peridotite (as supposed by Professor Lewis), if not a material yet more basic, would prove to be the birthplace of the diamond.

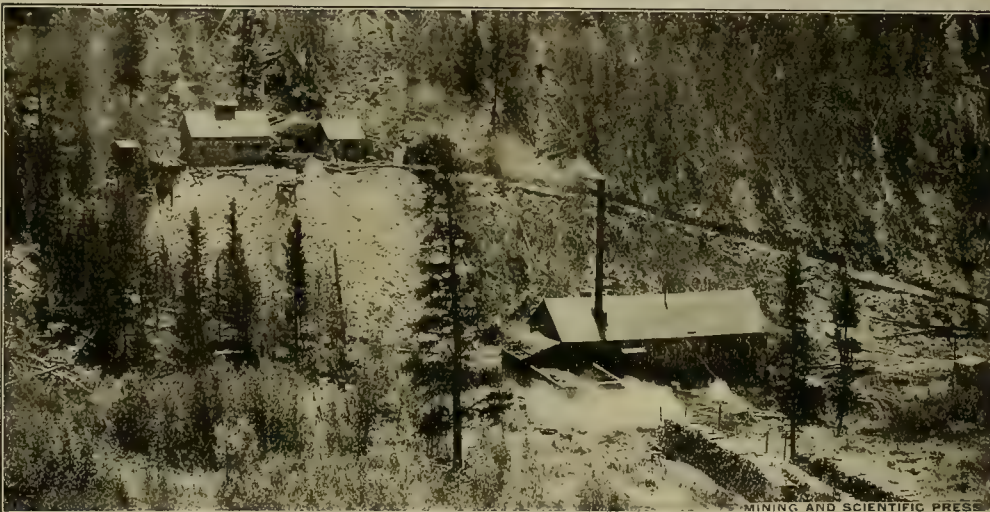
Can it possibly be a derivative mineral, even in the eclogite? Had it crystallized out of a more basic magma, which, however, was still molten when one more acid was injected and the mixture became such as to form eclogite? But I content myself with indicating a difficulty and suggesting a possibility; the fact itself is indisputable; that the diamond occurs, though rather sporadically, as a constituent of an eclogite, which rock, according to the ordinary rules of inference, would be regarded as its birthplace.

Professor Bonney's statement that diamonds occur in the eclogite of the Newlands mines caused me to examine the eclogite which is found in all the mines at Kimberley, and has always been treated as waste rock and thrown away. There are tons of it lying about the Kimberley mines. I have examined hundreds of pieces of this rock, but never found a diamond; nor have I ever heard of a diamond being found in it by any one during the many years that these fields have been worked. I caused about twenty tons to be collected and sent to a test plant, where it was crushed and afterwards jigged; but it contained no diamonds. Surely, if in the eclogites of a poor mine like the Newlands, the total diamond yield of which was only a few hundred carats, one could find diamonds, one would naturally expect to find them in the eclogites from mines in the vicinity of Kimberley, which are so rich.

5. Sir William Crookes and others have mentioned



Tunnel Entrance Raymond Con. Mine, Ohio City, Colo. (See Page 281.)



General View of Raymond Con. Mine, Ohio City, Colo. (See Page 281.)

diamonds which burst or explode on being brought to the surface; and Sir William says it has been "conclusively proved that the diamond's genesis must have taken place at great depths under enormous pressure. The explosion of large diamonds on coming to the surface shows extreme tension."

Professor Lewis says that Kimberley diamonds have been found sometimes to have optical anomalies due to strain. Fizzan thought this strain to have been caused by the unequal distribution of heat during cooling; but Jaunettaz holds that the strain is due to compressed gas in the interior of the crystal.

I have found that the light-brown smoky diamonds are the only ones which crack on being brought to the surface; but even these remain intact if kept in a moist place. In the days of open-cut working, when a smoky or light-brown diamond was found, the digger placed it in his mouth, where he kept it until he offered it for sale. The buyer placed it in a raw potato, in which it was shipped to Europe. The temperature of the ground in which the stone was found would, as a rule, not exceed 70° F. The temperature of the diamond would be raised to 98° F. while in the digger's mouth. If, however, the stone was kept in a dry place, even at a lower temperature, it would crack in all directions. One might argue from this that it was not the expansion of gases by heat alone which caused the fractures. If these fractures were due to compressed gas, as contended by Jaunettaz, one might expect this cracking to have occurred while the diamond and its contained gas were exposed to the enormous heat to which, according to the igneous theory, diamonds must have been exposed.

It is a strange fact that only light-brown or smoky stones crack on being exposed to dry air at a slightly increased temperature. There are innumerable fragments of diamonds in the Kimberley pipes; and it is a question of how the original crystals were fractured.

6. Sir William Crookes says that the ash left after burning a diamond invariably contains iron as its chief constituent, and the most common colors of diamonds, when most perfectly pellucid, show various shades of brown and yellow from the palest "off color" to almost black. These variations, he declares, accord with the theory that the diamond has separated from molten iron.

I have made exhaustive tests in order to ascertain whether diamonds contain iron, oxidized or metallic. The experiments were made upon a magnetic separating machine, the field magnets of which attracted any mineral containing iron or iron oxides. Although some of these diamonds had the appearance of being coated with iron in some form, and others were colored dark brown and deep yellow, they were in no way attracted by the magnet, even when excited by a strong electric current. These experiments do not, perhaps, disprove the existence of iron in the diamond, but they do establish the fact that the quantity is infinitesimally small. Further experiments in this direction ought to be made by those who have better facilities for such work than are at our disposal here in Kimberley.

7. From what is known of the theory of crystallization, one is inclined to the old Indian idea that diamonds grow like onions. It is hardly conceivable that diamonds, such as the Koh-i-nur, the Great Mogul, the Excelsior (a Jagersfontein, South African stone of 969.5 carats) and the two De Beers diamonds (respectively of 503 and 428.5 carats) were formed, as the microscopical diamonds have been, in a moment of time during the sudden cooling of molten iron.

Is it not more reasonable to suppose that these enormous crystals grew little by little, and that nature has followed the same laws of crystallization in the diamond as in other minerals?

In March, 1904, a diamond of 228 carats was found in the Kimberley mine which contains two red spots in the center of the stone. One of these is bright red, and, under a magnifying glass, is shown to be a small diamond with crystalline faces easily distinguishable. The large diamond is cracked in all directions around the small crystal for a distance of about  $\frac{1}{16}$  inch.

I regret that I am unable to propound a detailed theory as to the genesis of the diamond that could be supported by data less assailable and more conclusive than those given by others.

I have suggested difficulties which have occurred to me in reference to various theories and which leave the subject still obscure.

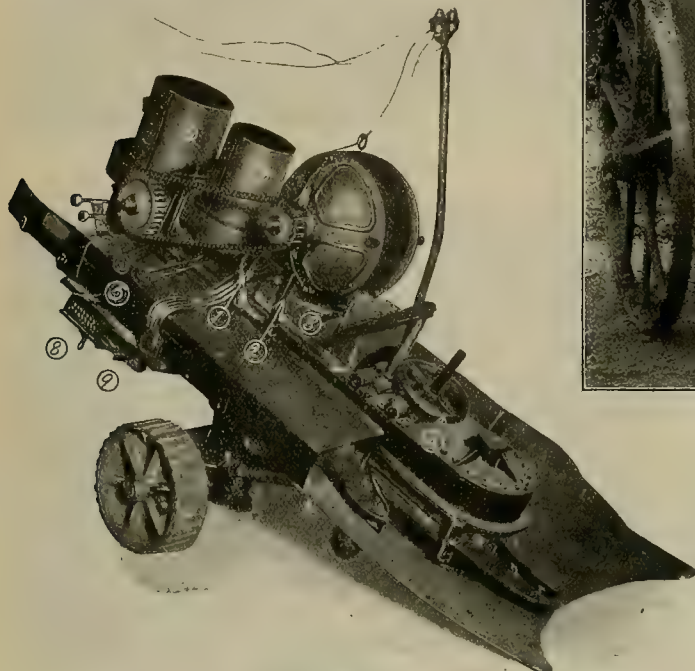
All that can be said is, that carbon has been changed by crystallization from its black and uninviting appearance to the most beautiful gem which ever saw the light of day.

\*Trans. Am. Inst. Min. Eng.



### An Automatic Loader.

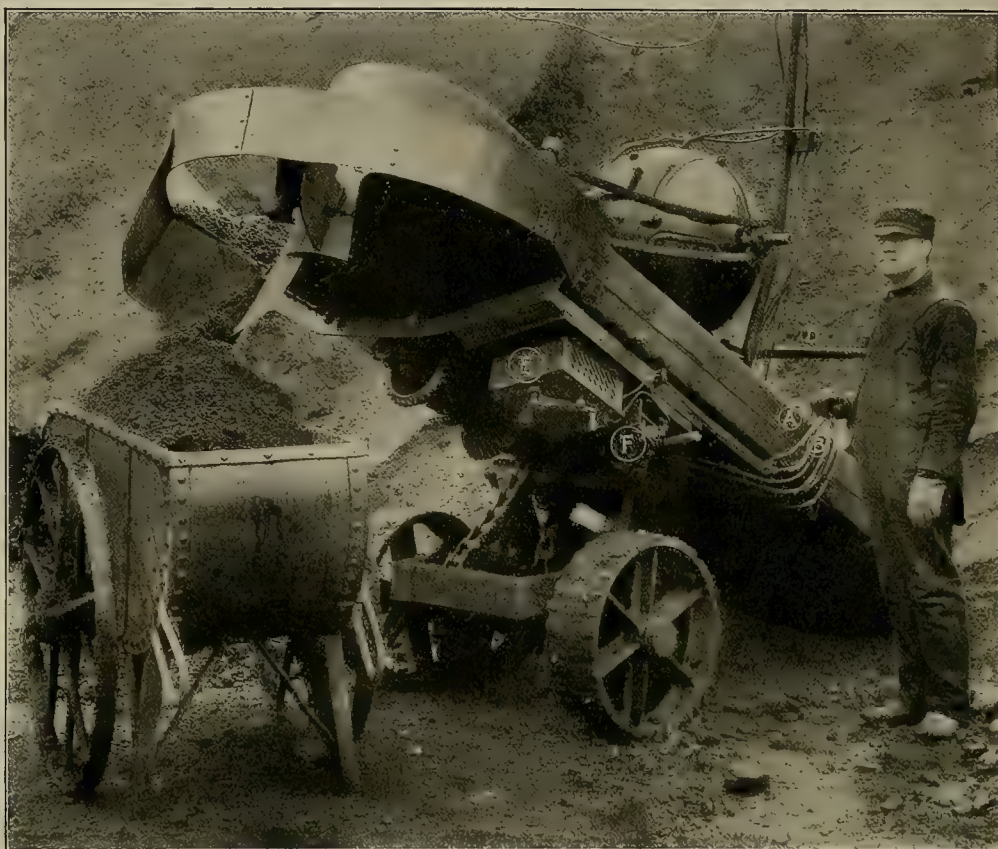
TO THE EDITOR:—I note in your valued paper an illustration of the loading machine built for the Empire Tunnel Co. at Georgetown, Colo., and in the descriptive article it is stated that it is doubtful if there is another mine in the world that has a loading machine. I can say that in my mining experience of twenty years throughout the West I never heard of a successful loading machine; however, from the illustration I cannot see anything more than a conveyor, and I believe a machine on this same principle was used in the Bunker Hill & Sullivan mines in Idaho, but the material had to be shoveled onto it, and it seems to me the same will have to be done in this case. This, however, is a great saving over shoveling into a car 4½ feet high, whereas the lower end of the conveyor need only be 15 to 25 inches. The need, however, has been for a machine to lift the material the first 15 inches, as it is a well known fact that once get the material onto a conveyor and you can carry it where you will. This is what has been



Automatic Loading Machine.

Height, 7 ft. 10 in.; clearance under discharge, 4 ft. 9 in.; width, 5 ft. 6 in.; weight, 4½ tons.  
1—Propelling Lever. 2—Main Clutch Lever. 3—Steering Lever. 4—Hand Wheel for Raising Front of Machine. 5—Reversing Lever. 6—Main Clutch Casing. 7—Propelling Clutch Casing. 8—Starting Box. 9—Circuit Breaker.

accomplished by the Park automatic loader, the principle of which will be readily seen from the accompanying pictures taken of one of their machines at work in the Illinois Steel Yards at South Chicago. One of them shows the machine, with buggy carrier



Automatic Loading Machine.

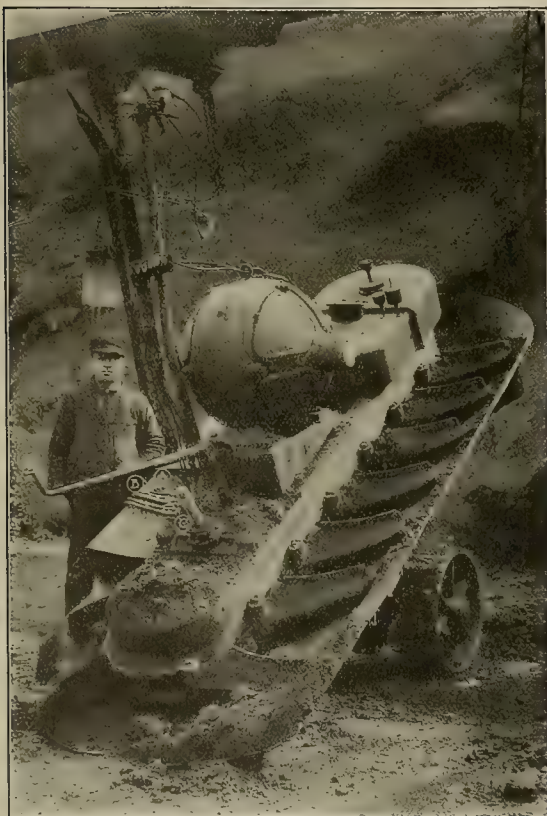
attached, at work against a pile of Mesaba iron ore loading the same into a buggy; the other shows the operating side of the machine, showing the different levers. The machine is automatic, so that the operator can move it back or ahead at will, or turn it end for end in its own length when on traction wheels. The machine can also be mounted on flange wheels. The machine eats its own way into the material and does away with any shoveling. I may say in the handling of this iron ore the machine has given perfect satisfaction, and this is considered most difficult material to handle. The machine has also been tested in the handling of coal, limestone and salt, all of which it has handled with success and at a saving of time and money.

Few outside the mining world know what this means. To a man who has a tunnel to drive it takes as long to clean up a blast after machine drills as it did to put in the holes; the same work with this machine can be done just as fast as they can get cars to it. This means that the blast can be cleaned up between shifts which will allow the drillers to

set up their machine in a clean face and in this way be drilling, when they would under the old way be shoveling back and getting ready to set up, and in this way break from 15% to 25% more ground to the shift. The capacity of this machine in the handling of material approximates 3 yards per minute.

MINE MANAGER.

EXPERIMENTS carried out by Moissan and O'Farrelly, with the aid of the electric furnace, show that the usual laws of distillation apply as well to the distillation of mixtures of metals, says the Comptes Rendus. Various mixtures were heated in the furnace for different times, and the residues were analyzed. In the case of copper and zinc and copper and cadmium, the zinc and cadmium were completely expelled after short periods of distillation. In the case of copper and lead, the same result was reached, after longer distillation, during which the percentage of lead gradually lessened. In the case of copper and tin, some mixtures gradually increased in copper content, some in tin content, and others distilled without change of composition. With mixtures of lead and tin, the lead gradually decreased until pure tin remained. A remarkable character of tin is the wide range of temperature through which the metal remains liquid; while it melts at 226° C., its boiling point is above that of copper and lead.



Automatic Loading Machine.



Machine at Work Loading Iron Ore in the Yards of the Illinois Steel Co., South Chicago, Showing Buggy Carrier Attached to Machine.



### A Traveling Machine Shop.

Some time ago appeared herein a description of the repair ship Vulcan, which did such good service for the American navy. The same idea appertaining to the land has been suggested, being as applicable to the land as the itinerant repair auxiliary was to the sea.

This idea has been successfully worked out in a practical way by the Morgan Construction Co. of Worcester, Mass., in the use of a freight car suitably equipped for a portable machine shop. In erecting rolling mill plants it has often been found necessary to have on the ground several machine tools and means for operation with which to do some small jobs of fitting and operation, which cause considerable delay if the parts have to be sent to a machine shop. The expense of installing tools and the depreciation on account of exposure was excessive. The machine shop car has proved to be an economy. It is sent to a plant whenever the erection is to begin and remains there on a siding ready for use until the work has been finished, when it is sent on wherever required.

The car itself is an 80,000-pound capacity box car, standard inside dimensions 8 feet 6 inches by 36 feet, and was made by the Laconia Car Co. of Laconia, N. H. It was fitted up entirely by the Morgan Construction Co.

In Fig. 1 it will be observed that the windows are partially imbedded in the sides of the car. This was



Fig. 1.

done that the wooden sections might be replaced over the windows as protection for the glass while the car is in transit or not in use.

Fig. 2 shows the inside of the car looking toward the end containing the machinery. The motive power



Fig. 2.



Fig. 3.

is supplied by an 8 H. P. gasoline engine. One of the difficulties of using a gasoline engine in such a small place, where a forge and combustible material would often be used, was to locate the gasoline supply tank where there would be no danger of explosion. This was overcome by bolting the 74-gallon gasoline supply tank underneath the car. For cooling the engine cylinder a 300-gallon water tank was placed inside

the car, as seen in the right hand corner of Fig. 2. The exhaust muffler is bolted underneath the car. The engine is connected to the shaft by a belt running on a clutch pulley, so that the power may be shut off at any time without stopping the engine. The main line of shafting is 1½ inch diameter, 15 feet 3 inches long.

The car is equipped with a 20-inch lathe, an 18-inch stroke shaper, an emery wheel grinder, a forge, anvil and good-sized work bench. It is also equipped with all the necessary auxiliary tools for these machines.

The car is so wired that it may be lighted by electricity the current being taken from the nearest point where electricity is available. Acetylene lamps are provided for use when electricity is not to be had. Steam pipes for heating are run along the side of the car, the steam also being taken from the nearest convenient supply.

Fig. 3 shows a view of the end of the car, in which a section has been reserved as an office for the superintendent of erection. In this office are a roll top desk, a chair and a cabinet, where blue prints and drawings are filed. A sink and toilet case with mirror complete the equipment. There can also be seen at this end of the car a rack where tools, bolts and supplies are kept.

This car is entirely complete with all necessary tools, lubricants, supplies and all ordinary items that a machine shop is likely to require.

It has been found of practical value in field work, saving the superintendent of erection time, trouble and traveling when machine work is required without delay.

### An Ore Testing Plant.

Of recent years progress in metallurgical knowledge and in the number and diversity of processes has been so rapid that if the ore of a given mine cannot be profitably handled by one method the mine need not necessarily be closed. If a given method fails, experiments may show that some other process is suitable. It is not always practicable to have at each mine a laboratory equipped to make tests of the various processes on a commercial scale. The accompanying engraving shows a mill and cyanide plant arranged to test ores in quantities up to carload lots and over. It has three 350-pound stamps, with a quadruple discharge mortar. For the majority of tests, however, all these screen openings are closed but the front one. The battery frame is of steel. The ore to be treated is hauled to the floor of the mill, on the left of the portion shown in the cut, weighed, shoveled into a jaw crusher, and then elevated by bucket conveyor to the ore bin.

After the pulp has passed over the silver-plated amalgamating plate, and over the 4-foot Frue vanner, if cyanidation is to be tried, it is pumped by a small centrifugal, at the lower end of the vanner, to three cone classifiers above the cyanide tanks. The classifiers are so arranged that the upper one is a settler, while the two lower ones may be used as spitzlute or simply as settlers. The slimes overflowing from the classifiers go to an agitation tank and the sands to percolation tanks. There are two of the latter, each of three tons capacity, and arranged with overflow to the sewer. A sump tank is above those for percolation. Besides the belt machine, there is a Wilfley table (about 4 feet long) for concentration tests.

A 7½ H. P. electric motor (on left of picture) is used to drive the mill, and there is a separate 2½ H. P. motor to run two sample crushers and a small jig. The jig is equipped so that the speed and stroke may be varied. There is a gas-heated oven, containing a series of shelves, for drying samples for assaying. All assays are made at the company's office, but sizing and percolation tests are made at the mill laboratory. It is proposed to add to the equipment a hand reverberatory furnace of 500 to 700 pounds capacity. A branch line of the Belt Railroad has a side track within 300 feet of the mill, so that ore for testing can be shipped in quantities up to and including carload lots. From tests made with such a mill, not only the most economical method of treatment can be determined, but also capacity

and cost of treatment for larger plants may be calculated. It is better to spend even a few hundred dollars for working tests than several thousand for what may prove useless. The plant shown is that of the Cal. Ore Testing Works, A. A. Hanks and F. L. Bosqui owners, with offices at 531 California St., San Francisco, Cal.

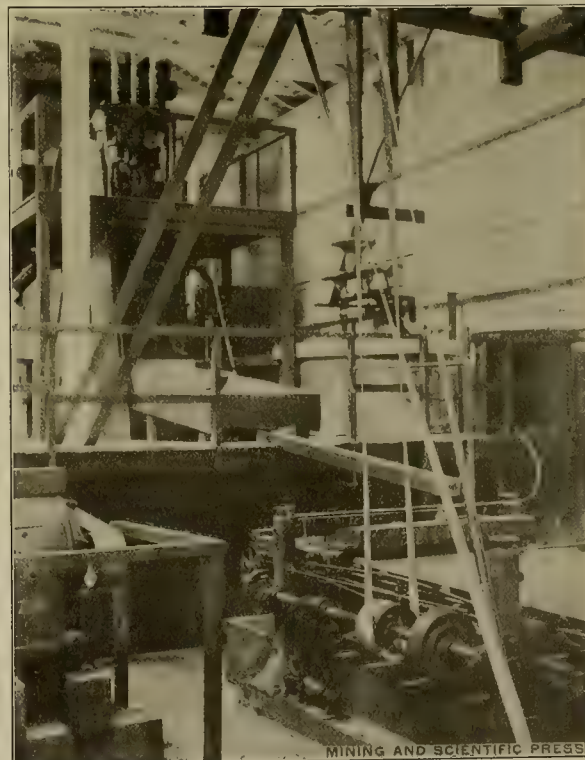
### The Dependence of Copper Mines on Electricity.

The huge changes taking place in the West owe their inception to the origin and development of great industries, among which none figure so prominently as agriculture and mining, says Electricity. It is many years since the first gold was discovered in California or the first copper in Colorado, yet it may be noted that the swift changes occurring, which swept out of existence the old order of things—the wilderness, the roving tribes of marauding Indians and all that pertained to a primitive civilization—were inaugurated by the systematic and scientific development of the great mining industries, and among these colossal industries none occupy so prominent a place as that of copper mining.

It is not too much to say, when we claim that copper mining, in order to be an economical and not a wasteful process, calls for the application of electricity for the refinement of the ore. In the great mountain ranges of the West many opportunities for the development of water power exist, and this power is frequently utilized for the operating of mining machinery, electric lighting, haulage, and the ultimate reduction of the crude copper into metal of the purest quality.

On the other hand, if water power is not available it more than pays to install engines and generators, as it has been shown in the operation of at least one mine in particular, the great Anaconda, that the use of electricity is indispensable to its successful working. To cite this mine as an illustration is profoundly interesting as regards the facts at hand. The Anaconda mine was formerly operated according to the old methods, with the result that the waste was very great in a financial sense. Copper is a metal which is subject to rapid changes during the purely metallurgical processes of purification, and for that reason the by-products are heavy. It was decided to try the electro-chemical method of reduction and in the course of time huge vats were built, generators were installed, and great blocks of crude copper were treated by this method. The result was beyond the expectation of the engineers, as great masses of electrolytically pure copper were found deposited at the cathode, and all that remained was a mass of sludge at the bottom of the vats. This mud-like substance for quite a period of time was thrown away, until one of the chemists decided to analyze its constituents. He found to his surprise that it consisted of a heavy percentage of silver and some gold. In the operation of the Anaconda mine to-day it has been stated that this in itself pays nearly all the operating expenses. As a matter of finance little else need be said in favor of the use of electricity in copper mining if under such circumstances all the copper obtained can be regarded as pure profit.

CONCERNING the breaking of a hoisting rope at the Aldworke colliery, by which seven men were killed, the Colliery Guardian says that the rope had been inspected the day before, and about half an hour before the accident had been tested by hoisting loaded cars twice up and down the shaft. The rope showed no sign of internal corrosion at the point of fracture, the separate strands being well protected



Mill of the California Ore Testing Works, San Francisco, Cal.



by tar. The actual breaking strain of the rope was found to vary from 15.5 to 44 tons (the breaking strain of a new rope should have been 56 tons), and the load weighed 4 tons, whereas the total weight at the point of fracture, due to rope, cage and men, was less than 3.5 tons. The rope had, from some cause or other, so deteriorated that, while to all appearances sound, it became liable to fracture under any sudden stress. Probably a large number of such accidents are due to the sudden application of the brake when the cage is falling rapidly. In Belgium, where there have been but six cases of broken hoisting ropes in ten years, the permissible working load is not allowed to exceed one-tenth of the breaking strain of the rope when new, unless the length of 2 meters cut off every three months shows that the breaking strain has not been reduced over one-third.

## Stamp Milling Practice in Nova Scotia.\*

NUMBER II—CONCLUDED.

Written by M. R. O'SHAUGHNESSY.

Another favorable feature in connection with the condition of the mortar as above described is in regard to the quicksilver, the principal agent in the recovery of the finer particles of gold. There is no danger of creating losses through an overabundant use of mercury when the mill is running under thin feed and the pulp is being displaced and washed 2 inches below the surface of the dies.

The moving pulp will suspend, or keep suspended, for a limited period of time the mercury so supplied, whether in small or large quantities, and whatever particles of gold mingled with the pulp are in like manner under suspension, will have an opportunity to become amalgamated with the mercury, if previous to the association the specific gravity of the particles of gold was sufficient for it to take a suspended position against the mechanical displacing or discharging wash of the mortar. Such particles of amalgam once settling or sinking below the crushing surface of the dies will be retained on the base of the mortar by the affinity of other larger or smaller deposits of amalgam or mercury, as the case may be, and by the specific gravity that has already been the chief factor in arresting the gold from being discharged after liberation from the ore. But too often, through carelessness or ignorance of the millman, the period of crushing is prolonged without a cleanup until the crushing surfaces of the dies have worn down to the deposits of amalgam and mercury collected between the dies and the values are churned out as the run is continued. By the method here described the millman will recover probably 70% of the deposits and find the same adhering to coreholes and rough surfaces in stamps, shoes and dies, screen frames and any rough surface that the pulverized amalgam may come in contact with inside the mortar; and lastly a large percentage adhering to plates outside the mortar. A portion of the loss may be recovered on concentrators.

Another common method of increasing the wear and tear of gold and the losses is to start with the mortar running in a choked condition, either from too high fronts, insufficient water supply, or by supplying ore to the mortar in quantities and at periods that do not allow the water to reach the crushing surface of the dies. Under this method of milling or starting a mill run, it takes but a few hours to stem or thoroughly pack the mortar to the surface of the die with the pulverized material in such a manner that nothing will remove it but bar and pick on cleanup day. In this condition of the mortar, What is the result when coarse granular gold is liberated from the ore? The activity or the discharging force of the mortar is not capable of removing it immediately out of harm's way; and if it were, the screens would not allow the gold to escape in its granular or coarser form. If inside plates are used it has to become amalgamated before it will adhere to them, and if bulky and having sharp angles the wash of the mortar will not allow it to remain on the plates until some of its sharp corners become worn off. If mercury is supplied in larger quantity than the gold being liberated will take up, it will settle to the base (in this case the crushing surface of the dies); and if the quantity of mercury supplied happens to be much in excess of amount required, its presence on the surface of the dies forms slush amalgam. This slush amalgam resting on the crushing surface of the dies holds with a subtle grip small and coarse gold alike, to be thoroughly pulverized before being discharged or lodged on the inside plates. If, on the other hand, we do supply sufficient mercury to a mortar running under conditions to meet the requirements of the gold being liberated, we run the risk of the gold being pulverized or beaten into minute, thin sheets that will not combine with the mercury, and that will eventually escape unamalgamated.

In my opinion, the millman that can judge the happy medium in supplying mercury to the mortar run in conditions as above described, is not very much in evidence in our mining camps. In my practice I have found the light mill will give best satisfaction by operating with medium fronts, fine screens, and abundance of water, thin feed, frequent beating out of the mortar, and by avoiding too prolonged a run without a partial cleanup. In all cases

I speed the mill to its limit with a reasonable drop of stamp, and depend on gravitation for the protection of the values when liberated from the ore. Twelve years of my twenty years' milling practice were spent before the light stamps, milling ores ranging from \$1 to \$2000 per ton, and when the mill was operating continuously, one shift under my personal supervision, I never entertained any apprehension as to the result on cleanup days. In my practice I have always found the light mill give splendid results as a gold saver and collector, when operated by methods that I have described in part as above.

I must admit that the modern mill is undoubtedly an improvement on the light mill when considered as a pulverizer of ore, and had our mining men confined the mill to the pulverization of the ore by a system of rapid, coarse crushing, and depended on secondary treatment for the recovery of the values in gold, a system or method of milling could be put in practice whereby the milling capacity of our mills could be almost doubled, and conditions under which losses may now occur avoided.

At the time of the introduction of the modern mill into our mining camps, men and owners made a general movement to retard the crushing capacity of the mill, practically defeating the very end they were seeking. In the first place they got the idea that the rapid high speed of the mill brought about the expulsion of the gold before mortar amalgamation had taken place; thus they jeopardized the chances of recovering values on the outside plates. To remedy this trouble, coupled with a great many more imaginary difficulties, they reduced the speed of the mill, in some cases from 20% to 30%, never thinking for a moment that in so doing they were practically checking the displacement of the pulp from one die to another and choking the mortar unless the greatest precaution was exercised in feeding the ore. The reason for this condition of the mortar in the modern mill when speed is reduced is the difference of design in the cam of the improved mill compared with the cam of the old type of mill. For example, the period of rest of stamp on the dies in the old mill, dropping 8 inches and making sixty drops per minute, is about equal to the modern mill dropping 6 inches and making 110 drops per minute. It will be apparent that in order to ensure satisfactory displacement of material under the stamps and to enable sufficient water to reach the crushing surface of the dies, especially in mills equipped with the usual methods of supplying water to the mortar, the stamp should be lifted the moment the descending stamp has been retarded by the material on the dies and the slowing down of the improved mill is a serious mistake. It not only deadens the activity of the pulp in the mortar and retards the crushing capacity of the mill, but where slate is present throughout the ore it also brings about a pasty, mucky condition of the pulp on the surface of the dies, due in a great measure to an insufficient supply of water to wash out the disintegrated material after each thrust of the stamp.

Mortars running under such conditions practically stem or pack solidly all recesses between the dies, and the crushing surface of the dies forms the interior base of the mortars. In such cases where a sufficient quantity of water fails to reach the crushing surface of the dies it matters little what the interior form of the mortar is, for the pulp itself will build up a design of solidly packed sand, converting the interior design above the surface of the dies into what resembles very much a farmer's dug-out pig trough, and in such a trough a good share of our Nova Scotian gold-bearing ores have been pulverized since the introduction of the modern heavy mill.

High discharge and fine screens have been used to prevent the gold escaping from the mortar. High fronts and fine screens are conducive to fine grinding, and no doubt liberate a large percentage of gold that would otherwise escape in low fronts and coarse screens. When, however, you increase the height of your fronts and use closer screens, you also increase the difficulty of having a sufficient supply of water reach the crushing surfaces of the dies, so essential to the protection of the coarse particles of gold so common in our ores. The question is before me at all times, Do we, by raising the discharge and using finer screens and subjecting all the gold values to the pulverization action of the stamp during the period of the run before the cleanup is made, lose in float gold an equivalent in values equal to what we liberate by fine grinding?

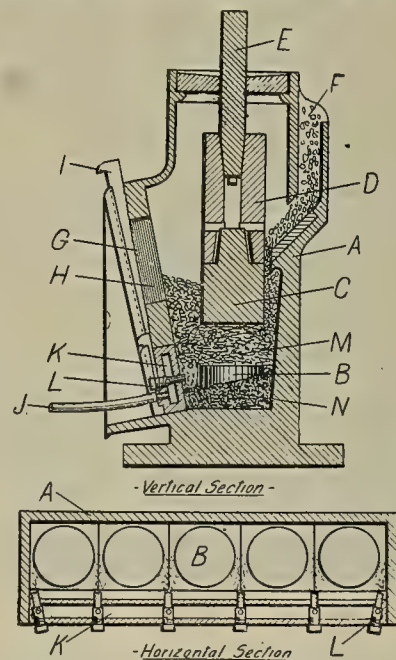
The first difficulty that I encountered in the improved mill was the protection of values after being liberated from the ore. This difficulty was chiefly due to stemming and packing of the sands between the dies, which, without constant attention to the feeders in use, I could not avoid.

With this difficulty continuously before me in operating the modern mill of the Tudor Gold Mining Co. at Waverley during the summer of 1895, I conceived the idea of putting in some form of agitator to continuously disturb the sand between the dies in such a manner that any atoms of the ore having extra gravity would readily find a safe place from the action of the stamps and the severe abrasion of sand.

I decided that the water usually dropped or directed into the mortar on top of the pulp, if directed into the mortar by means of a series of small jets or nozzles at any desired point below the

crushing surface of the dies, would bring about the desired agitating result, supplying a mechanical agency whereby I could be assured that at every stage of the mill-run all coarse particles of the gold would be recovered without the agency of mercury, and that a sufficient quantity of clear water was being directed on to the surface of the dies to wash out the disintegrated particles after each thrust of a stamp.

I have also found that under any condition of feed, height of fronts, or fineness of screens, the water directed under pressure, as herein described and shown in the accompanying illustration, will at all



times during the run of the mill keep the recess between the dies so freely agitated that battery iron, nails, and gold in small or coarse particles readily become deposited between the dies, and if any reasonable attention is given to the supply of ore to the mortar there will be found little or no difficulty in keeping the wearing surface of the dies and the stamp shoes perfectly square or level. I maintain that the capacity of the mortar is also increased because of the presence of clear water directed into the pulverized material immediately after the thrust of each stamp. By this system of water supply, the material under the stamp, while being displaced alternately from one die to another, has to pass through or take with it a fountain of clear water. Hence, it should be apparent to every practical man that the heavier ore will readily sink into recesses between and around the dies.

As an example of what can be done in a mortar supplied with water directed under pressure as herein described, the following may be of interest: During the month of November, 1900, I superintended at Renfrew the Thompson cleanup of 2700 ounces of gold bullion and made a practical test of one battery of five stamps, dropping 5 inches and making 110 drops per minute, with 6-inch fronts and No. 37-mesh screens. From one run of an hour and twenty minutes on specimens, I received one bar of gold bullion weighing 666 ounces. Of this amount 95% was recovered below the crushing surfaces of the dies, about 2½% was attached to the interior of the screens, and the balance of 2½% was on the outside plates. The run was witnessed by three men besides myself, and I consider the run practically showed the thorough protection coarse grains or even small particles of gold get in a mortar supplied with water directed under pressure below and between the crushing surface of the dies. In the majority of cases where the tailings of mills are not subjected to a secondary treatment to recover values lost by coarse crushing, I contend that by applying the water as herein described, the stamps could be allowed to reduce the ore to a slime, and yet not injure the values in gold; and when cleanup day came, the gold would (with the exception of a very small percentage which fine grinding had liberated and discharged on the outside plates) be found deposited between the dies in particles still having their sharp angles, and as free from wear as when first liberated from the ore.

The proceedings to obtain patent to placer claims are similar to those required in making application for patent to lode claims. The price at which the Government sells placer ground to the patentee is \$2.50 per acre or fractional part thereof. Where the placer claim conforms to the line of Government land survey, no resurvey is necessary. Subdivisions to ten acres may be followed.

\*Abstract Trans. Min. Soc. of Nova Scotia.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

The copper production of the United States for the calendar year 1903 has been issued by the United States Geological Survey, showing the following figures:

Source.	Pounds.
Lake Superior	192,400,577
Arizona	117,616,221
Montana	272,655,854
New Mexico	2,300,832
California	17,746,756
Utah	38,402,632
Colorado (including copper smelters, a)	1,158,308
Alaska	1,339,590
Wyoming	1,025,186
Nevada	140,000
Idaho	778,906
South Dakota	173,292
Washington	80,758
Maine and New Hampshire	
Vermont	13,855,612
Tennessee and Southern States	
Middle States, etc., b	500,000
Lead desilverizers, etc., c	
Total domestic copper	608,041,517
From imported pyrites and ores and matte, c	32,000,000

Total (including copper from imported pyrites) 730,041,517  
a Copper smelters in Colorado, buying argentiferous copper ores and matte in open market, sources not known. The quantity of Montana matte which goes to one of these works has been deducted.  
b The quantity stated covers only that part of the incidental copper product the source of which could not be ascertained.  
c Estimated.

## ALASKA.

A. Gfeller at Windham bay, near Juneau, reports development work in full progress at the Little Basin group. A compressor plant has been set up.

The Portland Reduction Co., owner of the Monumental mine in Grant county, Or., is developing a copper group on Prince Edward island, 30 miles from Ketchikan. The work is progressing, says C. J. Allen, president and manager.

## ARIZONA.

### Gila County.

Near Globe the Copper Bell M. Co., W. Kemp, manager, is excavating for a 250-ton smelter. The present smelter is treating forty-five tons of ore per day and the matte is shipped to Globe. There is also being shipped thirty tons of sulphide ore to Globe daily. At 120 feet in depth it is stated the vein is 16 feet wide, which averages 8% copper, 8 ounces silver and \$2 gold per ton.

The new smelter of the Old Dominion C. M. & S. Co. at Globe in its initial run is giving satisfactory results, says the Silver Belt. The amount of ore put through No. 1 furnace has been increased, until twenty-four hours' run takes 450 tons and the daily output of copper bars is 25 tons. No. 2 furnace has been blown in. Improvements are being made in the method of making up ore charges and making delivery to the furnaces more rapid. There is still a large number of men at work on construction in and about the smelter. Two 7-foot Chili mills and rock bins for the same are being placed. Grading is not finished as yet. On the sidehill above the smelter double tracks are being put in to hold thirty cars of ore and coke, as a reserve in addition to the supplies carried in the smelter bins, which have a capacity of 2000 tons. Another standard gauge locomotive is in use. Arrivals of coke have increased, the storage bins below the smelter are full, and there is a large amount of coke piled up outside the bins. It is intended to keep these bins and the adjoining ones for sulphide ores filled up, so that in the event of interruption to traffic there would be a two months' supply of fuel and sulphides on hand. Work in other departments shows progress.

### Mohave County.

J. W. Moore of Philadelphia, Pa., president and manager of the Golden Star M. Co., operating near Kingman, states that a road is being graded into the mines of the company, a few miles north of the Moss mine. Machinery will be put in and work on the mines started. The mine shows veins carrying milling values in gold.

Work on the Midnight mine at Chloride is to be resumed; shipments will be made to the smelter.

### Yavapai County.

The Equator smelter at Jerome has been changed from a coal to an oil burner and is said to be giving satisfaction.

The 85 H. P. gasoline engine for the Rincon G. M. Co., near Martinez, has been put in place. The Alaska mine will be worked with an increased number of men. An engine and other machinery are being set up and twenty additional miners will be put at work getting out ore, which will be treated at the mills of the Congress Con. M. Co. An office has been opened at Congress. G. Margueritch has bought

the Rocky Mountain mine, in Black Rock district, the price being given at \$25,000.

At Prescott the Metals M. Co. has been formed to operate mines at Walker. The officers are G. W. Middleton of Prescott, president and manager; J. C. Moore, F. H. Adler and T. G. Norris.

Manager J. S. Johns of the Little Jesse mine, near Prescott, says 7 miles of pipe line will be laid from DeLarge ranch to the Little Jesse mine. The line will be of 6-inch pipe. At the water supply point will also be built an electric plant. The water will be pumped 4½ miles and will flow the remainder of the distance by gravity. The lift is 1100 feet. It is also intended to construct water storage reservoirs in the mountains.

The Val Verde smelting plant at Val Verde, on the line of the Prescott & Eastern Railroad, destroyed by fire recently, is being rebuilt under supervision of S. E. Bretherton of the Bradshaw Mt. C. M. & S. Co., which owns it. There is a 250-ton smelter on the road that will be set up and in operation by December 15. The building for the smelter will be up and ready to receive the machinery on its arrival. The smelter will be set at south part of the building and additional furnaces will be put in to the north. It is intended to put up a plant with capacity for smelting 500 tons of ore per day. At present the company is buying ore and piling it on the ground and in bins ready for smelting when the machinery is in. The Val Verde water supply is said to be ample for all smelting and reduction purposes the year around. It is intention of the company to make a dam of slag dumped into the bed of the stream as the slag comes from the smelter. By making a slag dam the water can be raised about 90 feet, and a lake formed nearly ½ mile long and from 40 to 80 feet deep. The water thus saved would furnish a supply for neighboring mills as well as for the smelter, says Superintendent Bretherton.

H. L. Hall, who bought the Buster group of mines, near Prescott, is starting operations and will put on thirty miners in the stopes before November 1. C. Humphries, who has bought the extension of the Blair mine in Crook canyon, has started work. It is said he will arrange with the Cash mine to mill his ore until he can erect a mill of his own. The ore carries free gold.

## ARKANSAS.

### Marion County.

Yellville reports say three more producing zinc mines will be added to the Marion county list. The track of the Missouri Pacific Railroad will be laid to near the Iola, Susquehanna and Nakomis mines, which are ready to ship ore. To these will be added the Broome mine, near the group, which is being prepared for production.

## CALIFORNIA.

### Amador County.

W. E. Stewart, superintendent of the Jose Gulch M. Co., near Jackson, says operations are progressing favorably. Repairs to the mill are about completed, new plates have been put in, and it is expected to start up by Nov. 1st. The company owns 172 acres of ground, extending from Jose gulch to Butte City, a portion of which will be worked by hydraulic process, 6500 feet of pipe having been ordered to put water on top of Red hill. The mill contains ten stamps.

### Butte County.

The Viloro Syndicate, Ltd., of London, Eng., which took over the McGee ranch of 200 acres, 2½ miles south of Oroville, expect their Bucyrus dredger to be fully completed and working by November 1. From sixty-three holes drilled, the average depth to bedrock was found to be 31½ feet, giving 50,000 cubic yards of earth to the acre. The values discovered from these tests proved satisfactory. Walter McDermott, managing director of Fraser-Chalmers, London, England, is chairman of the syndicate; T. H. Leggett, general manager; W. H. James, Oroville, superintendent of dredger operations.

### Calaveras County.

The Madison mill of the Utica G. M. Co. at Angels is closed for repairs. The ore bins of the cross shaft and the Stickle mill are also undergoing repairs. The Utica Co. will also begin work of repairing the flames and ditches.

### El Dorado County.

Development work will be resumed on the Josephine mine at Josephine. It is reported the New Highland G. & C. M. Co. will resume operations on its mines in and near Georgetown. The dam at the Cash Rock mine on the American river, near Josephine, has been washed out and the flumes swept away. It is thought repairs cannot be made in time to resume operations this season.

A. N. Buchanan, who is opening up the

Smith Point or Zantgraf extension, near Loomis, Placer county, says he has run several hundred feet of tunnel. The ore averages well in a milling test. A shaft will later be sunk and a hoist and mill put up.

E. Silknitter reports he has bonded his North Extension of the Last Chance mine, near Placerville, to a Los Angeles company, and a mill will be built. His river claim in Coloma has been bonded to W. C. Bell of Kelsey, who will put a dredger in operation.

### Inyo County.

(Special Correspondence).—Cohen & De Lamar are developing the property bonded by them last May in the Funeral mountains, with encouraging results. This is the strike made by Kean and Etcharren on the east side of Death valley and known as Kean's Wonder. It is 80 miles northeast of Ballarat. In July another strike on an extension of the Wonder was made, and 17 miles northwest of that Harris & Cross report a strike in the Bullfrog mine.

Near the Republican mine is the Radcliffe mine. W. G. Macomber has a roaster which he is setting up on the property to work the refractory ore. There is a 20-stamp mill on the mine.

Seven miles from Ballarat in Pleasant valley the Republican M. Co., Superintendent G. E. Little, is working twenty-three men and milling fifteen tons of \$100 rock per day. The process is roller mill and plating, the tailings being held for future treatment. This is a southern California company, G. Montgomery of Whittier being the principal owner. It is intended to put in a stamp mill.

Considerable prospecting is being done in the Panamint range. It is likely to fall within the range of prospectors from the Goldfield, Nev., district. This section between the Clark road and Tonopah, Nev., and the Death Valley section is expected to receive more attention the coming season than ever before. Articles of incorporation have been filed at Independence for the extension of the railroad from Borate, now connected with Daggett, Cal., to Tonopah, Nev., by way of the Saline valley. This will go through the heart of a country hitherto almost prohibitive to the ordinary prospector, but generally conceded to be mineralized.

Darwin, 25 miles south of Keeler, is a silver camp, once operating three smelters, but deserted for several years past. There are indications that it may be reopened. The Lucky Jim mine is working a few men and the Coso mine has changed hands and will be operated again. Moss & Reck, the former owners, have been cyaniding the tailings. Other mines in the neighborhood are the Defiance, owned by the Reddy Estate; the Modoc, W. S. Gage; the Minnetta, J. J. Gunn; and the Lane mine.

F. L. Howard expects to build a stamp mill on his Star group, 20 miles south of Darwin. He has 900 feet of work done and stoping ground opened up.

Ballarat, Oct. 18.

(Special Correspondence).—The Kearsarge G. M. Co., T. F. Murray, superintendent and manager, has bought the Kearsarge mine, 12 miles west of Independence in the Sierra Nevada. The original values were silver and changed with depth to gold. The company will run a tunnel below the old workings, giving a total depth of 1000 feet below the apex and 400 feet below the old workings. A plant will be installed for treating the ore. An electric plant and power drills will be put in.

Independence, Oct. 18.

### Mono County.

Bodie reports say a strike has been made at Masonic mountain, 16 miles northwest of Bodie. A ledge 4 feet in width shows a 12-inch streak assaying \$300. Rich ore is being taken out at the surface and sacked for shipment. The discovery was made on Jump-Up-Joe claim, owned by Bryan, Dorsey & Phillips. The district has been organized and is connected with Bodie by wagon road. Claims are being staked out and the country is being located for several miles. The strike is ½ of a mile north of the mountain. The high altitude and severe climate will not allow much work until spring.

### Nevada County.

In the Ironclad mine, near Grass Valley, last week the bucket on the 8-inch pump broke, and before another pump could be put in place the water rose and the men were driven out of the mine. Superintendent McConnell says he will put in another plant of sufficient size to handle all the water which may be struck.

At Snowpoint, near Nevada City, the Santa Monica mine has been sold to E. Gregory & Co. of San Francisco which has had a bond on the property. Development work is in progress. The ledge is 2 feet wide and the rock goes \$10 per ton. The property is 5 miles from Relief hill.

In the spring the company will build a mill and put on more men.

Pumping out the lower workings of the Murchie mine is completed to the 700-foot level drift and men are opening up the ore bodies there. It is also stated the main shaft will be sunk 200 feet deeper. The main trouble seems to be to get expected results from the mill recently installed. It is said alterations will be made.

### Plumas County.

A. F. Eaton of San Jose, largely interested in the Tabor mine, in the Gibsonville ridge, and also interested in the Happy Hollow mine and adjacent properties in the Port Wine ridge, near Gibsonville, says the Tabor mine is working two 8-hour shifts in the face of the incline, which is in bedrock. They are under the gravel which was struck recently. There are sixteen men at work in the Happy Hollow mine and they will work all winter. Glinderman & Schofield are operating at the Swiftsure mine, 2 miles below Gibsonville. The Bunker Hill mine is working fifteen men, under management of J. K. O'Brien. The Bellevue mine, which had a fire on August 17th, has once more gotten everything under cover. The work of cutting down the tunnel floor to grade is progressing.

H. Kling at Gibsonville has taken charge of the Pilot Peak drift mine under an option and will increase development. The Pilot Peak is said to be on an extension of the channel running through Gibsonville ridge. Kling will have boreholes sunk on the channel to test its position and depth, after which a tunnel will be run from the Whiskey creek side of the ridge to tap the channel.

A San Jose company, with E. A. Hayes as president, has bought the Robinson mine in Granite basin, near Quincy, and will start development work.

### San Bernardino County.

(Special Correspondence).—The Yellow Aster M. Co. is working its 130 stamps to full capacity. The company still refuses recognition of the union and, though the latter is still strong in numbers, there is no open friction between the local union and the company.

The Adkinson Bros. have moved their 5-stamp mill from near Randsburg to their Sunshine mine, in the Stringer district, and are operating with satisfactory results. The Baltic mill, in the Stringer district, owned and operated by Wynne Bros., is running steadily.

The Red Dog mill at Johannesburg is running. A raise for air has been completed in the White mine and it will soon be on a producing basis. Development work on the Wedge mine continues to progress and it will be made a heavy producer. While there is no boom, steady progress is noticeable throughout the district.

Randsburg, Oct. 19.

### Santa Barbara County.

At Santa Maria, W. W. Orcutt of the Union Oil Co. reports he has secured a franchise for an oil pipe line right of way through San Luis Obispo county from near Santa Maria to Port Harford. The route has been surveyed and an 8-inch pipe will be used. The Union already has loading facilities at Port Harford for a large output of oil daily. At present the oil is shipped over the Pacific Coast Railway. This is the second oil pipe line franchise to be asked for through that section, the other being for the Arroyo Grande Co. The owners of two oil wells on the Lompoc anticline have struck oil. One of the wells is Lompoc No. 3, put down by a local company, the oil-bearing sand being struck at a depth of 3300 feet, and the drill is said to have pierced the sand to a depth of 100 feet, yielding twenty-four gravity oil. The other well is the Eefson well, the most western of the Lompoc group. This well was put down to a depth of 1500 feet, where a flow of 200 barrels a day was struck, but water worked into the casing, shutting the flow off. They sank deeper, and at depth of 2400 feet a second flow was struck. The well is yielding 1200 barrels daily.

### Sierra County.

P. Mason, superintendent of the Golden Scepter M. Co., operating a gravel mine near Bunker Hill, near Downville, says from five mine carloads of gravel washed two and one-half ounces of gold were cleaned up, an average of \$9 to the load. Preparations are being made to open the mine on a larger scale and twenty-five men will be put to work.

E. Westall of the New York mine, near Sierra City, has started work at the Marguerite mine. It has been shut down owing to more water than the pumps could handle. Heavier pumps are being put in.

### Siskiyou County.

At the Blue Ledge copper mines near the Oregon line, south of Jacksonville, Or., Superintendent G. W. Geddes reports



development progressing. It is expected they will take up their bond, build a smelter, and secure railroad connections for which a preliminary survey has been made from Jacksonville to Blue Ledge. The company also holds a bond on the Joe's Bar land on Elliott creek, where there is a location for a smelter and a town. Surveys have been made on Elliott creek and Joe creek to ascertain available power to be had for operating an electric power and light station. The current would be transmitted to the mines, 3 miles distant, where it would be used to operate a compressor and other machinery about the mine. Drilling in development work is being done by hand, but the company intends to put in a compressor and use power drills. Telephone connection will be established with Jacksonville. Superintendent Geddes has twenty-five men on the tunnels.

#### Tehama County.

(Special Correspondence).—The Basler M. & Dev. Co. mine, near Lowrey, is showing improvement as work progresses. The main tunnel cuts the limestone which is 210 feet wide. There are ore bodies 75 feet across on the hanging wall side of the limestone and 85 feet on foot wall of limestone. Drifts have been run near the hanging wall a distance of 200 feet and the copper values have increased from 7% at the adit to 18% at end of drifts, with gold and silver values. Near the foot wall a drift is in 50 feet and this will be extended 100 feet. The intention of the company is to run drifts both sides of the tunnel, also raises of from 100 to 200 feet at end of each drift.

Lowrey, Oct. 19.

#### Tuolumne County.

The electric power plant at Phoenix lake has started up again and power is available for all purposes. Many of the mines and mills that were compelled to suspend operations entirely or prosecute work in a limited way the past month are again in full operation, says the Sonora Democrat. The dry season this year has been short. The mountain dams of the water company are full.—The Moody mine at Big Oak Flat is being unwatered.

Work will be resumed on the Davis mine on the Trevithick place,  $\frac{1}{2}$  mile west of the Draper mine, near Soulsbyville, by Irish & Chandler, who propose to equip it with machinery.

#### Yuba County.

Near the site of the first two dredges on the Hallet farm, near Marysville, seventeen teams and scrapers are at work excavating a place 200 feet wide and 500 feet long where two more mining dredges will be built for the Hammon Co. Preparations are under way to build two dredges on north side for same company, and it is expected these six machines will be at work by next summer. A machine shop and additional boarding houses will be constructed. The two machines now operating are building up a double embankment between 20 to 30 feet high, one machine following the other and depositing its tailings alongside the embankment thrown up by the first one. The agreement with the Government calls for a single embankment, but after seeing the power of the Yuba river when the winter freshets come Hammon concluded to double the strength of the work. When completed, the Yuba river will have a wall over 20 feet high with a base of over 150 feet across the entire channel. It is expected this wall will turn the stream and cause the water to flow through the new cut-off. The expanse of river bottom back of the wall will form a large settling basin for future deposits of sand and gravel. This wall will be below the barrier being built by the Government and will be about 2 miles in length.

R. E. Cranston and W. C. Hendricks of Sacramento, who have been prospecting a tract of Yuba river land, near Marysville, have closed a deal for it. The tract contains 1200 acres and adjoins the Hammon tract on the north, west and south. The drills have shown it to carry workable deposits of gold, and two dredges will be placed on the property. They are expected to be in operation next spring.

A bond on the Albion Hill mine on the F. Hunt estate in East Bear River township, near Marysville, has been taken by Marysville and San Francisco men. There is a large body of quartz and low grade ore in Albion hill, and one of the first requirements is a tunnel to drain the mine. The Whitney quartz mine is 2 miles from the Albion Hill, and also is under bond and in course of development.

### COLORADO.

(Special Correspondence).—Business generally with the machinery and supply houses is reported not very active, although there has been a decided improvement the past month over the mid-summer months. The stagnation is traceable to the labor agitation, and now everybody is waiting for election to be

over. With but few exceptions, the mining camps are in a flourishing condition. Most of the men are busy who want to work and nearly all the mines are employing as many, if not more, men than heretofore. It is believed, when election is over, that there will be increase in the sales of machinery and supplies.

Colorado has secured several first prizes offered at the St. Louis Exhibition. The mining exhibit under the supervision of Commissioner of Mines E. L. White was awarded first prize. The exhibit sent from Colorado is valuable, as many of the specimens are almost pure gold and silver. The School of Mines at Golden has received word from St. Louis that it has been awarded the gold medal for its exhibit of practical metallurgical and chemical work conducted by the students under the supervision of some of the teachers.

Denver, Oct. 17.

#### Boulder County.

Tungsten ores are being produced in Nederland mining section of southern Boulder county, 4 miles north of Rollinsville. The owners of the Boulder county mine are putting in machinery and erecting a shaft building, work being in charge of F. W. Lake of Nederland. The mill at Nederland has been overhauled and it is running regularly on tungsten ores of fair grade. H. E. Woods is interested in the Graham lease and they have shipped three cars of tungsten ores to Denver.

#### Chaffee County.

The Manitou mine, in Hematite district, 10 miles northeast of Salida, has been bonded and leased to C. Johnson and J. W. Levon of Cripple Creek for \$50,000. Negotiations are also said to be pending whereby the Cripple Creek group and the Big Five mine will be transferred to Colorado Springs men.—A strike is reported made in Alder district, 20 miles southeast of Salida, showing a 5-foot ore body carrying gold, at a depth of 2000 feet, by the Spring Creek M. & M. Co.

L. Cavanaugh of the West Gold Hill M. Co. reports work progressing on that company's holdings in Taylor Park section, near Tin Cup. The company is erecting a cyanide mill and will have it in operation by Nov. 15.—The Woods G. M. & M. Co. is building a mill, the machinery for which is being hauled into the park by wagon from Buena Vista. It is hoped to have it in operation by December.

#### Clear Creek County.

Ore shipments from Idaho Springs mines for the nine months ended September 30 amounted to 1175 carloads. For the same period in 1903 the shipments were 898 carloads. Ten carloads of ore daily have been sent out so far this month, and Manager F. D. Wiley of the Chamberlain-Dillingham Ore Co. says shipments for October will exceed the shipments of any month in the history of the camp.

#### El Paso County.

J. D. Grant, manager of the Telluride mill at Colorado City, says they will reorganize the General Metals Co., pay off the indebtedness, improve the property and resume operations.

#### Fremont County.

Extension of the Santa Fe Railroad, being built from Rockvale to the mines being opened by the Victor Fuel Co., 7 miles south of Florence, is making headway. About 200 men are on construction work. This coal belt is known as Radiant and seventy-five men are constructing buildings for the town of Radiant. Near it three coal mines are being opened, each of which is expected to employ 500 men. Surveyors are locating site for the dumping station, the coal from the three mines to be dumped into the railroad cars at the same point.

#### Gilpin County.

J. H. Campbell of Russell Gulch has a two years' lease and bond on the Rover mine, in Russell district, south of the Saratoga group. The main shaft is down 320 feet and will be retimbered, as the mine has been idle for several years. Campbell owns two adjoining claims to the Rover. A plant of machinery and shaft buildings will be put up. The property was formerly wet, but the Newhouse tunnel is expected to drain it.—The United M. & Exp. Co. has finished putting in machinery and repairing buildings on the Modoc mine, on the "Patch," on Quartz hill, and will start sinking. The main shaft is down 180 feet and will be sunk below La Crosse tunnel level.

The Reed M. Co. has been organized to operate mines in Gilpin county by J. M. Champion et al. of Concordia, Kan. They have become interested in the Thompson and Bon Air mines, on Eureka gulch, west of the Nevada district, near Central City. The Thompson lode has been developed by a two-compartment shaft. In the bottom of the shaft there are 18 inches of quartz showing on the foot wall which gives average values of \$11 in gold,

30 ounces silver, with some lead. On the hanging wall there are 8 inches of quartz showing lead and iron sulphurets. It is intended to continue sinking the shaft and they have put up a temporary building and will put in hoisting machinery and a steam plant. W. J. Thompson of Nevada district, near Central City, is superintendent.

The Hampton Con. M. Co. reports that it will put in a plant of machinery at its Hampton mine at Russell Gulch. It will also arrange for shipments.—The Cashier G. M. Co., at Central City, will put in a larger hoisting plant and sink the main shaft, which is down 600 feet, says Manager B. Campbell. A large tonnage of smelting ores is being taken out.

It is reported that negotiations are pending for the sale of the Perigo mill, in Gambel gulch, near Perigo, to the Gold Dirt M. Co. It is equipped with thirty rapid-drop stamps. The Gold Dirt M. Co. will start it up on ores from the Gold Dirt mine, intending to run this winter at its present location, but next spring they expect to remove the mill to the tunnel entrance of the Gold Dirt property at a point lower down Gambel gulch.

Near Rollinsville, the Ideal G. M. Co. has resumed operations on Tip Top mountain on its group of three claims. In the spring they intend to put in a steam plant for deeper operations. The same company is interested in the Sunshine mine.—The Golden Sun M. & M. Co. has been incorporated. It owns and is operating a group of claims covering 200 acres on South Boulder creek, 3 miles west of Rollinsville. They have had men doing surface work all summer and have opened up ores, some of which carry \$3 to \$12 per ton. They have started a tunnel at foot of hill near the line of the Moffat Railroad. It is a double-track tunnel, 7x7 feet in the clear.

The Wilkes-Barre G. M. & M. Co. is continuing development work on its Baldwin group at Russell Gulch under management of J. F. Harrington. Drifting is being done in the 200 west level, while in the 325 east level the drifting has opened up 3 feet of vein matter which is being saved for milling. Crosscut has started south from the 325 east level. The work is being carried on from the Baldwin shaft, where there is a gasoline hoist. The company is also sinking on its Dark Horse lode. The company expects to build a plant for treatment of its low-grade ores.

Central City reports say shipments of smelting and other ores, concentrates and tailings to the smelters and other outside points during September amounted to 277 cars, or 5550 tons. This was the heaviest shipping month of the year, showing an increase over August of about 10%. The gain was due to the present low treatment charges offered by the American S. & R. Co. and by the Independent S. Co. operating in Golden. Increased tonnages are going to the local concentrators and stamp mills. The Spur Daisy mine is sending several loads per day from Negro hill to the Buell mill, which carry eight ounces gold per cord. The Eureka mine in Prosser gulch is also shipping regularly. Lessees have shipped several loads from the Kansas mine, on Quartz hill, which are reported to have given five ounces gold per cord. Parenteau & Co. have opened up ore on claims which they have leased in Quartz Valley district. These ores pan high and shipments will be made to the stamp mills.—Colorado and Eastern men have become interested in the Minnesota G. M. & M. Co., which has been incorporated by O. L. Beardsley, W. K. Gregory and A. S. Lamberton. The main office will be in Central City. The company has bought the Minnesota mining claim, south of Central. The shaft is being cleaned out.

#### Gunnison County.

(Special Correspondence).—The Raymond Con. M. Co. (see page 276) owns thirty-two claims in the Gold Brick district, on Ohio creek, 4 miles north of Ohio City. They are driving a 2000-foot tunnel to cut the Monte Carlo, Old Raymond and Midnight veins, which have been worked to a depth of about 300 feet from the surface, but on account of water had to be abandoned. The tunnel is in over 1300 feet and making an average of 8 feet per day. The work is being done with Norwalk compressor and Leyner drills. Several blind leads have been struck in the tunnel, some of which show values. As soon as the ore bodies are opened up the company will install a mill. The tunnel is lighted by electricity, the company owning its own plant. Little timbering is required in the tunnel. As soon as a shot has been fired steam is turned into the breast of the tunnel for several minutes, and then a blower is set in operation to purify the air. E. M. Lamont is manager and R. Hightower superintendent.

Adjoining the Raymond mines on the

north is the Gold Link mine, which is starting to drive a tunnel to cut the same veins as the Raymond Co. They are putting in a compressor plant and erecting bunk and boarding house. The tunnel is in 200 feet.

G. Brant of Pitkin is putting up a 10-stamp mill on the Golden Islet mine, in Jones gulch. The mill is about ready for operation and if it proves a success the plant will be enlarged.

Ohio City, Oct. 17.

The Big Comet mine, above the Citizen mine, near Pitkin, is being worked under lease and bond by the Columbia M. Co. of Washington, D. C., with R. Kahlow in charge. A vein of ore 5 feet wide, with a 14-inch pay streak on the hanging wall, carrying silver and copper, has been opened in the incline shaft.—F. W. Ferry and J. F. Murray have a lease and bond on the Bertha lode, in the gold belt, and have begun work. The tunnel is in 150 feet on the vein, which is 3 feet wide, assaying one ounce in gold.

#### Lake County.

At Leadville, Manager Goodwin of the New Monarch M. Co. says the company owns the New Monarch, Cleveland and Winnie claims, on Little Ellen hill, Evans gulch. A body of ore averaging \$10 per ton has been opened up for 1500 feet. It is 40 feet wide and 250 feet thick. The ore is too low grade to be shipped, but can be worked at a profit by milling, either concentrating or electrical separation. The company will build a mill.

W. A. Cunningham, at Twin Lakes, near Leadville, has put men to work on the Helen group of mines. The Helen group is owned by Chicago, Ill., parties. The group is 2½ miles from the lakes. A tunnel has been driven and will be continued.

Manager A. Boyd reports progress with development of the Fanchon mine on Sugar Loaf mountain, near Leadville. The shaft of the mine is on the mountain above Turquoise lake. Boyd is sinking it to the level of the proposed tunnel which he is preparing to drive from a point near the Colorado Midland tracks on northern slope of the mountain. The Fanchon is near the Dinero mine and the object is to extend the workings of the Fanchon to cut the Dinero vein, the extension of which is believed to pass through the Fanchon. Boyd has put in a plant of machinery.

#### Mineral County.

At Creede the Solomon and Ethel mines, on East Willow, which are being worked by Superintendent C. Loughridge, are preparing to sink the shaft to a depth of 500 or 600 feet and run drifts each 100 feet to ore, so that it can be stoped. They have put in a compressor. The Ethel mill, owned by the same company, produces high-grade zinc ore. An average of a day's run from the tables gave 61% zinc and 21% lead.—The Mollie S. mine, under management of R. S. Light, is shipping regularly, as they have put in a tramway from the mine to the road, so that the ore, which had to be packed with jacks and cost \$3 a ton to the cars, can now be loaded in the cars for 50 cents a ton, says Manager Light. Most of the ore from the Mollie S. is chloride of silver and high grade, carrying some copper and lead.

#### Park County.

At Tarryall, President Vanatta of the Apex C. Co. says ore bins are being built and more men will be put on stoping ore from the 12-foot vein, which assays 18% copper, \$3 gold and 10 ounces silver.—Manager Clancy of the Hayman G. M. Co. has operations under way on the Hayman mine, adjoining the Apex. The shaft is down 300 feet. He is putting in compressed air equipment and pumping machinery. The ore carries gold and copper.

#### San Miguel County.

The Black Bear M. Co., owning fourteen full claims, a millsite and water power in Ingram basin, near Telluride, reports development progressing. The south drift, which has been driven 600 feet from the intersection of the crosscut tunnel with the Argentine vein, is going ahead, showing values in gold. The vein is 8 feet in width. Within the next 100 feet the drift is expected to cut the Golden Crown cross lead. This vein is from 2 to 6 feet wide of brown quartz, free milling. No more ore will be sent out for treatment this fall, but the ore taken out in driving the drift and sinking the shaft will be piled on the dump for reduction next spring, when it is intended to build a stamp mill, a tramway and other improvements.

#### San Juan County.

At the power plant at the Gold King mill, near Silverton, a steam turbine which has a capacity of 315 H. P. is being put in. Eight jets of steam are conveyed to the cups of the wheel under pressure of 160 pounds. A small shaft 1 inch in diameter connects that wheel with an-



other set, from which the power is transmitted to two dynamos of 150 H. P. each. Engine, dynamos, etc., occupy a space of 8x10 feet. Steam will be generated by two marine boilers of 150 H. P. each. The power will be used to run the tailings plant, lately completed.

#### Summit County.

The Old Union M. & M. Co. is increasing work on Mineral hill, near Breckenridge. While mining is going ahead in the upper workings, where bodies of silver-lead-zinc ore are being blocked out, a contract to drive 250 feet on the tunnel has been let. Ground is broken and the foundation going in for a concentrating and separating mill in French gulch. The ore bodies developed through a shaft will be tapped at depth by a tunnel, and this tunnel will be driven during the winter months while the mill is under construction.

#### Teller County.

The Colorado Mica M. Co. has been organized by Duluth, Minn., men to operate mines in Teller and Fremont counties. J. A. Stetson, H. F. Rehbone, J. W. Harbison and C. H. Glover are directors. The company is operating properties near the Teller and Fremont county line, and is said to have opened up mica measuring 3 to 9 inches in width.

The Ajax Co., on Battle mountain, Cripple Creek, is working fifty men and the lessees about thirty. During September 600 tons of ore, average value \$30 a ton, were shipped. During October the value and tonnage will be increased, as new veins have been uncovered. Nearly all the ore being mined is from the seventh, ninth, tenth and twelfth levels. Besides this production, the company is doing development work.

The Cripple Creek Cyanide Co., whose plant is at Gillett, has started operations. While the company holds leases on several dumps in the district, they expect to treat a large tonnage from the mines around Gillett. The mill has a capacity of 100 tons per day.

Of the twenty sets of lessees operating on the Stratton's Independence, Ltd., mine at Independence, all are taking out ore, says the Cripple Creek Times, and they are shipping ten cars of ore per day. Among other mines shipping are the Golden Cycle, the Valley City, and the lessees on the Dead Pine. J. D. Fore, leasing on the Gregory of the Elkton Co., is sending out screenings that run ten ounces gold. The railroad officials say the tonnage now being hauled is heavier than it has been for several years.

### IDAHO.

#### Boise County.

Machinery and supplies are being taken in for the Dry Lakes group of quartz claims owned by L. Powell, and on which Green & Thompson of Spokane, Wash., hold an option. A chili mill, with capacity of fifty tons daily, will be put up, also a sawmill. The Dry Lakes claims are on the State wagon road, 4 miles from Banner, near Idaho City.

#### Custer County.

J. McGregor of Salt Lake City, Utah, operating mining interests at Bay Horse, says he has started development work. The properties are known as the Pacific group, operated by the Salmon River M. Co. Ore is being shipped.

#### Idaho County.

The owners of the Dewey mine are rebuilding the dam in south fork of Clearwater river, east of Grangeville. Nearly all of the dam was washed away by the high water last spring and the company has been waiting for low water before rebuilding. A 100-ton cyanide plant will be put in. Twelve men are at work.—At the Evergreen mine, 6 miles east of Grangeville, R. J. Howard et al. of Rosalia are working men and have 1000 feet of work done. On the Atlanta the tunnel is in 600 feet and has cut three ledges.

T. Parks says at Clearwater the Hawk-eye group, owned by Nez Perce men, is showing ore. They expect to put in a cyanide plant. They are running a 1000-foot tunnel on the group.

About sixty men are at work on the Sunnyside mine at Hump, putting in the 40-stamp mill, which will start next week.

—The Dewey mine is working thirty-five men and the mill is crushing ore steadily.—Twenty men are at work on the H. Y. group. Most of the work this summer has been on development, but a stamp mill is on the road and will be working this winter.

#### Shoshone County.

Work is being resumed at the Hunter mine at Mullan. The mill machinery has been overhauled.

At the Snowstorm mine, at Mullan, a compressor will be put in at the lower workings and a raise will be made to the up-

per workings. In the lower workings the ledge was tapped at a depth of 1072 feet. The upper workings are 400 feet deep. On the 400-foot level the ore body uncovered was 42 feet wide, which is claimed to run 8", in copper with gold values. It is expected the leaching plant will treat the low-grade ores at a profit. This plant is partly completed, but work is suspended. The lessees of the upper workings are shipping 160 tons of copper ore daily to smelters. About fifty men are working.

The Silver Star M. Co. has been incorporated by W. H. Batting, R. Stevenson, C. H. Maiden and W. J. Bracking of Wallace and E. Fleming and E. J. Flanagan of Mullan, to operate Coeur d'Alene mines.

Manager E. P. Spaulding of the Monarch M. Co. of Murray will build a concentrator of fifty tons daily capacity. The vein has been opened 350 feet deep, and development shows high-grade galena. While roads are in good condition it costs \$7 per ton to transport ore to the railway. During bad weather the cost is increased to \$10, says Spaulding.

The Reno-Idaho Con. M. & M. Co. has been incorporated by Spokane, Wash., men, including E. J. Dwyer, R. H. Voorhees, T. Ryan, C. Eckel and W. R. Newport. The company owns a group of claims on Military gulch, above Burke.

### MICHIGAN.

#### Keweenaw County.

The Kearsarge lode has been cut by the Allouez mine at Allouez, the lode having been tapped by a diamond drill. A shaft 1000 feet in depth and of 80° pitch reaches to within a short distance of the lode, says the Mining Record, but the final work was done by diamond drill, as the shaft must be continuous, and a curve is required to connect the 80° section above with the 40° section that will follow the dip of the lode. To start the curved section at the right point, it was necessary to locate the bed exactly before opening it. Several weeks will be required to complete the curved section and reach the lode with the shaft. The hoist for the Allouez is being built. Foundations are built for the engine, which has capacity to hoist six-ton loads from a depth of 6000 feet at a working speed of 2500 feet per minute and a test speed of double that limit. For milling facilities the Allouez will have one head at the Centennial mill.

#### Ontonagon County.

At Victoria, the Victoria mine reports progress in removal of the Belt mill to the Victoria millsite. The mill will go into commission about May, 1905. The mine is said to be sufficiently opened to begin production, and but little further work will be done underground until the mill is ready. Much work is in progress, however, on surface, both at the millsite, where foundations are being built for stamps and washing machinery, and at the power station, where 5000 H. P. from Glenn Falls of the West Branch of the Ontonagon river are being developed by means of a combination of dam, canal and shaft, by which the energy of the water will be transformed into compressed air, which will be piped to both mine and mill and made to operate machinery in same way that steam is used at other copper mines of the Lake district.

### MISSOURI.

#### Jasper County.

The Good Friday M. Co. at Joplin is sinking another shaft east of the old millsite. The superintendent expects to have his mill in operation by Dec. 15.—O. Baker, P. Burress, S. Smith et al. have leased thirty-six lots known as the Old June property on the Thousand Acre tract and have the water pumped out. Several sub-lessees have gone to work. There are two runs of ore, one at 60 feet and the other at 125.

C. D. Harris, J. Westcott, K. Bailey and C. Sallee have leased the Luke & Brown mine and mill No. 8 on the Keller land, south of Webb City, and are operating the same. They have opened up ore carrying lead and jack.—The South Portland mine is breaking into ore with its shaft and the dirt carries both lead and zinc in paying quantities. This shaft is said to differ from the usual in the sheet ore belt for the reason that the top of the sheet ore run carries rich dirt, whereas ordinarily the dirt is lean.

At Webb City the Fullerton M. Co. has leased the Blue Wing grounds and started operations.—The Opal Wonder M. Co., after being shut down for repairs, has resumed operations under management of C. B. Gammon of Carthage.—L. L. Harrington, W. Hall, et al., have begun operations at a prospect on the North Carterville ground. They run their ore through the custom mill.

### MONTANA.

#### Carbon County.

S. S. Glidden and Chicago, Ill., and

Minneapolis, Minn., men have bought all of the properties of the Bridger Improvement Co. and that of W. A. Clark in Bridger. Included in the properties are the Bridger coal mines, the townsite of Bridger, comprising 640 acres, and water power in the Clarks Fork river, estimated at 5000 H. P. It is intended to make improvements and a mill for handling of gypsum from the works near Bridger will be built with a capacity of 100 tons per day.

### NEVADA.

#### Humboldt County.

T. Trelfall of San Francisco, Cal., is reported to have bonded the Humboldt Queen and other mines, near Lovelock.

The Ohio-Nevada M. Co. of Salt Lake City, Utah, has been incorporated with L. V. McKesson as president; G. V. Parmelee, vice-president; W. G. Adamson of Salt Lake City, Utah, secretary and treasurer. The company owns a group of eight claims.

#### Lincoln County.

The North Star and the Talisman mining claims at the Point, 4 miles west of Pioche, bonded to C. E. Rives of Salt Lake City, Utah, have passed to the Pioche Con. M. Co., which Rives et al. of Utah have organized. Final payment has been made on the group. Several promising ore shoots are reported found on the claims, covering a length of 500 feet.

L. Syphus, of Panaca, reports getting out free gold and lead-copper ore from two groups of mines, the Marguerite and Winona, 18 miles south of St. Thomas, on the Virgin river, and about 50 miles from Moapa, on the San Pedro railroad. The groups are owned by L. Syphus with R. C. Lund, E. Brown and F. Burgess of St. George, Utah. They consist of sixteen claims and have fissure veins between granite and schist walls. There are 2 feet of ore assaying \$28 per ton. The quartz is honey-combed, carrying hematite and free gold. The lead-copper properties show 40% lead and values in copper. They have completed 300 feet of work. The lead-copper ledge is 4 feet between walls.

#### Washoe County.

The Electric M. & R. Co., which is between Reno and Sparks on the Southern Pacific railroad, has resumed operations after an idleness of two years. The plant is owned by H. D. Corey and L. Williams of Boston, Mass. They will start operations on 1000 tons of ore from the company's mines near Lovelock, in the Trinity and Arabia districts. The ore is free-milling gold and silver sulphides. The company has entered into a lease for two years with option of buying, with the Nevada M. & R. Co. of California, and on completion of the present run the mill will be turned over to that company. The lessees intend to install a leaching process for treatment of low-grade ore.

The Springfield-Nevada M. Co., at Olinghouse, near Wadsworth, has a large body of free milling ore with its ore bins and mill bins full. Superintendent J. D. Poole reports that the company will build more mills and take water in from Fort Defiance to enable them to treat at least 250 tons per day. The entire mill system will be changed and all mills consolidated at or near the mouth of Free Canyon.

### NEW MEXICO.

#### Colfax County.

A strike is reported from Elizabethtown, on the Hidden Treasure mine, owned by the Jetta G. M. & M. Co. A 3-foot vein was uncovered.

#### Grant County.

It is said funds to discharge all obligations of the American Con. C. Co. have been raised in addition to funds for building a treating plant at Lordsburg. Work will resume in the company's mines, near Lordsburg.

The 200-ton smelter at the Comanche M. & M. Co. at Silver City was completed October 15.

### OREGON.

#### Baker County.

Ten stamps are dropping at the Alpine mine, near Sumpter, says Superintendent Addoms. The mill is of twenty stamps and the second ten will be put in operation next week. The principal ore shoot opened is in the Alarm vein, showing a width of 7 feet of high-grade milling ore for 400 feet.

Gilkey & Kershaw, in the Greenhorn mountains, near Greenhorn, are putting in a 3-stamp mill on the Belmont mine. The group, comprising five claims, is on Vincent creek  $\frac{1}{2}$  mile from the company's placer ground. Three veins have been opened, one showing a width of 14 feet, assaying \$5.

The Lucy group, near Greenhorn, has been sold to the Greenhorn G. M. & Dev. Co. for \$10,000.—S. R. Stott and E. Sullivan of Sumpter, former owners of the

Lucy, will increase development on the Earle, which is a continuation of the Lucy. The drift on the vein is in 350 feet, giving a depth of 225 feet, showing a width of 22 feet with gold values.

Work has resumed on the Cracker-Oregon mine, near Sumpter. Work will be resumed in tunnel No. 2, which has been run 700 feet on the east vein, and it is expected a drive of 350 feet will reach the intersection of the east and west veins, giving backs of 450 feet, says Manager Bellman. Tunnels Nos. 1 and 3 have also opened up the east vein, the former being in 490 feet and the latter 600 feet. The vein is 3 to 5 feet in width. A shaft has been sunk to 100 feet and 350 feet of drifts and crosscuts run.

Manager Wright says Superintendent Allen has the shaft at the Black Butte down to the 145-foot level and a station cut. The mill of fifty tons daily capacity is in operation.

At the Friday mine, near Sumpter, J. F. Shelton, of the Sorensen Co., says the drifts are showing high-grade shipping ore from which the men are putting up 100 sacks daily, that will net, after all expenses of mining, transportation and smelting, \$100 per ton. Mill work has been temporarily suspended pending installation of jiggling plant.

The main tunnel driven on the ledge of the Hidden Treasure group, Greenhorn district, near Sumpter, is in 250 feet and will be extended to 400 feet, which will bring it beneath outcrop that showed a 12-foot vein of milling ore. The property is on Big Boulder creek and is owned by A. E. Dageny et al. of Portland. Dageny is also owner of the Co-operative group, 4 miles from Sumpter. He has put men to work in the crosscut tunnel and will extend it to the ledge. The crosscut is in 200 feet. Ore has been taken from the shaft sunk on the vein.

The Sterling mine, near Jacksonville, owned by H. Ankeny, V. and J. W. Cook, is ready for the winter run as soon as there is sufficient water. The ditch, 27 miles long, that brings in the water from Little Applegate, is cleaned out. Four giants will be used to wash down the gravel.

Near Sumpter the Huntington mill at the Columbia mine is set up. Five stamps of the old mill were removed, reducing the number to fifteen. The change is claimed to double the capacity of the plant. Ore is being taken out of Nos. 1, 2 and 3 tunnels, above the collar of the main shaft.

#### Columbia County.

W. W. O'Connor of Grants Pass says he will resume operations on his group of mines at St. Helens.

#### Douglas County.

At Bohemia, the 10-stamp mill of the Vesuvius mine has been put in operation. Ore is being broken in the stopes.

#### Grant County.

At Susanville the compressor plant for the Badger mine is completed. It consists of two 12x14-inch cylinders direct connected to a 10-foot Pelton water wheel running between them. The wheel takes water from a 14-inch pipe leading from a ditch giving a 240-foot head.—The Goldbug Co. has its hoist and head frame in place. A 40 H. P. boiler and a No. 6 pump are on the ground and sinking will be resumed.

#### Lane County.

A pumping plant is being built for the Lucky Boy mine, at Blue River, to raise water, after being used once in the batteries, for use again. All the stamps of the Lucky Boy have not been dropping, owing to a scarcity of water. Water has been developed in adjacent canyons, but the dry weather has caused the supply to be insufficient. Water is being developed in tunnel No. 6, or the main adit, for the leaching plant. The electric power with which the Lucky Boy is equipped will be used in pumping water back for second use. Such will have to be resorted to only in unusually dry seasons. The Lucky Boy is at an elevation of 3100 feet above sea level.

#### Josephine County.

The Southern Oregon M. & Dev. Co., composed of Portland men, is shaping its placer mine of Jump Off Joe district, near Grants Pass, for running this winter. The ditches have been cleaned and the flumes repaired, new piping laid and the whole property overhauled. The water supply will operate one giant night and day. The ground is an old channel, with banks from 5 to 20 feet deep, carrying values in coarse gold.

F. J. Catterlin et al. of Portland are making progress in development of the Bone of Contentment mine of Williams district, near Grants Pass. Over 700 feet of development work is done and a body of ore is uncovered for the mill.

The group of seven claims owned by the Almeda M. Co. of Portland is on Rogue river, 25 miles west of Grants Pass and about 3 miles below Galice Creek



postoffice. The ledge, 200 feet in width, strikes through the mountain nearly north and south, in slate formation, with diorite on the west. Rogue river, cutting through, exposes the entire width of the ledge. Covering the mineralized rock or ore body is an iron capping 40 feet in thickness. The lower tunnel which is developing the property is about 50 feet above Rogue river. This tunnel is in 275 feet and several crosscuts have been made which show the ledge 30 to 40 feet—all payable ore. The upper tunnel crosses the ledge 300 feet above and shows 30 feet of ore. The ore in lower tunnel assays from 1% to 8% copper and \$2 to \$10 in gold, while the upper tunnel ore gives values of \$7 per ton. South of this property the company owns two claims in a different formation and having low-grade ore. There are 160 feet of tunnel work; the lowest point is at 150 feet below the surface. The company intends building a road from the mine to Leland station, on Southern Pacific, a distance of 11 miles, with about 5% grade to overcome. The company proposes building a 200-ton smelting plant, which will be installed this winter. There are fifteen men at present on payroll of the Alameda mine. Headquarters are at Portland; O. M. Crouch, president; R. C. Kinney, secretary; J. F. Wickham (at the mine), manager.

## SOUTH DAKOTA.

### Custer County.

E. Collins of Fort Dodge, Iowa, part owner of the Mile High mine, near Custer, says work will be resumed.

### Lawrence County.

Lead reports say the Columbus Con. G. M. Co. has reorganized, with W. Saunty of Stillwater, Minn., as president.—The Quaker City G. M. Co. is working men on its mines in southern Lawrence county, south of Elk creek, near Roubais, running a tunnel and sinking. The company owns 1280 acres of ground, on which there is surface showing of ore.

The Spearfish G. M. & R. Co. for the month of September reports proceeds amounted to \$35,000. The ore was short of the tonnage treated in August, owing to interruptions. It reached 7500 tons. The ore carries from \$4 to \$5 a ton gold. In development work during the year the company has driven 7000 feet of drifts and heading. For the first five months of the year the mill was supplied entirely with ore taken out in course of development work. The plant is now receiving half its supply from development drifts and the other half from stopes. The main office of the company is at Colorado Springs, Colo., and the mines are in the Ragged Top section west of Lead.

The Bear Gulch G. M. & M. Co. and the Bear Gulch-Gold Hill Co. are reported preparing for consolidation. Their properties are adjoining in Bear gulch, west of Lead.

On the Victoria group in the siliceous ore district of Spearfish and Squaw creek, west of Lead, Superintendent Jackson says five shoots of ore from 6½ to 24 feet in width have been opened up. It is intended to build a 500-ton treatment plant. The company owns millsites and water rights on Squaw creek. Ore will be delivered to the mill by gravity.

The Clinton claim at Terry, owned by T. W. Thompson of Whitewood, is reported under bond to Eastern men. The Clinton adjoins the Buxton, owned by Lundberg, Dorr & Wilson.

The Ruby M. Co., operating at Galena, proposes sinking a shaft several hundred feet deep, to serve the double purpose of supplying water for the mill and exploitation of the ore bodies. The company expects to get water for mill operations either in that manner or by pumping from Bare Butte creek, a distance of ½ mile, and about 200 feet lower than the plant. The company also intends to increase the efficiency of its mill by adding a cyanide equipment. J. Z. Conzett is superintendent.

G. P. Baldwin, manager of the Eleventh Hour M. Co., near Deadwood, says he will build a milling plant at the mine. Work in the mine will begin Nov. 1st, and Superintendent Madill will get out logs and start a sawmill to cut lumber for the cyanide plant.

The Goldstake M. & M. Co., near Lead, will put in a plant of machinery to increase development, including a 10 H. P. gasoline engine, a dynamo and two electric drills. With this equipment the company will open up its mineral lands west of the Matland mine. There is a tunnel in on the ground 500 feet showing two low-grade veins. At 460 feet from the portal a winze connects with the surface, giving ventilation.

E. Hansckha, president of the Deadwood-Standard M. Co., operating in Ragged Top district, west of Lead, says development work is being done to open up a supply of high-grade ore to mix with the low-grade already opened up,

when milling will be resumed. Churn drills have been put in.

Fifteen more stamps have been put in operation at the Horseshoe mill, near Deadwood, making seventy-five stamps dropping. Good cleanups are being made, says Manager McLaughlin.

## TENNESSEE.

### Polk County.

The Tennessee C. Co. at Ducktown during 1903 produced 10,690,389 pounds of fine copper, compared with 8,103,534 pounds in 1902. A third furnace and a larger blowing engine have been built, which, says President J. P. Channing, will raise the output to 14,000,000 pounds. The company is increasing smelting equipment from three to six furnaces, and the capacity from 300,000 tons of ore per year to 600,000 tons. They are carrying out the plan of smelting "green" or unroasted sulphide ore, to reduce operating costs and increase extraction. Manager R. Adams in his annual report says there were hoisted from the Polk County mine 75,153 tons of ore, from the Burra Burra 120,046 tons, and from the London 92,266 tons, a total of 287,425 tons. Details of operating costs are given at:

Items.	Per Ton of Ore.	Per Lb. Copper.
Mine development.....	\$ 1343	0.36
Mining, hoisting, etc.....	6696	1.78
Crushing and sorting.....	0761	20
Railway.....	1454	38
Roasting.....	3500	88
Ore in process in roast yards.....	0442	12
Blast furnace.....	1 1437	3.04
Engineering and laboratory.....	0234	.09
General.....	1443	.18
Converting.....	2692	.72
Cost of fine copper in pig.....	\$2.9892	7.95
Refining.....	0971	.25
Cost of fine copper as ingot.....	\$3.0663	8.20

## UTAH.

### Utah County.

Superintendent N. Dunyon of the Scranton M. Co., near Eureka, in Tintic district, reports he is putting in a gasoline engine and a three-drill compressor.

The Utah mine of Fish Springs proposes sinking the main working shaft to the 1000-foot point. Superintendent C. Crismon says the ore bodies below the present lowest workings will be opened up. The mine has been operated only above water level and no pumps have been necessary, except the one employed to supply the engines and camp with water, which is obtained from a winze sunk from the 800-foot level.

### Piute County.

The Sevier Con. mill in Gold mountain mining district, near Marysvale, is in operation.

On Gold Mountain, near Marysvale, Manager P. A. Franklin of Salt Lake City of the Gold Dev. Co. reports opening up ore bodies in the tunnels, and a milling plant will be built.

### Salt Lake County.

To more economically handle its output and to increase tonnage that its enlarged smelter will require, the Tintic M. & Dev. Co. will equip the main tunnel by which its Yampa group of mines at Bingham is opened with an electric locomotive, says the Tribune. The tunnel is in 1 mile. With the enlargement of the smelter the locomotive will be required to handle at least 450 tons a day. The management is making raises and chutes, says Manager G. H. Robinson.

Sinking within the copper, gold and silver-bearing zone of the Utah Con. M. Co. at Bingham has been resumed after the installation of equipment, and the vein will be opened to a depth of 900 feet. The winze, says Manager Channing, will drop down with the foot wall and on the 900-foot level crosscutting will begin. On the 800-foot level the ore body shows a width of 150 feet between walls. The furnaces are reducing an average of 700 tons daily.

H. W. Crowther, manager of the Continental-Alta mines at Alta, reports work progressing at the mine and at Tanner's Flat, where construction of the mill is under way. Machinery is being set up. While it is the ultimate intention of Manager Crowther to put in an electrical plant, this work will not be undertaken at present. A water wheel will be put in at the mill. More energy than required will be obtained through the use of about one-third of the water to which the company has secured title in Little Cottonwood creek. A contract for the aerial tramway to be installed is under consideration.

At the Galena mine, in Bingham, the management of the United States M. Co. reports progress in development. A drift is being run along the strike of the new vein on the fourth level. While this work is going ahead, other men are running a crosscut to the Galena vein. The aerial tramway, 1656 feet in length, is being installed, and Superintendent Allen

says it will be ready for operation November 1.

The Queen mill at Bingham, with which the Butterfield M. Co. is concentrating low-grade ore, is reducing 100 tons daily under direction of F. Whitmore. The work is on ores with average of 8% lead, fifteen ounces in silver, with gold. Ores are blocked out in the mine. The mill is equipped with two tables, three vanners and five jigs. The middlings are returned to the battery bins, where they are resorted to a 14-mesh, and the result is said to be satisfactory.

### Summit County.

The Ontario drain tunnel will be extended into Daly-West territory, contracts for which have been signed by the Ontario Co. and by the Daly Co., says Manager J. E. Bamberger of the Daly-West. The Daly-West is to pay the Ontario and Daly companies, the tunnel being owned jointly by them, an annual rental of \$9000. The tunnel will be extended by the owners to the easterly end lines of the Daly-West territory without cost to the latter and then the Daly-West Co. will take up the work and pay the cost of driving in its own ground. The contract also provides that if the Daly-West wants to mine through the tunnel it shall have the privilege. It is said it costs the Ontario and Daly companies \$5000 per year to keep the tunnel open and in repair; that it cost \$1,000,000 to build it; and that the extension of the tunnel will open and drain the Daly-West mine at an additional depth of 600 feet vertical and about 900 feet on the dip of its ledges. Driving the tunnel will be started this week by Manager C. L. Rood of the Ontario and Daly companies. There are between 700 and 800 feet to run to reach the western limits of Daly ground.

The men have been withdrawn from the upper workings in the Quincy ledge, in Daly-West ground, says Vice-President Wood, as the management has suspended production from that source until connection is made through an opening advancing from the Daly-West workings proper. This will overcome the expense of hoisting and hauling the output from the Quincy ledge around the hill.

Work has been discontinued for the winter at the Lone Pine mines in Snake Creek district, near Park City. The tunnel is in 150 feet.—The Lubeck mill in Empire canyon is grinding steadily. The mill is equipped with a revolving screen and a concentrating table, power being furnished by a water wheel, which utilizes the flow of water from the creek on which the plant is built.—Retimbering of the Hanauer tunnel (the Kearns-Keith) is complete, the new track and rails have been laid and everything is in readiness for the mine locomotive. The boilers at the mill are in place. A compressor has also been set up.—Mules have been put on the 1400-foot level of the Daly-West mine for handling the ore trains.

### Tooele County.

G. St. Clair, operating on Lion Hill, near Mercur, says plans are made for remodeling the Chloride Point mill in which it is proposed to treat the low-grade ore of the property. Meanwhile they are also arranging for development of a new group of claims underlying the Zella. It is intended to drive a tunnel into the group to tap the ledge at depth.

That the gold-bearing ore opened up in Herschel ground through an opening from the Sacramento workings may be provided with an independent outlet, says Manager J. Smith, the management will begin driving a tunnel connection with the ore bodies to be made at a point between 400 and 500 feet from its mouth. The mine will be equipped with a mill after the tunnel is completed. Sampling of the ore bodies shows an average of \$5 gold per ton.

### Washington County.

C. H. Doolittle, manager of the Utah & Eastern M. Co. properties, consisting of the Dixie mines and smelters near St. George, says connection will be made through the main shaft with the main ore body this month, when he will be able to double the output. On the lower levels are exposed ores of good grade. The smelter equipment will be increased.

## WASHINGTON.

### Ferry County.

S. R. Delbridge of Seattle, manager of the Oversight M. & M. Co., says operations will be resumed in the Oversight mine on Belcher mountain, near Republic. He will complete a tunnel driven last year toward a shaft, in which there is ore of paying value, and hoist the ore and ship it to the smelter. It is said to carry \$15 a ton in gold.

### Okanogan County.

H. Barbs, manager of the Copper World Extension M. Co. of Loomis, says he will increase development on the Copper

World Extension group, which adjoins the Palmer Mt. Tunnel Co. mines. He will sink a shaft 500 feet and open up levels. The Palmer Mt. Tunnel Co. will put in an electric plant this fall, to continue the Palmer Mountain tunnel into the Copper World Extension ground. The distance the tunnel is to be extended is 5000 feet, and the depth to be gained is 4000 feet below the summit of the mountain. The Palmer Mt. Tunnel Co. will defray all expenses and the Copper World Extension Co. will take out ore from its own ground, run it through the tunnel and pay a royalty for the privilege. Barbs says the shaft will have two compartments for hoisting and another compartment for manway and pump line.

A ventilating plant has been put in and is operating with water taken from a tunnel of the mine, says S. E. Barron of Spokane, president of the Q. S. G. M. & S. Co. This fall they will put in an air compressor and six machine drills. The main tunnel is in 900 feet, and has cut three ore-bearing veins. The values are copper and gold. The ledge is 400 feet in width and runs \$5 per ton. It is intended to eventually install a smelter. There is yet a great deal of development work to be done. The property of the Q. S. company embraces fourteen claims, 11 miles from Conconully.

### Stevens County.

The Roselle M. Co. has been incorporated by J. B. Moseley, W. S. Thyne, A. Schulze, H. M. Moseley and G. Schulze at Spokane, to develop a section of mineral land on both sides of Cottonwood creek in center of the Colville Indian reservation, near Colville.

## WYOMING.

### Carbon County.

The smelting works of the North American C. Co. at Encampment have increased their output until 41,000 pounds of blister copper, 99% pure, is being turned out daily, or a total of 7482 tons a year. The value of the output is \$1,795,800, which is said to be largely profit, as after smelting and converting the ore runs \$20 per ton in gold, sufficient to pay for the cost of smelting. The North American C. Co. is composed of Colorado men headed by J. S. Cary of Denver.

### Laramie County.

J. J. Hauphoff of Hartville says he will open up and develop his onyx and marble mines near Hartville. A \$10,000 plant of machinery will be installed for quarrying the product and a polishing factory will be built.

## FOREIGN.

### AUSTRALIA.

#### Queen Island.

The report of the Mount Morgan G. M. Co., Ltd., operating at Mount Morgan, for the year ended May 31 last, shows:

Gold produced.....	\$467,428
Copper produced.....	15,485
Interest, etc.....	3,221
Total.....	\$486,134

Mine and reduction costs.....	\$318,797
Leases.....	730
Railroad charges.....	6,993
Royalties.....	5,274
Total.....	\$331,794

A total of 686,770 tons of rock was handled during the year, divided as follows:

Material.	Tons Underground.	Tons From Open Cut.
Oxidized ore.....	416	118,139
Sulphide ore.....	117,523	.....
Copper-gold ore.....	3,466	.....
Sulphur ore.....	1,147	.....
Limestone.....	153	.....
Waste rock.....	16,702	122,599
Overburden.....	.....	305,625
Totals.....	139,407	547,363

Steam shovels were used to remove 219,105 tons of the overburden, the balance being handled by contract. Mine manager says development included 1058 feet of sinking, 2274 feet driving, 10,135 feet diamond drilling. There are three diamond drills in steady operation. The steam shovel plant consists of one 65-ton Bucyrus shovel, two 10-ton locomotives and 20 side-dumping cars of 4 cubic yards capacity. A shovel of 10-ton lift and another locomotive, with cars, will be added to the equipment. "Exploratory work has been carried on almost entirely by diamond drilling." The reduction works treated 118,906 tons sulphide ore, 118,555 tons oxidized ore and 30,794 tons tailings, producing 122,252 ounces bullion carrying 109,903 ounces fine gold. There were 157 tons of copper matte produced containing 75 tons copper and 1794 ounces gold. Treatment costs were:

	Per Ton.
Sulphide ore at Mundic works.....	\$3.20
Oxidized ore at West works.....	3.44

These show decrease of 44 and 37 cents per ton, respectively, from costs of previous year.



## BRITISH COLUMBIA.

## Boundary District.

Men are working at the Lancashire Lass mine, in Summit camp, which has been bonded by the Montreal & Boston C. Co. The ore dump of the Brooklyn mine has been sold to the Montreal & Boston Co. by the Dominion C. Co., but it is to be delivered by the latter company at the smelter.—The Greenwood-Strathmore Mines, Ltd., is being formed to operate the Strathmore claim, near the Providence, which has been bonded. S. Curtis of Rossland is interested.

Diamond drilling operations are under way at the 300-foot level of the Old Ironsides mine, at Phoenix, to decide on the best point at which to sink.

The head office of the Granby M., S. & P. Co., operating at Phoenix and Grand Forks, has been transferred from Montreal to Grand Forks, control having been sold to Boston, Mass., and New York men. The annual report shows the amount received from production for the past year was \$2,948,551, and from rents and land sales \$17,795, or a total of \$2,966,347. Against this there was working expenses of \$1,814,216, and the cost of foreign ore and matter \$868,619, making a total of \$2,682,835, leaving net profits for the year \$283,500.

The Athelstan-Jackpot mine, in Wellington camp, is sending out a car of ore daily.—Development on the Silver Cloud and the Silver King mines, adjoining each other in Skylark camp, is showing ore values.—Work has been started on the Last Chance mine, which has been idle for five years. It is owned by the Spokane-Boundary M. Co. The work is in charge of D. W. McVicker. The Last Chance has machinery equipment. It is 2 miles from Phoenix, toward Greenwood, and it is said that a long tunnel will be driven to strike the ore body at depth.

At Phoenix the Snowshoe's machinery in the compressor building has been overhauled, says Managing Director A. J. McMillan. The Snowshoe ceased operations Dec. 16th last, after shipping 100,000 tons of ore. It has a machinery plant, including an electric hoist.

## East Kootenay District.

The waters of Perry creek have been turned into the flume of the Perry Creek Hydraulic M. Co., near Fort Steele. For three years the company has been prospecting the ground and equipping with flumes, pipe lines and monitors. Roads, trails, tramways and sawmills have been built and mining operations begun. The ground to be piped away is a ridge above the bed of the present stream and at the falls of Perry creek. From the bottom to the top of the ridge is 600 feet. All the water of Perry creek has been brought to the top of this ridge by flume and pipe line 5 miles long. Two monitors are set up and connected.

## Rossland District.

Placer mining operations have been started by P. H. Craven of Rossland on the west bank of the Columbia river. He has a 100-ton plant in operation and has taken up placer locations on the Columbia about 2 miles down the river from Waterloo. Water for sluicing is being pumped from the river, and the same power runs the amalgamator. A steam engine is used. At present Craven relies on the plates to secure all the gold, but later riffles will be placed in the sluice boxes and another plant put in, including an arrastra. The gravel is said to average 40 cents per yard. Craven reports handling the material at 15 cents a yard. The gravel bed is 30 feet in depth. Water is pumped against the face of the gravel bed, the boxes being kept continuously against the gravel. This brings the material steadily down the sluice and over the plates, where the gold is amalgamated. Much of the values is in fine or flour gold.

## Slocan District.

(Special Correspondence).—At a time when zinc is worth 5 cents per pound, as against 2½ cents which the British Columbia miners receive for their lead, it is encouraging to see that the Kootenay districts of British Columbia are not continuing to remain unmindful of their deposits of high-grade zinc. The Lucky Jim mine, near Sandon, has completed shipment to the sampling works of the Kootenay Ore Co. at Kaslo of 1000 tons of zinc ore, which has been sampled in four lots of 250 tons each, giving results of between 50% and 60% zinc. The Slocan Star and the Ruth at Sandon and the Jackson mines have adapted their concentrators to turning out separate products of zinc and lead concentrates, and the first two have large piles of zinc concentrates awaiting further treatment of magnetic separation by which the zinc contents can be raised to 50% or over. To supply the want for this process the Kootenay Ore Co. is adding to its sampling works at Kaslo a zinc separation

plant, and which will be in operation when the concentrators resume work next spring. At Rosebery, on Slocan lake, a similar plant is being built by C. Fernau to handle the zinc concentrates of that district.

Kaslo, Oct. 16.

M. S. Logan of Nelson has an option on the Mountain Con. mine, near Slocan City, for \$55,000.—A lease and bond on the Cowboy and Texas groups, on Spring creek, have been taken by H. Newcomb, D. W. Moore and J. A. Whittier and work started. The amount of the bond was \$20,000.

At Sandon there are seventy men working at the Ivanhoe mine.—The Jackson concentrator is being overhauled.—The Slocan Boy mine at McGuigan has been leased to R. H. Gordon et al.—The Slocan Star mill at Sandon has closed down owing to a lack of water.—A. Peterson has a lease on the Ontario mine, near Cody.—Work is being resumed in the old workings of the Surprise mine at McGuigan.

W. W. Van Baun of Philadelphia, Pa., part owner of the Rockland group of copper claims, near Silverton, on Slocan lake, says development work has been started and the properties will be equipped.

At Sandon the Slocan Star mine has 3000 tons of zinc ore at the concentrator for treatment at the Rosebery plant.—G. W. Hughes is taking out zinc from the Lucky Jim and testing it at the Kaslo sampler. He has thirty carloads ready to ship. A strike of galena was made last week.—W. J. Richards and J. Williams, lessees of the Joe Joe, have started another tunnel 100 feet lower down the hill to tap the gold-bearing vein. They have put on more men. They have 300 sacks of ore piled up, and will make a shipment this week.

## West Kootenay District.

At Camborne, the Silver Dollar Co. reports opening up ore. An air compressor plant and a sawmill are being put in.

## MEXICO.

## Chihuahua.

H. E. Cary and R. J. Coleman of Salt Lake City, Utah, have completed a 20-stamp mill at the Lluvia de Oro mine in Chihuahua, near Choix, Sinaloa.

## Lower California.

E. Borton and F. Aguilar of Nogales, Ariz., who have been engaged in placer mining on the concession owned by C. Ramirez, report they will organize a company to put in heavy pumping machinery, a pipe line, etc., and proceed to hydraulic operations.

## Sonora.

The Missouri-Mexican M. Co., T. W. Foster manager, which has properties at Todos Santos camp, near Suaqui de Batuc, will increase development this winter. The shaft will be sunk to 300 feet and a tunnel run 250 feet on an ore body assaying 400 ounces silver on the surface. Todos Santos is an antigua camp.

The Ures Con. M. Co., has contracted with the Vega M. Co., operating the San Jose mine, an adjacent property, to treat the ores from the latter mine, and the mill is now running on that rock while the Ures Con. Co. is sinking its shaft from 340 feet to 540 feet and drifting.

Assistant Manager T. M. Carson, of an English company operating a group of gold mines near Alamos, says a reduction plant will be built by the company.

## Obituary.

B. N. HILLARD, a mine owner and operator of Idaho, died at Lakeview, Idaho, on the 19th inst.

JOHN GEORGE, a pioneer miner of Placer and Shasta counties, Cal., died at Redding, Cal., on the 11th inst., aged 77 years.

J. T. FILCHER, a pioneer miner and mine operator of Montana, died at Boulder, Mont., on the 7th inst., aged 67 years. Deceased was interested in the High Ore mine in Jefferson county.

R. SILER, a pioneer miner of California, a native of Mount Vernon, Ohio, aged 73 years, died on the 11th instant at Hungarian Hill, near Quincy, Plumas county, Cal. He was a pioneer of Nevada and Yuba counties and went to California in 1850.

W. M. LENT, a pioneer mine owner and operator of California, and on the Comstock in Nevada, died at San Francisco, Cal., on the 17th inst. Deceased was born in New York eighty-six years ago. In the late fifties he was a member of the California Legislature. He was interested in the Central, Mexican, Savage, Bullion and Yellow Jacket mines on the Comstock.

## Personal.

T. CORNISH is manager for the Nevada G. M. & M. Co., Central City, Colo.

M. F. LYNCH has resigned as superintendent of the Reveille mine at Reveille, Nev.

A. P. HODGSON has been appointed assayer in the United States mint at Denver, Colo.

C. H. NAZRO is superintendent of the Weyant M. Co. at Pollock, Idaho county, Idaho.

R. KAHLOW is superintendent of the Big Comstock mine of the Columbia M. Co., near Pitkin, Colo.

F. M. DOWNER has been appointed superintendent of the new United States mint at Denver, Colo.

T. W. MACK, of Dayton, Nev., is in Guadalajara, Jalisco, Mex., where he has charge of mining interests.

W. H. HAMPTON is manager of the Jualpa M. Co., of Philadelphia, Pa., operating near Juneau, Alaska.

G. V. MICHELL is managing placer mining operations at Campamento, Department of Olancho, Honduras.

W. A. CUNNINGHAM is superintendent of the Helen group of mines in Twin Lakes district, near Leadville, Colo.

C. B. GAMMON of Carthage, Mo., is superintendent of the Opal Wonder M. Co., operating in the Webb City district.

H. KLING of Quincy, Cal., is superintendent of the Pilot Peak drift mine, near Gibsonville, Plumas county, Cal.

D. W. MCVICKER is superintendent of the Last Chance mine of the Spokane-Boundary M. Co., near Phoenix, B. C.

J. E. BAMBERGER of Salt Lake City, Utah, has resigned as manager of the Daly-West M. Co. of Park City, Utah.

R. P. COLEMAN of Denver, Colo., is on the engineering staff of the Lindsay Cananea Center M. Co. at Cananea, Sonora, Mex.

H. J. GRANT is manager of the Cosmopolitan Proprietary mine at Kookynie, in North Coolgardie district, Western Australia.

A. B. MEDWORTH is manager of the Preston-Buchanan G. M. & D. Syndicate of Cape Town, South Africa, operating African mines.

E. LUND, a southern California mining engineer, has removed to Darwin, Inyo county, Cal., south of Keeler, and will engage in mining there.

C. BASKERVILLE, recently with the University of North Carolina, is professor of chemistry at the City College of New York, New York City.

W. M. KNOX, who has been testing for gold dredging ground at Gas Point, Shasta county, Cal., is now at Oroville, in the same line of work.

J. HARRINGTON, until recently superintendent of the Quincy mine at Park City, Utah, has gone to Bellevue, Idaho, to take charge of the Galena mine.

E. BAMBERGER, who has been assistant manager of the Daly-West M. Co. of Park City, Utah, is manager of same company, vice J. E. Bamberger resigned.

J. A. KIRBY has resigned as superintendent of the Daly-West Co., at Park City, Utah, and will in the future serve as consulting engineer for that company.

H. E. NICHOLLS is manager of the Malaysian Co., operating hydraulic gold mines at Sepan, near Lipis, in Pahang, Malay Peninsula, vice R. M. W. Swan deceased.

H. H. KIRKPATRICK, recently at Illinois University, is instructor in civil engineering, Syracuse University, at Syracuse, N. Y., vice O. M. Jones resigned.

J. A. McCASKELL, who has been assistant superintendent of the Daly-West M. Co., at Park City, Utah, has been appointed general superintendent, vice J. A. Kirby, resigned.

T. H. LEGGETT, expert for the Vilorio Syndicate, Ltd., London, England, is at Oroville, Cal., inspecting progress of work on the new 5-foot Bucyrus gold dredger.

O. M. JONES, recently instructor in civil engineering, Syracuse University, Syracuse, N. Y., is head professor of civil engineering in Tulane University, at New Orleans, La.

J. CARTER, recently superintendent of

the Cedar Valley M. Co., near Kingman, Ariz., has gone to Florence, Final county, Ariz., to have charge of operations of the Fletcher M. Co.

G. B. CHURCH, who formerly represented the Montana-Tonopah M. Co., at Reno, Nev., is superintendent of the Reveille mine at Reveille, Nev., vice M. F. Lynch, resigned.

E. E. F. CREIGHTON, recently in the service of the General Electric Co., has been appointed assistant professor of electrical engineering in Union College, at Schenectady, N. Y.

F. LYON, civil and mechanical engineer for the United States M. Co. of Salt Lake City, Utah, is at the Mammoth copper mine of the company near Kennett, Cal., to remain for several months.

J. C. OSGOOD of Oroville, Cal., with the W. P. Hammon Dredging Co., has been transferred to Marysville to take charge of the office of the company, operating at Daguerre Point, on the Yuba river.

G. A. LAIRD, formerly superintendent of the Victoria mines at Cerro de San Pedro, San Luis Potosi, Mex., is superintendent of the Sierra de Cobre mines of Phelps-Dodge Co., near Cananea, Sonora, Mex.

I. MCKAY, formerly of Park City, Utah, but late of Tonopah, Nev., has been appointed general superintendent of the Goldfield and the Adams-Goldfield Mining Companies at Goldfield, Esmeralda county, Nev.

F. A. THOMPSON, manager of the plant of the Western Reduction Co., at Forks Creek, Jefferson county, Colo., has also been put in charge of the Missouri mine, at Russell Gulch, in Gilpin county, Colo., for the same company.

A. M. McDONALD has resigned as superintendent of the Ida Mitchell mine, Placerville, Cal., and has accepted a position with the Debris Commission as chief engineer and U. S. deputy marshal, with headquarters at San Francisco, Cal.

## Books Received.

"Geology Applied to Mining," by J. E. Spurr, published by the Engineering and Mining Journal, presents a comprehensive yet simple study of those geological principles that are necessary for the understanding of ore deposits. The principles are stated so that all can understand them; their application to mining is intelligible to any mining man. The book also gives a brief account of those principles of historical geology and petrography that are of practical use. The author first gives an account of the general theory of sedimentation, concluding this by a study of bedded deposits. He then shows how ore bodies are formed, laying stress on the influence of igneous rocks, the latter being well classified and described. In the part devoted to the study of dynamic and structural geology is given a general description of earth movements and their effect on ore bodies. The chapters on placer deposits are good. The chemical work of water is fully treated, and the book is completed by a chapter on the relation of physiography to mining. The illustrations and examples are new, typical and well chosen to show the application of principles to actual occurrences. Some unnecessary repetition and redundancy is caused by the arrangement of the matter as a series of questions and answers. The book would be made more compact if these questions were omitted. It will be valuable alike to the prospector on the surface and the expert tracing lost veins underground. The book is bound in cloth and will be sent postpaid from this office on receipt of price, \$1.50.

## Trade Treatises.

Special Catalogue No. 100, from the Crane Co., contains 94 large pages of information regarding their pop safety valves, water relief, cylinder relief, snifting and hydraulic relief valves and boiler trimmings.

Bulletin No. 6 of the Mine & Smelter Supply Co. gives a good general description of the new No. 5 Wilfley concentrator, finely illustrated. The pamphlet also gives in detail the erection and operation of the table. It can be had on application to any of the Mine & Smelter Supply Co.'s offices—Denver, Colo.; Salt Lake City, Utah; El Paso, Texas; 139 Liberty St., New York; City of Mexico, Mexico.

"On the Track" is the title of a hand-



some booklet illustrating and setting forth the value and practical worth of narrow gauge railway material. It comprises everything that enters into the construction and requirements of such a narrow gauge railway as might be required by a mining engineer. The book will be sent to any address on request by Arthur Koppel, 66-68 Broad street, New York City.

## Commercial Paragraphs.

**COLORADO IRON WORKS Co.** of Denver, Colo., report sales of three sets of their improved standard (36x16 inches) wide faced crushing rolls to the Montana Zinc Co. in Montana, and a 36-inch copper matting furnace to the Traylor Engineering Works, New York. Two carloads of machinery for the El Cobre Mining Co. in Cuba left the works this week.

The Galena Iron Works at Galena, Ill., are furnishing most of the machinery and equipment for the rapidly developing lead and zinc district about Galena, Ill., and Platteville, Wis. They have brought out a process for magnetic separation, adapted to ore bearing pyrites of iron. C. C. Mathey is president and E. W. Moore manager of the company.

**KILBOURNE & CLARK Co.** of Seattle, Wash., and San Francisco, Cal., have been appointed representatives for the Stromberg-Carlson Telephone Manufacturing Co. Their territory includes Oregon, Washington, Idaho and northern California. B. F. Kierliff, Jr., & Co. of Los Angeles, Cal., have also been appointed representatives for that company for the territory embraced by Arizona, Nevada and southern California.

**CARY BROS.**, formerly with the Mine & Smelter Supply Co., Denver, Colo., have secured the selling agency for the United States for the Shaw eclipse air hammer rock drill. This drill has been on the market for some time past and the reports received from it are encouraging. They have offices at 432 Equitable Building, Denver, Colo. The Shaw Drill & Machinery Co., Ltd., London, E. C., 7 to 11 Moorgate street, are sales agents for all foreign countries.

The Power & Mining Machinery Co. has closed a contract with J. E. Hooper of Baltimore, Md., for a 25x30, two-cylinder engine and two No. 8 suction producers for his new cotton mill at Woodberry, Baltimore. It will have three rope pulleys for driving to the floors of the mill, and the shaft will be extended for a flanged coupling, so that another 25x30, two-cylinder engine can be installed at a later date, it being Mr. Hooper's intention to double the mill after the first half is in operation. "This," say the manufacturers, "is the first installation that we know of for cotton mill work. The order was obtained after a very thorough investigation on the part of Mr. Hooper and his engineer, C. C. Hedrick, of the Lowell Machine Co."

The following telegram is received: "Allis-Chalmers-Bullock swept the field; won the highest awards St. Louis Exposition, the grand prize in every department, steam engines, electricity, and mining machinery; also gold medal for Bullock system of operating variable speed electric motors for driving machinery. One grand prize was for the Allis-Chalmers (Big Reliable) engine, the largest ever seen on exhibition. Another grand prize was for our Bullock electric generator, these two machines comprising the high unit which supplies the world famous decorative lighting, and much of the power at the St. Louis Exposition. Another grand prize was for our exhibit in the Department of Mines and Metallurgy. There is nothing left to be won. We have taken everything."

The Wellman-Seaver-Morgan Co., Cleveland, Ohio, has been awarded by the board of trustees of the sanitary district of Chicago the contract for the turbine water wheel equipment for the new power house of the Chicago drainage canal. This is the second largest installation of water power equipment contracted for in the United States—the largest single water power equipment previously contracted for being the one, also built by the Wellman-Seaver-Morgan Co., at Sault Ste. Marie, Michigan, for the mammoth power house of the Lake Superior Power Co., and to consist when completed of 50,000 H. P. The Chicago drainage canal power station is to be located near Joliet. The equipment will comprise four 6000 H. P. units of turbine wheels, which will be direct connected to electric generators. There are also two exciter units of 600 H. P. each included in the contract, which will require one year for completion.

## Latest Market Reports.

SAN FRANCISCO, October 21, 1904.

### METALS.

**SILVER.**—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c, refined (1000 fine); San Francisco, 58½c; Mexican dollars, 47c San Francisco, 46½c New York.

**COPPER.**—New York: Standard, \$13.25; Lake, 1 to 3 casks, \$13.37½; Electrolytic, 1 to 3 casks, \$13.10; Casting, 1 to 3 casks, \$13.25; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £61 1s 6d spot per ton.

Following are the figures of the German consumption of foreign copper for the months January-August, 1904, as compared with the same period of time in 1903-1902:

	1904.	1903.	1902.
Import, tons.....	74,482	56,094	54,643
Export, tons.....	5,610	6,964	6,118

Consumption, tons. 68,872 49,130 48,525  
Of the total imports this year 62,165 tons came from the United States, against 41,475 tons last year.

**LEAD.**—New York, \$4.35; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £12 5s 6d long ton.

**SPELTER.**—New York, \$5.25; St. Louis, \$5.00; London, £23 20s 3d ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

**TIN.**—New York, pig, \$28.75@29.00; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, 32½@35c. London, £132 spot.

**PLATINUM.**—San Francisco, crude, \$18.50 ½ oz.; New York, ingot, \$19.00 Troy oz. Platinum ware, 75 @ 82c ½ gram.

**QUICKSILVER.**—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 ½ flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

**BABBITT METAL.**—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100 lb. lots, 16c.

**ZINC.**—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

**NICKEL.**—New York, 40@47c ½ lb.; ton lots, 40@47c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

**IRON.**—Pittsburg, Bessemer pig, \$12.75 @12.85; gray forge, \$12.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c ½ lb.

**WHITE LEAD.**—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ¾c ½ lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, ¾c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

**LUMBER.**—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

**NAILS.**—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

**LIME.**—Santa Cruz, \$1.25 country, \$1.25 city ½ bbl.

**CEMENT.**—Imported, \$2.15@2.65 ½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 ½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

**ANTIMONY.**—New York, Cookson's, 7c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

**CAPS.**—3x, \$5.50@6 per 1000; 4x, \$6.50

@7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

**FUSE.**—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 11½c ½ set; 14 oz., 40s., 10c.

**CHEMICALS.**—Cyanide of potassium, 98%-99%, jobbing, 23@24c ½ lb.; carloads, 23@24½c; in tins, 30c; soda ash, \$2.00 ½ 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ½ lb.; Cal. s. soda, bbls., \$1.20@1.40 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 24@24½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c ½ lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1½@2c ½ lb.; nitric acid, carboys, 8c ½ lb.

**OILS.**—Linsed, boiled, bbl., 53c; cs., 58c; raw, bbl., 51c; cs., 56c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

**ALUMINUM.**—No. 1, 99%, small lots, 37c ½ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

**BORAX.**—Concentrated, 6@7c ½ lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

**BONE ASH.**—Extra No. 1, 5@6c ½ lb., No. 1, 4@5c.

**RED LEAD.**—500 lbs. and over at one purchase, ½ lb., 7c; less than 500 lbs., 7½c.

**LITHARGE.**—Pure, in 25-lb. bags, 8@9c ½ lb.

**MOLYBDENUM.**—Best, \$2.75 ½ lb.

**CHROMIUM.**—90% and over, ½ lb., 80c.

**PHOSPHORUS.**—American, ½ lb., 70c.

**SILVER.**—Chloride, ½ oz., 90c@1.00; nitrate, 55c.

**MERCURY.**—Bichloride, ½ lb., 77c.

**MAGNESIUM.**—Pure, N. Y., 60c.

**MANGANESE.**—½ lb., \$2.75.

**SODIUM.**—Metal, ½ lb., 50c.

**BISMUTH.**—Subnitrate, ½ lb., \$2.10.

**URANIUM.**—Oxide, ½ lb., \$3.50.

**FIRE BRICK.**—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

**FIRE CLAY.**—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

**PILE AND WHARF SUPPORTING STRUCTURE.**—No. 772,160. Oct. 11, 1904. H. C. Holmes, San Francisco, Cal.; one-half assigned to Carl Uhlig of same place. This invention is designed more particularly to be used where more or less hard ground or solid bottom can be found and in which it is not necessary to use a cluster of piles, but in which is used a single pile driven into the bottom, and the surrounding inclosing casing with the filling of concrete and metal bond will answer the purpose required. It consists of various parts of construction adapted to bring about the desired result.

**DRAIN TRAP.**—No. 772,091. Oct. 11, 1904. A. W. Edwards, Sacramento, Cal. This invention relates to an improved trap for use in catch basins, slop hoppers and the like, or wherever the back flow of sewer gas is to be guarded against. Its object is to provide a simple effective trap which may be readily applied to present sewerage systems and which will permit of easy access to the pipe or sewer leading from the hopper or catch basin. The improvement resides especially in the formation of a combined hinged gravity-actuated inclosure and water seal in connection with the catch basin or other reservoir and its outlet.

**CENTER FIRE BALANCE ENGINES.**—No. 772,109. Oct. 11, 1904. R. A. Morton, San Jose, Cal. This invention relates to improvements in engines of the type employing opposed pistons operated simultaneously in a single cylinder through the expansive force of a propelling medium introduced between the pistons. Its object is to provide a motor suitable for use in automobiles, launches, yachts and the like which shall be simple in construction and operation of high efficiency, practically noiseless and free from all vibration.

**ELECTRIC CLOCK.**—No. 772,002. Oct. 11, 1904. T. A. Schluter, Oakland, Cal. This invention relates to devices for operating a clock or clocks which may be hung in such places as to be readily seen and where it would be difficult to reach to wind or set. The object of the invention is to provide a means for actuating a clock mechanism and the escapement thereof by means of weights mounted upon a fulcrum lever and so counterbalanced that one is sufficiently heavier than the other to actuate the escapement and to use the momentum of the two weights to give a greater radius of action.

## New Patents.

**DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY**, 380 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING OCTOBER 11, 1904.

772,018.—PRESERVING FRUITS—E. N. Alexandrian, Fresno, Cal.  
771,855.—RETORT—G. W. Arper, Oakland, Cal.  
772,324.—FORCEPS—N. D. Asdell, S. F.  
772,270.—VEHICLE—H. Beckwith, Oakland, Cal.  
771,856.—IRONING BOARD—W. O. Bowman, Oakland, Cal.  
772,273.—MASK—A. Braverman, Fresno, Cal.  
771,970.—OIL BURNER—L. E. Coleman, Santa Ana, Cal.  
771,814.—HASP LOCK—J. Davy, Oakland, Cal.  
772,091.—DRAIN TRAP—A. W. Edwards, Sacramento, Cal.  
772,223.—VINE CUTTER—F. M. Ewell, Egypt, Wash.  
772,230.—STRAINING MACHINE—F. J. Farner, Seattle, Wash.  
771,979.—CUSPIDOR CARRIER—C. H. Gunn, Stockton, Cal.  
772,036.—ACCOUNT BOOK—C. L. Haggard, Seattle, Wash.  
772,313.—ELECTRIC CONTROLLER—A. W. Harrison, Los Angeles, Cal.  
772,097.—BEEF TOPPER—G. L. Hayes, Roseburg, Or.  
771,981.—OIL BURNER—T. W. Hill, Los Angeles, Cal.  
772,098.—SCREEN—E. Hipolito, Los Angeles, Cal.  
772,100.—PILE AND WHARF SUPPORT—H. C. Holmes, S. F.  
772,043.—BORING APPARATUS—C. Kleinschmidt, Seattle, Wash.  
772,157.—RATCHET LEVER—H. W. Kochler, Oswego, Or.  
772,045.—OIL BURNER—H. Luckenbach, S. F.  
772,047.—HOISTING MECHANISM—G. W. Menefee, Berkeley, Cal.  
772,109.—CENTER FIRE BALANCE ENGINE—R. A. Morton, San Jose, Cal.  
772,173.—MUSIC LEAF TURNER—O'Neil & Edwards, Lafayette, Or.  
771,997.—LATHES—A. Palm, Ventura, Cal.  
771,999.—WATERPROOF FEATHERS—C. A. Potter, S. F.  
772,254.—CLAMP—J. C. Reckweg, Los Angeles, Cal.  
772,049.—DOOR OPENER—G. Rischmuller, S. F.  
772,003.—ELECTRIC CLOCK—T. A. Schluter, Oakland, Cal.  
771,866.—GAME APPLIANCE—F. H. Smith, S. F.  
771,948.—BUGGY TOP—G. H. Taylor, Goldendale, Wash.  
771,857.—CRUSHING ROLLS—J. A. Thomas, Los Angeles, Cal.  
771,949.—CRUSHING ROLLS—J. A. Thomas, Los Angeles, Cal.  
772,072.—SNATCH BLOCK—A. Uren, Seattle, Wash.  
772,303.—FEED WATER REGULATOR—T. M. Wilkins, Seattle, Wash.  
37,185.—DESIGN FOR PORTIERE—M. M. Harding, Monrovia, Cal.

## SITUATIONS WANTED.

**A FOREMANSHIP OR SUPERINTENDENCY.** Twelve years' experience, practical mining. Possesses technical knowledge necessary for economical ore extraction. Address Edward W. Ralph, 602 W. Broadway, Butte, Montana.

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**MINE SUPERINTENDENT WANTS POSITION.** Capable miner, mill man, cyanide man and assayer. Address R. P., this office.

**MINING COMPANIES AND MINING ENGINEERS** installing steel cyanide tanks and desiring a first-class boiler maker familiar with class of work to do the erecting and riveting for them, address Box 25, this office. Best of references.

**POSITION DESIRED BY AN ELECTRICAL** and Gas Engineer; technical graduate; three years' experience in electrical work, eight years' experience in the operation of gas engines; will accept position in either line, but prefer to combine the two. Address R. W. Shoemaker, 613 E. Sixth St., Los Angeles, Cal.

**POSITION WANTED BY COMPETENT MILL** Man, Assayer, Analyst. Practical and technical education. References. Address J. R., this office.

**PRACTICAL PROSPECTOR AND PROSPECT** Examiner. Have your work done by me and you will know where and when to invest your money. Address A. J. Davis, Pine Flat, Sonoma Co., Cal.

**TWO EXPERIENCED YOUNG MEN PROSPECTORS** wish to be grubstaked to go to Mexico, where they know of properties that should be investigated. Best references. Address Box 42, care of this office.

**WANTED—POSITION AS SUPERINTENDENT** or assistant supt by a practical man; first-class chemist and assayer. Specialty: Reduction work, milling and smelting. Address X, this office.

**YOUNG MAN, TECHNICALLY EDUCATED,** who has had over two years practical experience, desires position with mining company or engineer. Good references. Address H. C., care of this office.

**THE ENGINEERING AGENCY, CHICAGO,** furnishes free to reliable employers information leading to employment of Mining Engineers, Draftsmen, Mine or Mill Superintendents, Assayers, Chemists, Cyanide Men, Electroplaters, etc. In successful operation eleven years. Let us know your need and competent, high-grade men whose complete professional and personal records have been thoroughly investigated will be referred to you at once.

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The Mexican Patio. (See Page 239.)



Operation of the Mexican Planilla. (See Page 289.)



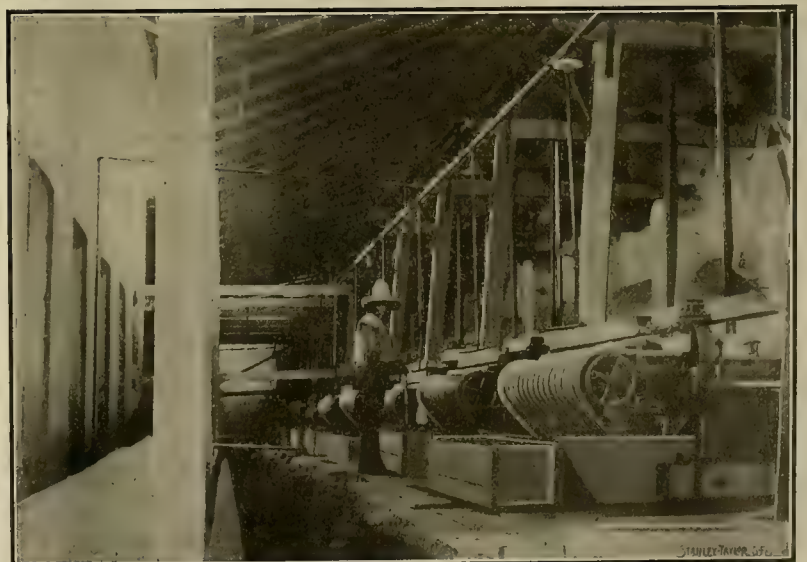
The Planilla, at Guanajuato, Mex. (See Page 289.)



A Chilean Mill. (See Page 289.)



Native Miners at La Reina Mine, Zacatecas, Mex. (See Page 289.)



Twelve Concentrators in Real del Monte Mill, at Pachuca, Mexico. (See Page 289.)

The Patio Process as Practiced in Mexico. (See Page 289.)



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SAN FRANCISCO, OCTOBER 29, 1904.

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## True - Fissure Veins and Zones of Mineralization.

An important question which arises in connection with the exploitation of every mineral vein which descends into the earth is, to what depth will the vein pay? It is generally assumed that superficial deposits, and those veins and deposits which approach the horizontal in position, will offer no material change in mineralogical or physical character which will radically influence the commercial side of the proposition, and that these factors will remain practically constant, but in the case of deposits and veins which descend to great depths it is different. There is no prejudice in favor of fissure veins, as compared with all other types of mineral deposit, but that such bias is warranted by the known characteristics of the simple or so-called "true-fissure" vein is not apparent. An investigation of the facts leads to the conclusion that the simple fissure vein is no more reliable and no more productive of great values and profits than many other forms of mineral veins and deposits. Fissure veins are often traceable along the surface for great distances—many thousands of feet, and in some instances for several miles—but deep mining has not proven that fissures of this character can be depended upon to go to a depth in any degree approximating their length.

Another important feature of fissure veins in great depth is their tendency to split up into several veins or to form zones of mineralization which can no longer be considered as simple fissures. The greatest mineral deposits and veins are not simple fissures, but broad zones of mineralization, due to the crushing, shearing and alteration of rocks subjected to severe compressive stresses and their subsequent mineralization by infiltration of mineral solutions, which deposit their contents in the interstitial spaces and often substitute mineral atoms for those of the original rock mass. These broad zones of mineralization often have illy-defined walls, or, at least, but one wall, and where two distinct walls do occur a considerable distance apart, investigation usually discovers sufficient evidence to warrant the belief that these walls represent but two of a possibly great number or series of parallel fissures within the zone of fracture and movement. Often these interior fissures result in giving the vein a banded appearance, which in some cases has been mistaken for a successive series of depositions upon the walls of an open fissure or crevice—a condition improbable, if not physically impossible, upon a large scale.

The occurrence of masses of barren rock in large ore deposits of the character here referred to has often been accounted for on the assumption that these masses have fallen into the fissure from the hanging wall, and in the case of simple fissure veins the appearance of a "horse" in the vein has frequently been ascribed to a similar cause. In the first instance, masses of barren rock occurring in a broad zone of mineral undoubtedly represent masses of the original rock which have, to a great extent, escaped the crushing due to the pressure and movement which has fissured and crushed the surrounding mass, and being thus practically unaltered is consequently better able to resist the decomposing influences of the mineral solutions, and remains as a barren mass of the original rock. In the second case the fissure has simply divided and the movement of the walls has crushed the rocks along its course, and subsequently the minerals have been deposited in the zone of crushing, or in part in an open fissure, leaving the inclusion of barren wall rock as a "horse" in the vein, surrounded by mineral.

The type of vein formation known as "comb structure," often illustrated in text books, is of comparatively rare occurrence and of limited extent—sometimes existing as a series of lenses, pinching and swelling and indicating clearly the extreme rarity of the very extensive open fissure.

The conditions under which ore deposition has occurred and the subsequent alteration of the original deposit resulting in the impoverishment of one portion and the enrichment of another, are being studied more thoroughly than ever before, and the theories of ore genesis are undergoing many radical changes, with a decided tendency toward a more rational solution of the various problems presented. Thus far the deepest and most profitable mines are

not opened on simple fissure veins, but on beds of conglomerate or other fragmental rock, and on broad zones of mineralization which presents no suggestion of the simple "true-fissure" vein.

Mining is a thoroughly practical business and is not usually carried on to demonstrate scientific theories, but incidentally the study of vein formation, as exposed in mine working, is both interesting and necessary to the greatest success, and speculation and investigation as to the probable genesis of the vein or deposit is of interest. In this connection, what may be expected of veins at depth exceeding 5000 feet is becoming a matter of importance, as there are numerous mines approaching this depth on the vein in several of the mining districts of the United States.

## Mining in the Stock Market.

Stock speculation in mining shares is one of the marked features of the mining industry. In some instances it is, in fact, almost the only feature. When the stock of any mine alternately rapidly rises and falls in price in the open market it is almost always noticeable that that mine is not a producer which steadily turns out a stated monthly output, but that the property is in the development stage, or is erratic in its monthly production. "Rich strikes" and "no ore" are frequently mentioned in connection with such a property. The announcement of a new strike is immediately noticeable on the market, while the statement that a dividend is to be passed, no matter for what purpose, or that the vein has "petered," as quickly causes the high price of shares to tumble like a house of cards. A curious and oft repeated feature of the stock market in connection with the mines of the Comstock lode at Virginia City, Nev., is that stocks will bound upward under reports of new strikes and a demand for shares, and often the market prices are far above the value of the property, but immediately upon the payment of dividends, when higher prices would naturally be expected, the stock drops at once in price, carrying everything along the line downward with it in sympathy. A mine which month after month, "year in and year out," steadily runs and declares its dividend seldom shows rapid fluctuations of stock prices. That particular property comes to be recognized as a substantial industry, more sure in its results than any manufacturing concern, or other commercial enterprise, and is not suitable as a speculative investment, but one to hold. Without doubt the assessments paid in by the public on mining stocks makes possible many undertakings which private owners would not give consideration. Often they are of a speculative nature and far from certain in their outcome, but the investing public is willing to take the risk for the possibilities involved. Not infrequently these speculative ventures have a fortunate outcome, and in these instances the wisdom of the risk taken remains unquestioned, but more often the result is less satisfactory, but the public, always optimistic, is willing to venture again. In these speculative stocks but little is required to send prices upward. If one mine in a camp makes a rich strike all the others in camp are more or less directly affected. The speculators are not looking for, nor even expecting dividends—they are waiting for a chance to unload at an advance. It is such investors as these that keep many enterprises alive, which, were their support withdrawn, must quickly die and be forgotten.

THE farmers and stock raisers in the valleys of the Rio Grande, Arkansas and Las Animas rivers in Colorado are complaining that they are losing stock due to poisonous waters and salts on the flats and in the streams and are seeking State aid to abate this alleged condition. As usual in such cases, the matter is greatly magnified and many absurd theories are advanced and statements made which are not entitled to credence. Among the latter is the statement that the slimes from the quartz mills cover fish eggs and kill them. Mining is the principal industry in the State of Colorado, and if mining were to cease in that State the small farmers of the mountain valleys would find life without object or success, as everything depends upon the mines. An investigation may be made, but the report will without doubt show that the damage, if any really exists, is relatively so small as to be unworthy of legislative attention.

HEROIC measures were promptly adopted at the Baisley-Elkhorn mine, near Baker City, Oregon, a few days since when a neighboring creek was turned into the mine workings. It is not always convenient to extinguish a mine fire by turning a river into the workings; but without doubt, this method of fighting fire is superior to steam or the pouring of large volumes of carbon dioxide into the mine. It is true that the damage from water would be much greater than where steam or gas is employed as the extinguisher, but the water is direct and effective, although its cost may be somewhat greater. At the time of a fire in the Utica-Stickles mine, at Angels, Cal., several years ago, 1800 cubic feet of water per minute were turned into the workings for ninety hours, when it was thought the fire had been extinguished. It then required constant bailing and pumping with the regular skips and pumps and several extras for eight weeks to remove the water poured into the mine and that which had accumulated. It was an expensive experiment, but it worked perfectly and quickly extinguished the fire which occurred in a stope several hundred feet above the bottom levels of the mine.

LATE letters received from the Stewart peninsula of Alaska state that as the winter will interfere with placer mining many of those who remain in the country will devote their attention to prospecting and developing the tin-bearing veins of the Cape York and Ear Mountain regions. The tin placers have thus far been somewhat disappointing, so it is said, but the veins promise not only greater permanency but a better reward for capital invested.



## CONCENTRATES.

THE disc, bar and jib machines are among the devices used in electrical coal cutting in Great Britain, the former being of most marked economy in use.

BUT sixty-three days remain to do the necessary assessment work on an unpatented mining location to hold it for 1904. This applies to any such location made since January 1, 1903.

IN product assays, should particles of zinc be observed floating on the surface of the molten lead and giving off fumes of zinc oxides, the assay should be discarded for the results would be too low.

THE coil spring can be thus straightened: Heat it to a dull cherry red; place it on a rod or bolt in the hardy of an anvil, and, taking hold of one end with a blacksmith's tongs, pull it out straight.

THE muffled furnace works on the ventilated principle. Some operators claim that it gives more rapid work than a closed muffle. The results in either case will correspond when the work is accurate.

DIRECTOR OF THE MINT ROBERTS estimates the output for the year 1903 for Colorado to have been \$22,540,100 gold and \$7,014,078 silver, figured at commercial value. Official returns are not yet complete.

THE safe speed for flywheels is generally calculated to be about 5000 feet peripheral velocity per minute. If greatly exceeding this, unless the flywheel be wire bound, there is a constant element of danger.

THE consulting engineer mentioned is deemed competent. A \$500 fee in such a case would be economy. It might save twenty times that amount in unwise expense occasioned by lack of expert and specific information.

TO CALCULATE the weight of the round mine timbers of yellow pine, the dimensions being in feet, multiply thirty-eight times the length by one-quarter of the product of the mean girth and the diameter. The product will be the weight in pounds.

THE lines of a junior location may be laid across a senior location for the purpose of defining extralateral rights of the junior location, and the lines may be so laid across any unpatented public land, and, it is believed, also across patented land, if done peaceably and openly.

THE steam turbine presents the possibility of using highly superheated steam, uniform rotation and high speed. No lubrication is required in the steam chambers; hence the steam itself is not contaminated with oil, but can be condensed and pumped back into the boilers without purification.

THE amount of lime to be added to a ton of pulp in the cyanide process must be determined by experiment. The fact that at the Dakota mill at Deadwood, S. D., six pounds per ton is required is not a safe index for a charge of ore elsewhere, as more or less may be necessary to have the desired effect.

FOR line shafting, where the speed is not over 400 revolutions per minute, an alloy of eight parts zinc and two parts block tin will wear longer than the babbitt now being used. It will also resist the force of a heavy load. The tin counteracts the shrinkage, so that the metal will adhere to the box if it is not overheated.

THE most important tungsten minerals are wolframite, hubnerite and scheelite. The test for tungsten is to boil the finely powdered mineral with a mixture of four parts hydrochloric acid and one part nitric acid for two hours in a porcelain dish, when, if the ore contains tungsten, yellow spots of tungsten-trioxide will show.

THE amount of annual assessment work to be performed on the unpatented mining claim is determined by the cost of labor in the camp or district where the claim is located. Ten feet of work is sufficient if it is actually worth \$10 per foot to break and remove the rock. In many cases it can be done for one-half or even one-fourth of this amount.

ZIRCON ( $ZrSiO_4$ ) is found in commercial quantities in the United States in but one locality thus far—Zirconia, Henderson county, N. C., where it occurs in a pegmatite dike. Besides the use made of the transparent varieties for gems, the oxide of zirconium is extracted and used with yttrium oxide in the manufacture of the glowler for the Nernst electric lamp.

CHALCOPYRITE of the purest kind is a mixture of copper sulphide and iron sulphide. Often the ore appears to consist of a single mineral (copper sulphide), with no impurities; but under the microscope the iron sulphide is always easily discernible as a mechanical and not a chemical admixture. Quartz in fine grains is also disseminated throughout the ore in particles invisible to the unaided eye. It is due to these foreign admixtures that chalcopyrite has a greatly varying value. The

highest copper content in chalcopyrite recognized by Dana is 34.5%.

WHEN blasting fuse does not burn regularly, or is found improperly wound, it should be returned to the manufacturer. On nothing does the safety of miners depend to so great an extent as upon the quality of the fuse. No attempt should be made to improve it by wrapping it with tape, greasing it or otherwise fixing it. It should be refused if not perfect.

COPPER ORE occurs frequently in quartz porphyry, but it also occurs abundantly in other rocks, notably in limestone and in amphibolite schist, mica schist, granite and in many other kinds of rock. It is a mistake to search for a mine in a certain kind of rock, and with a prejudice against other kinds, for in this way valuable mineral deposits may be overlooked.

A STAMP BATTERY which has large crushing capacity by reason of coarse screens, low discharge, and other devices employed to facilitate crushing capacity is rarely a good inside amalgamator. Lower capacity due to higher discharge is more in keeping with the idea of inside amalgamation, but where it can be successfully accomplished outside amalgamation is advisable.

IN the assay of cyanide solutions zinc dust has the advantage of being more easily measured and somewhat quicker in action. Where zinc shavings are used, five or six grams are to be added for every ten assay tons of solution operated on, thus producing as much zinc sulphate. The stated quantity of zinc shavings may be added a gram at a time at about two-minute intervals.

THE slag from the 50-ton crucible smelter is hardly sufficient to make its money value of daily importance. The resultant slag from so small a plant can better be reduced every four or five months in a lead bath when enough has accumulated to warrant such operation. At the San Jose de Gracia plant, Sinaloa, Mexico, such operation is performed in an ordinary Mexican vaso.

A CONCRETE FLOOR in front of the mortars and beneath the open plates of a quartz mill is superior to any sort of wood floor. It should have a slope away from the battery and end in a trough-like depression, also having a small grade, to a collecting basin or launder, that all sweepings, which usually contain small amounts of mercury and amalgam, may be saved for treatment.

MINING CLAIMS owned by two or more co-partners may be partitioned into segregated parcels, if the co-owners can agree upon what is considered an equitable division of the property; but generally, owing to the unequal distribution of ore in the veins or deposits, both in quantity and quality, such agreement can not be reached, and the only satisfactory way to then divide the property is by sale and division of the proceeds.

THE residue (essentially iron oxide) from the roasting of pyritic ores might be used for the manufacture of iron or steel if the sulphur were driven off (a "dead roast" obtained). But there usually remains a considerable percentage of sulphur after treatment in the chemical works. Sulphur is detrimental to steel. It is stated that at certain works in Spain the residue from the manufacture of sulphuric acid is used for making steel.

THE rate of progress in shaft sinking cannot be anticipated unless a shaft has been sunk in the vicinity and the rate of sinking observed. Many shafts do not exceed a rate of 2 feet per day owing to hardness of the ground and amount of water to be handled. On the Rand, in South Africa, an average of over 7 feet daily has been maintained in several shafts for months. Three feet is a good average rate of sinking under fair conditions.

THE capacity of screens and trommels is dependent upon the length of screen, the mesh, the square feet of surface, its inclination, the kind of material to be screened and the presence or absence of various devices for jarring or cleaning the screens. The capacity per twenty-four hours of a 6-foot, 30-mesh trommel with two hammers, 38 square feet of surface, 24 inches diameter, an inclination of 1 in 7½, is eight tons; 30 inches diameter and 47 square feet is ten tons.

THE use of pyrite as a substitute for sulphur, particularly in the manufacture of sulphuric acid, is increasing, due largely to the rise in prices of Sicilian sulphur. The world's principal supply of native sulphur is from Sicily, of which production the United States is the largest consumer. Deposits of sulphur are known in the United States—in Louisiana, Texas, Arizona, Nevada, California, Utah, Idaho, Oregon and Alaska—but, except the first two named, the output is irregular.

MANGANESE ORES and manganiferous iron ores are used in the manufacture of spiegeleisen, a white cast iron containing manganese and used in the manufacture of steel by the Bessemer process. In the Lake Superior region some of the iron ores mined carry up to 20% manganese. The Colorado ores of this class, though containing a higher percentage of manganese, are used mainly as flux by the smelters. In the manufacture of zinc from the ores (franklinite) of northern New Jersey, a "clinker" is obtained containing iron and manganese,

which is used in the production of spiegeleisen. During 1903 there were 73,264 long tons—value \$1 per ton—of this clinker produced in the United States. Most of the manganese ores used in the United States are imported from foreign countries.

IN drifting in swelling ground it is as necessary to "open lag" the back of the drift as it is the sides, and to relieve the back as well as the sides. In some instances where this is done much smaller timbers have been found to last as long as the large ones. All miners familiar with this sort of ground know that size counts for little, as the support from 30-inch logs is limited to a few weeks, or at most a few months, and where proper relief is afforded small timbers will last as long as large ones.

THE true course of the side lines are to be laid with exact reference to the course of the vein, parallel therewith, and not more than 300 feet from each side of its center—600 feet in width. Should more be taken up in locating the claim, any excess must be discarded. The middle of the vein should be in the center of the location. Any area excluded from the original location—if on public land—is, of course, subject to location. If a location is made crosswise of the vein, the side lines become end lines.

ACCORDING to "Mineral Resources for 1903," issued by the United States Geological Survey, consumption of crystalline graphite is divided as follows: "Fifty-five per cent for crucibles, 15% for stove polish, 10% for foundry facings, 5% for paint and 15% for all other purposes, including pencils, powder glazing, electrotypes, steam packing and other minor uses." The coarser forms (lump and chip graphite) are used for crucibles, pencils, lubricants and electrotypes. The bulk of the world's supply of crystalline graphite is obtained from Ceylon island. The difficulty of purification of amorphous graphite prevents its use for lubricants, the better quality of pencils, electrotypes, etc. The principal uses of the amorphous variety are in manufacture of paints and for foundry facings.

MONAZITE is an anhydrous phosphate of the rare earth metals—cerium, lanthanum and didymium—and carries usually a varying percentage of thorium (thought to be mechanically mixed). It occurs as an accessory constituent of gneissoid rocks in certain regions, particularly North Carolina and Brazil. It is brittle; color, hyacinth-red, clove-brown, reddish or yellowish brown; resinous to vitreous luster; specific gravity, 5. The commercial value of monazite is due to the thorium ( $ThO_2$ ) contained (up to 9%). The thorium, with lanthanum and didymium oxides, is used in the manufacture of the cylindrical mantle of incandescent gas lamps. Production of monazite in the United States for 1903 was 862,000 pounds, value \$64,630, an increase of 60,000 pounds over 1902. Monazite is obtained in the same manner as cassiterite, by sluicing.

THE failure to record assessment work in California under the existing law, which is somewhat involved, does not work a forfeiture. The performance of the work is the principal thing, and if it can be proven that it has been done, there is no danger of losing the claim. Assessment work cannot be done at any time for the following calendar year. The work can only be made to count for the year in which it is done, or, in the case of neglect to promptly perform the work which has been begun late in the year and extending into the following year, it may be counted for the past year. Work begun in December, 1904, may be continued into 1905 for the year 1904. In no case can work be done in 1904 for the year 1905, nor in 1905 for 1906. If work is not done at all in 1904 and the claim has not been relocated January 1, 1904, the owner may begin work at any time prior to its being claimed by another, and the work then done may apply for 1905—the year 1904 being skipped entirely, there having been no work done upon it that year.

ONE good way to protect steam pipes covered with non-conducting material from damage, resulting from water in a wet mine, is to cover the pipes and asbestos, or other non-conductor, with galvanized iron pipe, and where this has been done, and it is subsequently found that water has reached the pipe covering and damaged it, it will probably be found that either the galvanized pipe was not properly put on, or having been put on right with tight joints, that subsequently the pipe line was damaged by concussion due to blasting, or that there were leaks in the steam line within the covering and that this caused deterioration in the non-conducting covering within the galvanized pipe. If nothing better can be done, compressed air might be substituted for steam underground. For pumping, running hoists, etc., the air is available and is successfully used in many mines for this purpose. Special arrangements must be made as to exhaust, etc., to prevent freezing. There is low efficiency in a plant of this description if the pipe lines be of great length, and it is not feasible to reheat the air underground, but there is probably not a greater loss than would occur by condensation of steam in long pipes underground in a wet mine. Moreover, the air line does not heat up the air as steam does. In a dry mine the heat radiating from steam pipes may be quickly reduced by carrying the pipe in a wooden box in which asbestos packing is loosely packed around the steam pipe.



## Preliminary Examining of Milling Ores.

Written for the MINING AND SCIENTIFIC PRESS by  
ALFRED HARVEY.

The examination of an ore from a mine—the "mine run"—before it is sent to the mill, is a matter well worth careful attention. The preliminary crushing, as it were, has taken place in the process of blasting and other methods of breaking.

The adaptability of the explosive used will have a good deal to do with the condition of the broken ore, and if the values are mainly carried in a mineral which pulverizes readily, a high-power explosive may produce too much fine ore, resulting in loss in the mill. On the other hand, an explosive of insufficient power leaves a maximum amount of breaking of rock to be done.

The values may be unevenly distributed in the ore and perhaps almost entirely carried in the fines and medium size. Or the larger rocks may carry a goodly share.

If the former condition exists, an inexpensive screening arrangement can be used, separating the coarser material and sending only the medium and fines to the mill, thus obviating the cost of treating waste rock and useless wear of the machinery. If the latter is the case even then it may be prudent to screen into two or three sizes, which may mean that number of grades of ore, and perhaps a modified treatment for one or the other.

Where practiced, the above method has given satisfactory results, and usually followed by remarkably close saving in the process of ore dressing, in some cases the finer ore going directly to the mill and the larger size hand picked before passing through the crusher.

In many low-grade ores hand picking pays where labor is cheap, and even when this condition does not altogether exist hand sorting, with little or no spalling, can be economically practiced on circular tables and conveyor belts.

A convenient method, where much sorting is to be done, is to have a rock house. Screens can be arranged in this house and the ore automatically dumped onto them, screening the ore into two or three sizes at one operation. The sizes not to be sorted run onto a conveyor belt, thence to the mill. The size to be sorted is run onto the belt after hand picking. A water hose should be used on the ore, washing it sufficiently to bring out the colors, which materially assists in the sorting. Drains should be arranged to collect any fines washed from the ore.

There are instances where a single operation of sorting on floors has taken out from 12% to 30% of worthless material from an ore at a cost of from 11 cents to 24 cents per ton milled.

Even if the values are fairly evenly distributed through the ore it seems reasonable to screen through grizzlies or other device, feeding the coarse only to the crusher, thus avoiding the recrushing, to a certain extent, of that portion of the ore already fine enough. The best way to treat slimes is to make as little as possible of them, although there are good sliming machines on the market, which make good savings and clean separations.

Intelligent study of the ore in the mine usually results in economy of treatment. The mining end is perhaps too often overlooked, especially where the ore is being broken by contract. The tendency of miners to carry the workings too large when breaking ore at so much per ton, thus getting a great deal of waste, and others when driving by the lineal foot carrying their workings too small and searching for soft spots, are details only too well known. But even when men are working by the shift, watchfulness on the part of those in charge will prevent unnecessary mixing of waste with the ore.

The vein from which the ore is referred to below is taken in in gneissic-granite. The wall rock is frequently so like the vein stuff that considerable care has to be exercised to keep out the waste. The vein filling is a material composed chiefly of quartz, feldspar and clay, through which is distributed in various forms iron pyrite, copper pyrite (chalcopryrite), and in smaller quantity galena, and occasionally small quantities of zinc blende and grey copper.

The gold is found mainly in the iron pyrite, and when copper pyrite is present (sometimes the copper runs to 3%), the gold value is usually higher. The galena carries the greater part of the silver. Zinc blende and grey copper, when present, are in small quantities. There would not be space here to go into details of hardness, structure and fracture, crystallization, etc., of the minerals composing this ore, nor the settling powers of spherical particles compared with those of rugged surfaces, or in sheet form, but these are among the details to be studied in the dressing of an ore. Suffice it to say that careful screen and mill tests, together with water sizing, brought to light many points which enabled the owners of the mill, which was treating the above ore and making a poor saving, to remodel it on such lines that a very good saving in values resulted.

Another instance is that of a stamp mill. The property is so far from railroad and smelters that freight and other costs were very high. The mill was making a very unsatisfactory saving. The writer

was called upon to do some testing with such conveniences as were at hand. Some screens and other appliances were missing, but the following were results obtained from a sample of a few hundred pounds taken by the manager, somewhat higher in value than the average "mine run," but the testing greatly assisted the subsequent experimental work, which was done on a larger scale. The gangue was quartz, porphyry and some clay, carrying iron pyrite, with very little copper and occasionally galena.

### CRUDE ORE ASSAYED.

Au. 1.66 oz. @ \$20.00 =	\$33.20
Ag. 4.4 ozs. @ 0.56 =	2.46
Total	\$35.66

After a series of experiments the following screen test was made. Commencing with 30-mesh screen; diameter of wire .016 inch, maximum size of particles (for 30 mesh) .0173 inch:

No. 1 passed through 30-mesh, but remained on 40.	18%
No. 2 passed through 40-mesh, but remained on 60.	28%
No. 3 passed through 60-mesh, but remained on 80.	15%
No. 4 passed through 80-mesh, but remained on 100.	32%
No. 5 passed through 100-mesh	9%
Total	100%

### PROPORTIONS OF ORIGINAL VALUES.

1. { Au. . . . . \$ 2.80	
{ Ag. . . . . .80—\$ 3.60	
2. { Au. . . . . 4.42	
{ Ag. . . . . .52— 4.94	
3. { Au. . . . . 6.60	
{ Ag. . . . . .39— 6.99	
4. { Au. . . . . 14.20	
{ Ag. . . . . 1.04— 15.24	
5. { Au. . . . . 4.68	
{ Ag. . . . . .31— 4.99	
Total	\$35.76
Crude ore assayed	\$35.66

Discrepancy	\$ 0.10
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### VALUES IN EACH SIZE.

1. { Au. .78 oz. x \$20 =	\$15.60
{ Ag. 3.60 ozs. x \$0.56 =	2.00—\$17.60
2. { Au. .85 oz. x \$20 =	17.00
{ Ag. 3.65 ozs. x \$0.56 =	2.04— 19.04
3. { Au. 2.2 ozs. x \$20 =	44.00
{ Ag. 4.75 ozs. x \$0.56 =	2.66— 46.66
4. { Au. 2.22 ozs. x \$20 =	44.40
{ Ag. 5.80 ozs. x \$0.56 =	3.25— 47.65
5. { Au. 2.60 ozs. x \$20 =	52.00
{ Ag. 6.25 ozs. x 0.56 =	3.50— 55.50

### EXTRACTED BY AMALGAMATION (AVERAGE OF 5 TESTS).

Au. .75 oz. x \$20 =	\$15.00
Ag. 1 oz. x \$0.56 =	0.56—\$15.56

### TAILINGS FROM AMALGAMATION ASSAYED.

Au. .90 oz. x \$20 =	\$18.00
Ag. 3.3 ozs. x \$0.56 =	1.85— 19.85
Total	\$35.41
Original ore assayed	\$35.66

Discrepancy	\$ 0.25
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Gold valued at \$20 per ounce. Silver valued at \$0.56 per ounce. Saved by amalgamation, 43.94%.

Concentration of tailings from amalgamation sized as in screen test.

PERCENTAGE OF VALUE IN EACH SIZE OF AMALGAMATION TAILINGS.	PERCENTAGE AND VALUE OF CONCENTRATES IN EACH SIZE.	VALUE OF CONCENTRATES.
1.08% { Au. \$0.93 { Ag. 0.11	\$ 1.04 1—6% concentrates. { Au. 4.3 x \$20 = \$ 86.00 { Ag. 18.7 x \$0.56 = 10.47	\$ 96.47 { Au. \$ 15.33 { Ag. 2.00
1.69% { Au. 1.75 { Ag. 0.19	1.94 2—6½% concentrates. { Au. 5.2 x \$20 = 104.00 { Ag. 21.0 x \$0.56 = 11.76	115.76 { Au. \$6.93 { Ag. 2.53
1.2% { Au. 3.16 { Ag. 0.14	3.30 3—8% concentrates. { Au. 13.2 x \$20 = 264.00 { Ag. 22.0 x \$0.56 = 12.32	276.32 { Au. 39.50 { Ag. 1.75
3.48% { Au. 10.44 { Ag. 0.37	10.81 4—8½% concentrates. { Au. 15.0 x \$20 = 300.00 { Ag. 19.0 x \$0.56 = 10.61	310.64 { Au. 122.82 { Ag. 4.35
7.45%	\$17.09	\$215.59

7.45% of concentrates. Value of concentrates, \$215.59 per ton. Tailings assayed, \$19.85. Loss in tailings, \$2.76 per ton. Nos. 4 and 5 were concentrated together (41%).

Saved by concentration of original ore valued at \$35.41. .48 26%

Saved by amalgamation. .43 94%

Total savings. .92 20%

It was demonstrated that a better saving could be made by amalgamating entirely on the outside plates and lowering the discharge of the mortar. Amalgamating inside the mortar caused considerable "sickening" of the quicksilver and consequent loss.

Although the subsequent experimental work did not exactly correspond with the above hand testing (a good deal of which was done in a gold pan), it was sufficiently near for all practical purposes and materially assisted in getting at satisfactory results. The tailings (if sufficiently valuable) were found to be in good shape for cyaniding. With facilities for testing ores at the mines, in a small way, and the experimental work which can be done at a reliable testing works, it would seem that risk should be minimized in designing a mill to treat an ore satisfactorily.

## Mining in China.

Besides the Shantung Railway Co., with its rights to mining on both sides of its line, there is a separate Shantung Mining Co.—a Germany company—opening mines in various parts of the province of Shantung. The mines in Anch'iu and Ch'anglo are under the management of Mr. Vorschulte. A huge steel tower is erected on a bare hillside, and a gang of coolies working a drill have gone down 700 feet. This is in southern Ch'anglo. Ten miles farther south, in Anch'iu, Mr. Vorschulte is honeycombing sundry small hills and tapping half a dozen veins of silver.

The work is only in the experimental stage, but already there are about 1300 feet of horizontal tunneling, besides over 600 feet of shafts in various spots. The rocks are andesites. The veins are but little inclined from the vertical and the gangue is barytes and fluorite. How rich the ores may be is not known until the proper analyses have been completed.

## The Modern Patio Process.\*

Written for the MINING AND SCIENTIFIC PRESS by  
ARTHUR H. HALLORAN.

The patio process is one of the oldest and simplest of metallurgical methods for the treatment of silver ores. For over three centuries this process has been successfully used in Mexico, Peru and Chili. In all this time but little change has been made; in many places it is still carried on in the primitive manner of the inventor, Bartholome Medina. It is of consequent interest to note that during the past year a series of improvements have been introduced in Pachuca, Mexico, the native town of the inventor, that even further cheapens and simplifies this old-time cheapest and simplest of processes. To understand the full significance of this advance it were well to note the primitive method of working still almost universally used.

The ore from the mine is hand sorted and broken, ordinarily giving a rich smelting ore, a poorer ore for the patio process, and waste. The second product is of present concern and is first crushed in a primitive stamp mill run by mule power. The stamps are usually of wood, shod with iron, weighing from 100 to 200 pounds each; the mortars are flat stones. The ore is crushed to about the size of a wheat grain. It is then ground in either an arrastra or a Chilian mill to a perfect slime or mud.

An arrastra consists of a carefully paved floor over which heavy crushing stones are dragged by mules, the mechanism being a vertical shaft and crossarms. The ore is slowly charged with water and ground to the proper consistency. If silver ore is being treated a small amount of coarse ore is added from time to time, and the mud or slime drawn off from the top, where it is settled and made ready for the patio. The Chilian mill differs from the arrastra in utilizing a large revolving stone wheel to crush the ore, rather than the dragging stones. (See illustration front page).

The fine slimy mud from the Chilian mill or arrastra is sun dried in vats and then removed to a number of circular spaces, from 20 to 40 feet in diameter, surrounded by frames of wood or low walls of stone, all in a large open space, with a slight incline to allow the water to run off. The pulp is spread as a

soft layer from 6 inches to 1 foot thick, and when dry enough a small percentage of salt is added, and mules, or other animals, driven over it to tread the pulp and mix it thoroughly. It is then allowed to rest for a day or two, when magistral and mercury are added. Magistral is a mixture of roasted copper pyrites, iron pyrites and common salt. The amount of mercury and other chemicals used in a charge depends upon the value and character of the ore under treatment. The time of treatment varies from fifteen to forty-five days, depending largely upon the heat of the sun. It is trodden by the animals until assay shows that complete amalgamation has taken place. The exact reaction by which this takes place is doubtful, but in the process the NaCl reduces the CuSO<sub>4</sub> of the magistral to CuCl<sub>2</sub>, which in turn reduces the Ag<sub>2</sub>S to Ag. Considerable mercury is lost as calomel. (See illustration of patio on front page).

The next operation is to wash the whole mass and separate the amalgam. This is usually done either in the "lavadero" or in the "planilla." The former is a tank settler, in which the pulp is agitated by men, mules, water or steam power. The planilla is a kind of hand buddle used throughout Mexico for the concentration of all kinds of slimes or residues containing the precious metals. Its operation is best understood from the illustration on the front page. The operator begins by spreading a 3-inch layer of tailings over the surface of the steep sloping back

\* See illustrations on front page.



part of the planilla. Then squatting on a board laid across the water tank he sweeps up the water with a gourd, bowl or small horn, letting it fall on the lower part of the bed of tailings. The water flowing down washes the light stuff and leaves the sulphurets sticking on the back plane. This process is repeated and the concentrates hand washed in bateas. The final sulphide product is usually shipped to the smelters for treatment, and the silver amalgam obtained from the batea is retorted.

In the past many unsuccessful attempts have been made by engineers to do away with the manual and animal power used in the primitive processes of the patio, substituting the results of modern research for those of ancient trial. Thus bluestone has largely replaced magistral as a source for copper sulphate, being cheaper and more uniform in composition. Rolls have largely replaced stamps for the preliminary crushing, the modern steel Chilean mill is often used in place of its stone prototype. Steam has replaced the mule for running the arrastra.

But until this year none of the various appliances invented as substitutes for treading by horses and mules have proven successful. The perfection of the mixture and the intimate contact of the particles of silver mineral with finely divided globules of mercury are the most important factors in determining the time necessary for amalgamation. This treading is very injurious to the animals. In the great majority of cases the hair and the skin of the fetlock are completely eaten away and the whole surface is cut and jagged. In this condition they have to travel round and round for eight hours without rest or water, beneath a broiling sun, almost knee-deep in a thick mud, which is 5% quicksilver. Sometimes a horse lasts only a few months under these terrible conditions, frequently dying or becoming permanently disabled from copper and mercury poisoning, following ulceration of the legs, or caused by licking up the ore mud for the salt which it contains, and this in spite of care taken to wash their legs immediately after work, and every precaution taken to prevent their licking the saline mud. In spite of these drawbacks the greater effectiveness of animal treading as a mixer and amalgamator has prevented the adoption of machines. Some of the old patio men believe that the heat from the horses' feet and the chemical action of their hoofs were indispensable factors for successful amalgamation.

Early in the present year the Real del Monte Co. completely equipped the Loretta mill, the largest in Pachuca, with a device which seems destined to re-

has prevented the introduction of the modern concentration. At the Loretta mill twenty-six Johnston concentrators are now in use, of which twelve are shown in the picture on the front page. Thirteen of these concentrate directly from Chilean mills. An average extraction of 38% was obtained with six different classes of ore during a three months' run. The extraction depended largely on the kind of ore, 20% to 25% resulting with one kind, and 50% with another. Each table handled an average of 15.6 tons per twenty-four hours. Four Wilfleys are used for the tailings from the patio, after which they pass over four Johnstons, when the extraction is so complete that the hundreds of Mexicans who formerly made a living by panning in the ravine below the mills are now out of a job. These concentrates are composed largely of silver amalgam, which is light and flaky and very difficult to save. At present mechanical concentrators are widely used throughout Mexico.

### Getting Rid of Cylinder Oil in Boilers.

I have seen some large, double-ended Scotch marine boilers successfully treated for the removal of cylinder oil as follows, says a writer in Southern Mills:

The boiler was emptied and a temporary connection of 3-inch or 1-inch pipe was made from the steam line to the lower part of one of the water gage columns. About seventy-five gallons of kerosene were poured into the boiler, after which the boiler was closed up. Steam was turned on the water gage column, allowing the steam to enter the boiler at the bottom, but only so as to start the kerosene boiling. If there was not enough kerosene to cover the steam connection inside the boiler, enough water was pumped in to do so. If there was time to do a good job of it, the boiling was allowed to continue until enough steam had condensed to show the water at the usual steaming level in the boiler; with less time in which to do the job, a few strokes of water was pumped into the oiler with the feed pump once every two hours. When the water reached the steaming level, steam was shut off (the boiler held forty tons of water when at steaming level) and after allowing it to cool down some the top manhole plate was removed and the boiler flooded so as to allow the oil on the surface to float off. The boiler was emptied and all manhole plates removed. An inspection at this stage showed splendid results, for the cylinder oil had loosened up so that, aside from the necessity of wiping it off at a few places, all there remained to be

but there can be no doubt that the extensive alluviums are rich in gold. Remoteness from the centers of mining effort has prevented their effective exploitation by suitable machinery. At present the only apparatus in use is the ordinary type of sluice with three or four 12-foot boxes, each containing riffles, and washed by shifts of from four to six men, who extract from 6 to 10 cubic meters per day. This primitive method of washing is naturally wasteful and allows much of the value to escape in the tailings. Prospecting is stated to have been going on busily for several years past to determine values with a view to the use of dredgers. According to an Argentine paper, one dredger is already in operation at Porvenir, though whether of the bucket, grab or suction type is not stated. While the island is well provided with ports which are within a comparatively short distance of the placers, too little is at present known about the industrial conditions prevailing there to speak with confidence of the mining prospects. There is, it is true, plenty of wood, while a certain amount of white labor is employed upon working the beaches under the payment of a daily royalty. Whether, however, the existing labor is of the character that managers would prefer seems doubtful.

### Crushing in Cyanide Solution as Carried on in the Black Hills, S. D.\*

NUMBER VI.

Written by C. H. FULTON.

The treatment of the slimes at the Hidden Fortune mill is similar, but differs in details. The slimes vats are first filled with barren solution and the slimes pulp is charged at the center of the vat through a large pipe which leads to within a few feet of the bottom of the vat. The clear solution overflows continually around the whole of the periphery, being collected by an annular launder and taken to the battery sumps. When the outgoing solution becomes cloudy the charging of the slimes is stopped and slimes are permitted to settle, the clear solution at the top, in the meantime, being decanted to the battery sump, in a similar way described for the Horse-shoe mill. When the solution has been decanted to within an inch or two of the slimes, the top layer of thin slimes to a depth of 3 or 4 inches is pumped to the vat that is filling with slimes, the object of this being to remove as much solution as possible in order to have the next dilution as efficient as possible. The first wash of barren solution is then added, this being added through the perforated air pipes at the bottom of the vat. This method of adding the barren solution is adopted, first, to keep the perforations of air pipes clear, and second, to secure the agitation and moving of the heavier slimes at the bottom of the vat. After the addition of barren solution the charge of slimes is agitated with air at 40 pounds pressure per square inch, then permitted to settle and the clear solution decanted as described.

The slimes receive three washes with barren solution and one with water. Before the slimes are finally discharged the top layer, to a depth of 3 or 4 inches, is again pumped to the vat which is filling. The total time required for the treatment of the slimes is between three and four days. Three washes are found sufficient at the Hidden Fortune mill, since the slimes receive an unwatering before going to the slimes vats, as has been described. At this mill the extraction made on slimes, as determined by the assays on the washed tailings, is 80%. The actual recovery is but 75%, as determined by the unwashed tailings, showing a loss of gold of 5% which goes out with the slimes tailings in the dissolved form.

The second method of treatment in which the slimes are successively transferred from one vat to another is illustrated by the practice at the Dakota mill. The slimes from the cones are alternately charged into the loading vats, Nos. 1 and 2, which are 20 feet in diameter and 137 inches deep. Each vat is filled for twelve hours, then permitted to settle for ten hours, the clear solution at the top being continually decanted off—finally to within 1 inch of the settled slimes. The settled slimes are then pumped by a centrifugal pump having a 4-inch suction to vat No. 3, barren solution being continually added to the suction of the pump during the transference, which takes from one to three hours. In vat No. 3 the slimes are permitted to settle again for ten hours, the clear supernatant solution being decanted off meanwhile. The slimes are then transferred to vat No. 4 by the pump, barren solution being added to the suction. In vat No. 4 the slimes receive an additional agitation by pumping for about one hour, the slimes being drawn off at the bottom of the vat by the pump and returned over the top. The settling and decanting is then repeated and the slimes transferred to vat No. 5. From this vat, after the settling and the decantation of solution, the slimes are transferred to vat No. 6, but this time with wash water, instead of barren solution. The amount of wash water added is equivalent to the amount of moisture in the slimes. In vat No. 6 the last settling takes place, the solution is de-



Machine Mixer for Patio.

place this inhuman practice. As seen in the accompanying engraving it consists of a rectangular frame, 12 meters long and 1½ meter wide, formed by two parallel I-beams. This rectangular frame is capable of running the length of the patio by means of flanged wheels attached to the four corners and running on rails firmly fixed in the stone walls which form the sides of the inclosure. In the channels of the girders two smaller frames are placed, one on each side of the center, in such a manner that they can be run from either side to the center by means of an endless chain running over pulleys at each end of the machine and attached to these smaller frames. These latter have a number of plows connected to them by a sliding bearing, so that they may be raised or lowered as necessary. The whole machine is drawn from end to end of the patio by means of a reversible cable. At each end there is an arrangement by which the smaller frames are shifted so that the plows keep continually changing their position from side to center and vice versa, during the time that the whole machine is being run from end to end. The practical success of the machine is due to Carlos F. de Sander, a vice-president of the American Institute of Mining Engineers, and Manager Quintanilla of the Real del Monte Co. The machine was invented by Aguilino M. de Parres and Stephen Waters of Pachuca.

The results show the average cost of working to be 65% less, a saving of 25% to 30% of quicksilver, and an appreciable saving in time and amount of reagents.

While the planilla concentration process seems costly and primitive, yet, till within the past few years, the cheapness of both the appliance and labor

done to finish the cleaning was to give the boilers a good washing out with a strong stream of water from a fire hose.

When a boiler is thus boiled out and opened, care must be taken that no fire or open lights are brought near the manholes before the boiler has been washed out and well ventilated, for there is danger of igniting the kerosene vapor and causing an explosion.

I have also seen large surface condensers boiled out in the same manner with equally good results.

I may as well mention another attempt to remove cylinder oil in a boiler. In this case the water was boiled out with 150 pounds of washing soda, and naturally the result was a waste of time and labor, waste of steam and fuel, waste of water and washing soda; for the cylinder oil stuck to the boiler as hard as ever.

### The Placers of Tierra del Fuego.

Attempts are being made in certain parts of South America to reawaken interest in the gold placers of the island of Tierra del Fuego, which have long been subjected to intermittent exploitation in primitive fashion, but are soon, apparently, to be systematically worked by machinery. More than one company has been formed in London to work auriferous deposits in the same region, but these have not operated to much purpose, says the London Mining Journal. Reports which from time to time have reached Europe as to the deposits have been mainly the results of hurried examinations made by geologists or mining engineers who have touched at the island on their way through the Straits of Magellan;

\* Bulletin No. 7, South Dakota School of Mines.



canted and the slimes are discharged. Lime for the coagulation of the slimes is added to the extent of six pounds per ton of ore to the batteries. The time required for the treatment of the slimes is five days.

The following figures on slimes treatment at the Dakota mill are of considerable interest: In 5.5 months 6681.67 tons of slimes were treated, the slimes amounting to 33% of the ores crushed. The average value of ore during this period was \$4.75 per ton. The slimes tailings dried and unwashed assayed \$1.31 per ton, giving a recovery on the slimes of 72.28%. The washed slimes tailings assayed \$0.912, showing a solution of the values of 80.7% and a loss of soluble gold of 40 cents per ton, or 8.42% of the value of the ore. The slimes are discharged with 50% moisture, this moisture consisting of solution having a strength of 1.07 pound of cyanide per ton. Since there is a ton of this solution going to waste for every ton of dry slimes discharged, in the 5.5 months which the above period covers, there were lost 7147.6 pounds of cyanide, which, at 23 cents per pound, had a value of \$1644. Adding to this the loss in dissolved gold, amounting to \$2672, the total loss is \$4316, or 64 cents per ton.

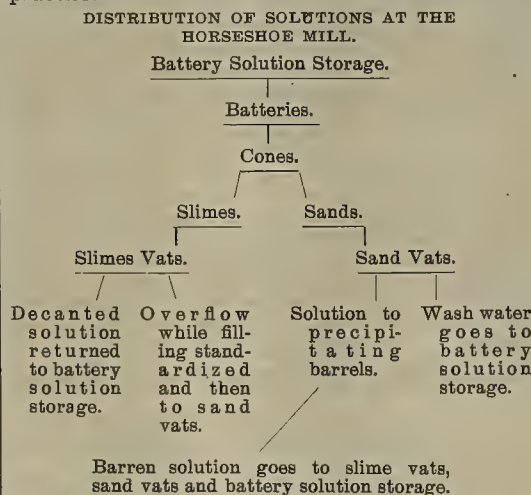
These figures show clearly the weak points of the decantation system of slimes treatment. The Dakota mill is one of the most successful mills in the district, treating what is practically the lowest grade of siliceous ores handled in the district. The results on sands at this mill are discussed under sand treatment. The treatment of the slimes at the Maitland mill is similar to that at the Dakota. Each ton of dry slimes receives a treatment by 5.38 tons of barren solution and 0.96 ton of wash water. The solution going out with the slimes as moisture contains \$0.46 in gold per ton. The head slimes solution, or the solution first decanted from the slimes while filling, has a value of about \$2 per ton.

At the Lundborg, Dorr & Wilson mill the Moore slimes process is used on the slimes. There are three rectangular vats 15 feet long, 7 feet wide and 5.5 feet deep. The first tank has a double hopper bottom, the sides inclined at 45°, to more readily collect the heavy slimes which sometimes fail to be taken on the filter frames. There is a set of thirty-five frames, 4.5x6 feet in area, and made of 2-inch material. The filtering medium is 18-ounce duck. Both sides of the frames are effective as filters and the total filtering area is 1836 square feet. The interior of the frames are connected with a pump, which produces suction, and also with a compressor. The suction is equivalent to 18 inches of mercury. The set of frames is suspended from a hydraulic crane, which transfers the frames from one vat to the other. The method of treatment is as follows: The slimes, after agitation by air and a centrifugal pump in an 8-foot sheet iron cone, are run to the first tank of the Moore process, the frames are immersed in the slimes and the suction is started. A coating of slimes deposits on the filters and the clear solution is discharged by the pump. When the slimes layer on the filters has accumulated to the thickness of an inch, which amounts to a load of four tons on the set of frames, and takes from 40 to 65 minutes, the frames are lifted out with their adherent load of slimes, suction meanwhile being continued, and immersed in the next vat, which is filled with barren solution. This barren solution is sucked through the slimes for forty minutes, when the frames are transferred to the next vat, which is filled with water. This water is sucked through the slimes for forty minutes, when the frames are lifted out, transferred to above the discharge hopper, the suction changed to pressure, which causes the slimes to peel off into cars below the hopper. Some little scraping has to be done to clean the frames. No figures are as yet available concerning the results of the Moore process, permitting of a comparison with the decantation process. It is a fact, however, that the process discharges dryer slimes, those at the Lundborg, Dorr & Wilson mill containing from 34% to 36% moisture, as against 50%, which is the usual figure for the decantation process. At the mills where the upper layer of slimes is pumped off, as described for the Hidden Fortune mill, the slimes are discharged with 46% to 47% moisture. Some of the mills of the district, which must confine their tailings within narrow limits and can not let them flow freely to waste, experience considerable trouble from the high moisture contents of their slimes tailings. The slimes tailings from the Moore process are much more easily held in check. In making a general comparison between the Moore and the decantation process it must be borne in mind that the slimes are under treatment in the Moore process only two or three hours, and in that time receive practically no agitation, so that the solution of the gold must take place practically before the slimes go to the Moore process. The Moore process, even with separate agitation, however, shortens the time on the slimes materially and a large capacity can be installed within a small space.

Filter press experiments have been made on a fair sized scale at one of the mills in the district, which indicated that slimes could be made containing about 25% moisture and that these slimes, on account of the close washing feasible, carried very little cyanide and dissolved gold. It would not be surprising to eventually see filter pressing replace the decantation process, at least in part.

THE DISTRIBUTION OF SOLUTIONS IN THE MILLS.—

The distribution of solutions in the mills is quite complex, and the following diagrams show the general practice:



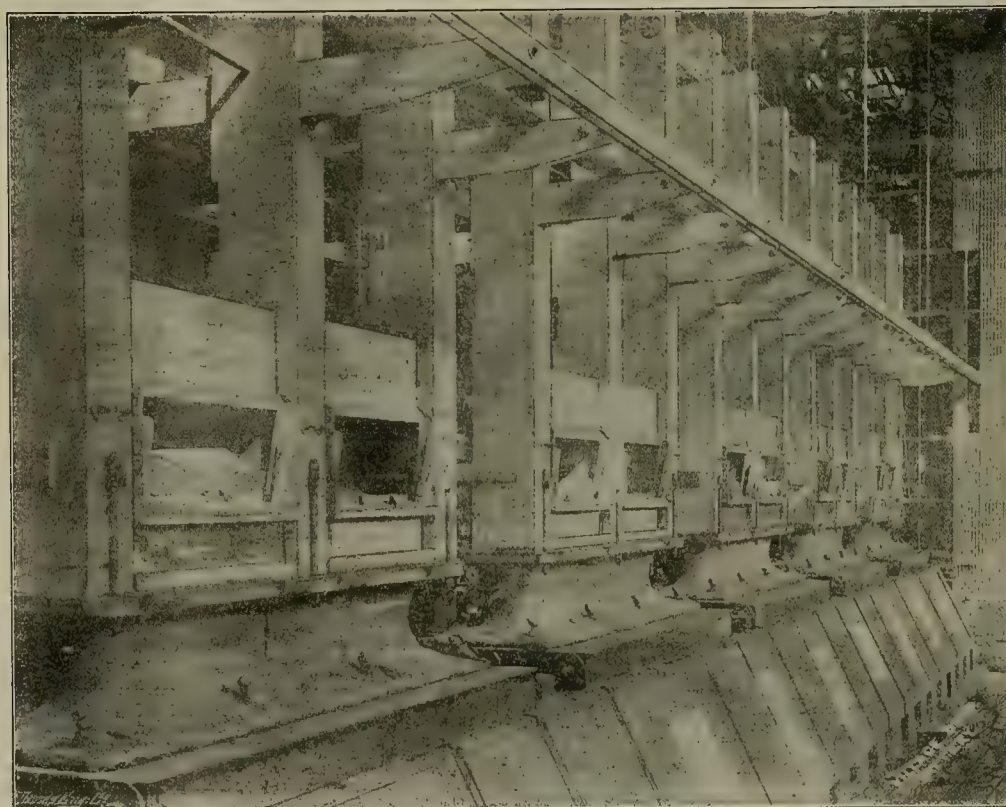
It will be noticed that the only solution going to the precipitating boxes is that which has passed the sands. This amounts to from 800 to 1000 tons per day. The battery solution has a gold value of approximately \$1 per ton. This value is derived for the greater part from the decanted slimes solution. The cyanide needed to bring up the strength of the solution is added to a comparatively small amount of decanted slimes solution, more particularly the overflow solution from the slimes vats while these are filling. This is brought up to three to four pounds of cyanide per ton and run on the sands so that these get the benefit of what is practically a strong solution.

In the scheme of the Maitland mill which follows, it will again be noticed that the only solution that is precipitated is that which has passed the sands. This is the general practice at all of the mills. The

## Milling on the Rand.

The treatment of the ores of the Witwatersrand forms a topic which is always interesting to mining men. In that district a great deal of attention is given to the metallurgical branch. Many innovations are made and experiments with a view to improvement is constantly carried on. The accompanying engraving and description of the new mill of the Village Deep mine are from the London Mining Journal. The battery consists of a heavy casting 2 feet 9 inches in height, under each ten stamps, so designed as to give great rigidity under the blows of the stamps. It weighs about 28,000 pounds and is embedded on a timber cushion about 14 inches deep, composed of timbers laid side by side and firmly bolted together. This in turn rests on a solid concrete foundation block, containing 66 cubic yards of concrete, provided with vertical grooves for the reception of the holding-down bolts, which pass through the base of the anvil block and the timber cushion, and are kept firmly in position by means of timber-straining pieces at their lower ends. This method of construction allows of any bolt being easily removed without hanging up the stamps or stopping the battery. To ensure an even bed for the anvil block, a layer of pitch is run on to the timber cushion before placing the block in position.

The old type of anvil block, as originally tried on the Rand, at the Geldenhuis Deep battery, consisted of a cast iron block or slab 6 inches thick, which was bolted down directly to the concrete foundation. This foundation was much the same shape as that already described, but the bolts were embedded in the concrete, pockets being provided for screwing up the bolts at their lower ends. In case of removal the nuts had to be unscrewed and the bolts drawn, the stamps being hung up while this operation is in progress. No timber cushion was used, with the result that the constant pounding of the stamps caused the concrete to gradually crumble. The casting also was not of sufficient depth and weight, and, taking everything into consideration, this type cannot be said to have been as successful as it might have been. It is fully expected that with the anvil blocks in the new



Iron Anvil-Blocks, Village Deep Mill, Johannesburg, S. A.

solution is restandardized ahead of the zinc boxes in order to get more efficient precipitation as there is some copper in the solution. The strength of the various solutions at the different mills is given under the discussion of the treatment of the sands. The battery solution in the case of the Maitland mill has a value of about 50 cents of gold per ton and the barren solution about 10 cents per ton. About 1100 tons of battery solution are pumped per day and close to 500 tons of solution are precipitated every day, which, after precipitation, becomes the barren solution, so that the mill handles per day about 1600 tons of solution, which, with a capacity of 120 tons of ore per day, is 13.1 tons of solution per ton of ore. The pumping expense of a wet crushing mill per day is appreciable and in the design of a mill the question of handling the solutions is a very important one. At one of the mills the restandardization takes place in the battery sump so that the strongest solution is used in the battery. The practice is for obvious reasons not the best.

(TO BE CONTINUED.)

form 15% to 20% may be added to the mill's contribution to the output. As each stamp earns about £260 per month, taking the Rand mine subsidiaries as a basis, it follows that the product of each unit if augmented to the extent of 15% will be about £300 per month, while the old type of wooden blocks lasted at most ten to twelve years. The new type is of sufficient size and strength to be practically everlasting.

## Looking Up Mexican Ore.

Representatives of the United States Steel Corporation have made a recent investigation of the mountain of iron ore at Durango, Mexico, with a view to its purchase.

This mountain is over 400 feet high, about 2 miles long and 1 mile wide. In 1884 it attracted the attention of C. P. Huntington, who bought it for a song and built the Mexican International Railroad through a long stretch of desert to tap the deposit. He never



carried out his plans for the establishment of a steel plant at Durango, and other interests took up the project to build a furnace with 100 tons daily capacity and 50 tons of bar steel capacity. The Steel Corporation has been losing business in Mexico since the establishment of the \$10,000,000 Monterey plant, and may establish a plant to meet the demands in the Southwest and Mexico.

### Geology of the Treadwell Ore Deposits, Douglas Island, Alaska.\*

NUMBER IV.

Written by ARTHUR C. SPENCER.

Without the above proof that the diorite is intrusive in the greenstone, several general considerations would lead to the probability of this relation. In the region at large the dioritic rocks invariably cut the bedded greenstone, and in Sheep creek they are even later than the gabbro dikes which follow the structure of the enclosing rocks approximately. None of

intrusions, while the greenstone exhibits no features which necessarily require an intrusive origin. The diorite bodies change in shape from place to place, branch irregularly, crosscut the stratification locally, and include masses of slate. The greenstone is a single layer or bed which continues along the same horizon for at least 6 miles, showing but slight variations in thickness. It does not crosscut the slates, so far as observed, and it contains no slate inclusions. Under the circumstances it is strongly believed that the greenstone is not intrusive, but that it originated as a lava flow similar to many others in the same general series of alternating sediments and igneous rocks, while the diorite seems to have been intruded at a much later date.

**THE BLACK SLATES.**—The black slates, which constitute the main country around the Treadwell mines, belong to the third sub-zone of the slate-greenstone band already described. Together with the hanging wall greenstone, they constitute all of the sub-zone which appears on the southern half of Douglas island, the remaining portion being beneath Gastineau channel. They are highly metamorphosed, carbonaceous

impossible to secure entirely unaltered material. Dr. Becker, who first studied it with care, gave it the designation "sodium syenite," to distinguish it from the ordinary syenites which contain potassium as their alkali constituent. However, since the soda feldspar albite, which is the characteristic mineral of the rock, belongs to the plagioclase series, and these feldspars are the distinguishing feature of dioritic rocks, he suggested the alternative name "albite diorite," which is here employed because it serves to indicate the known relationship of the Treadwell rock with the dioritic intrusives of the adjacent Coast range.

The rock varies in mineralogical composition from place to place, but it is always very much changed from its original condition. Most of it shows little or no ferro-magnesian minerals, either because they were never present or because they have been decomposed and carried away by the mineralizing solutions which have permeated the rock. Specimens were collected, however, which contained hornblende in apparently original prisms, and biotite is sometimes observed. Secondarily crystallized mica and green hornblende are somewhat common, and with them a considerable amount of epidote is ordinarily found. Feldspar is present in two conditions, original and secondary. The primary feldspars of the magma were albite oligoclase, occurring in phenocrysts now always clouded by decomposition products, and microperthite with some pure albite, forming a granular ground mass of distinctly later crystallization. The composition of the phenocrysts is inferred in general from the presence of epidote as one of the minerals formed by the alteration of the feldspars, but this has been checked by the optical characteristics of relatively fresh material occurring in several specimens. The secondary feldspar is always albite and is usually quite free from decomposition, and when it occurs in sufficient amounts it gives the rock a very fresh appearance. It seems to have been formed mainly at the expense of the original microperthite, which it replaces in part.

Quartz seems not to have been an original mineral in the albite diorite, and it is never observed in the body of the rock associated with the secondary albite, but is confined to the veinlets which intersect the dikes. Calcite is common both in the veins and distributed through the rock itself along with the albite of the second generation.

Original accessory minerals noted are: Apatite, titanite, rutile and magnetite. The secondary minerals which have been noted are: Uralite (secondary hornblende), green mica, chlorite, epidote, zoisite, calcite, quartz, sericite, rutile, pyrite, pyrrhotite and stibnite, with other sulphides occurring exceptionally. Some of the magnetite seems also to have originated from the breaking up of former iron-bearing minerals, where it surrounds cubes of pyrite it has apparently been deposited from the mineral solutions.

In the vicinity of the mines albite diorite occurs in the black slates as dikes distributed throughout a zone about 3000 feet in width and extending along the strike for a distance of 3 miles. Only bodies near the hanging wall of this zone have been mined up to the present time, though several others are strongly mineralized. The dimensions of the different dikes are extremely variable, the larger ones having a maximum observed width of over 200 feet in surface exposure and in the mine workings. From this, all sizes occur down to the width of one's hand, and toward the ends of the intrusive area only small dikes occur, as may be observed along the bed of Bullion creek. The sketch map (Fig. 6) indicates the general distribution of observed dikes. Undoubtedly a still larger number, principally of small dikes, are hidden by gravel beds and by the deep mat of decaying vegetation which covers much of the ground. In many cases, and this is particularly to be noted in the dikes which have been mined, the individual intrusions are made up of a series of lenses formed by alternate bulging and pinching of the intrusive mass. In places the structure of the slate follows these irregularities, while elsewhere there is local cross-cutting or even faulting. Pinching and swelling of the diorite is shown in both vertical and horizontal cross sections of the dikes, though in general it is to be noted that the variations are more frequent and the changes take place within shorter distances upon the dip than upon the strike. These features are illustrated in Figs. 10 and 11, which, with the addition of a few details, have been selected from the working maps and slope sections of the different mines.

The greater frequency of the variations on the dip, which has been mentioned, may be due to faulting, for in the west end of the Glory Hole at the Treadwell mine and in two other cases underground, where observations have been less readily made, the ore bodies are offset by movement along surfaces which strike nearly parallel to the veins, but dip at a lower angle. A series of such faults would produce the effect of alternate swelling and pinching (Fig. 9).

Outside of the ground which has been worked, the details of the various diorite masses are unknown, but their general distribution is shown upon the geological map, and the generalized cross section through the workings of the Treadwell mine indicates the relative number and size of the dikes which outcrop (Figs. 5 and 6). Considerable work was done

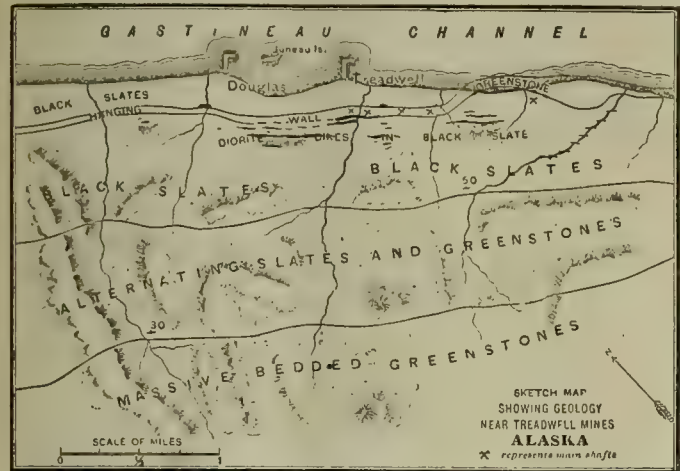


Fig. 6.

Fig. 9—Faulting of Dike, Treadwell Mine.

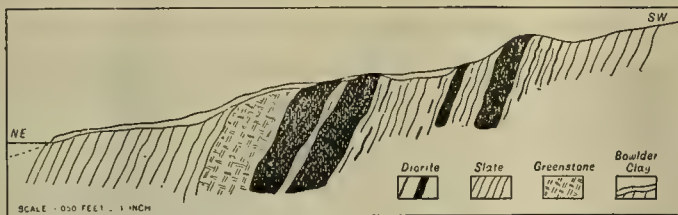
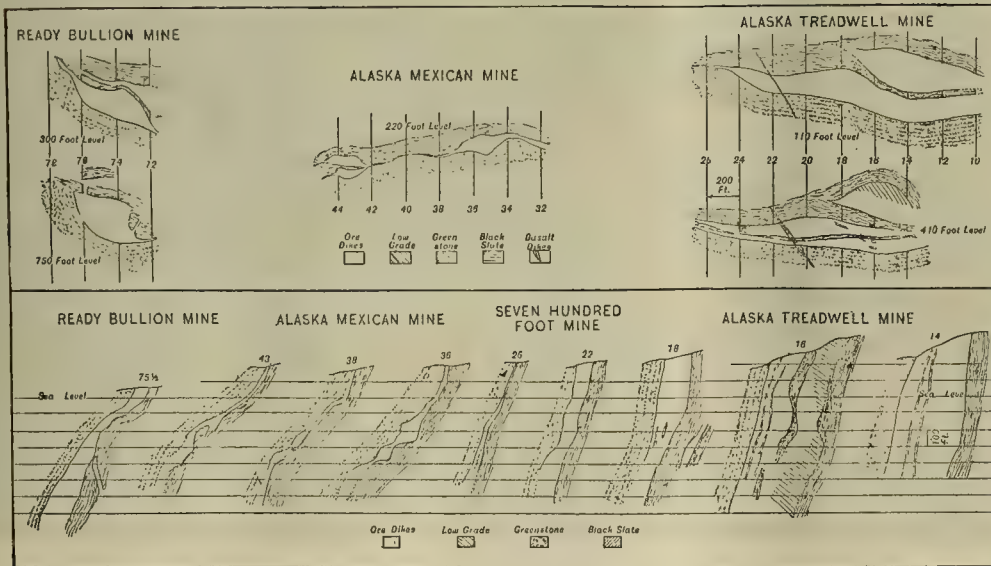


Fig. 5—Cross Section Through Alaska-Treadwell Mine, Douglas Island.



Figs. 10 and 11—Plan and Transverse Section Treadwell Mine, Douglas Island, Alaska.

the basic intrusives which are evidently later than the Coast Range diorites show any tendency to follow the structural trend of the region, but, like the small basalt dikes in the Treadwell mine, they characteristically hold to transverse courses. The way in which the greenstone limits the zone of diorite dikes, and the marked coherence of individual dikes to its lower surface, both point to the hanging wall stratum as a controlling feature in the distribution of the diorite, and therefore suggest its earlier existence. The probability of this connection is well brought out by the detailed map and cross-section (Figs. 5 and 6). Again, if the attitudes of the diorite dikes and the greenstone in reference to the slate country are compared, it is found that the diorite shows all the ordinary structural characteristics of

and calcareous shales, of fairly uniform texture. Their stratification is usually determinable from variations in color and from slight changes in the character of material, and in so far as observed the bedding and principal slaty cleavage are always in accord.

The cleavage of the slates is regarded as having been produced before the syenite intrusions, the direction of which it largely controls. In this respect the secondary structure corresponds with that of the sedimentary rocks of the general region, all of which were tilted and metamorphosed before the diorites of the Coast Range were intruded. The slates do not appear to have been altered by contact metamorphism next to the intrusive dikes of syenite.

**THE ALBITE DIORITE.**—Classification of the Treadwell rock is somewhat difficult, because it has been

\* Abstract Am. Inst. Min. Engs.



several years ago in prospecting adjacent bodies of diorite, many of which are as thoroughly impregnated with pyrite as the developed ore bodies. So far as known the gold values are mostly very low, and while mines may yet be discovered, explorations have not thus far resulted in important discoveries.

The occurrence of the sulphide-bearing diorite which forms the Treadwell ore deposit has been described by Dr. G. M. Dawson, who visited the mine in 1889. This geologist states his impression that the deposit represents the upper portion or "feather edge" of a granitic intrusion, probably contemporaneous and connected with the granites of the neighboring Coast range. The structural relations presented by this view are entirely in accord with present observations, for, while the rock cannot be strictly classed as granite, neither can a large part of the rocks which form the core of the Coast range be so classed, since their composition is usually dioritic. The diorite of the Douglas Island mines doubtless belongs to the Coast range period of intrusion, and if the small dikes of basalt which are found from place to place throughout the region be excepted, it is the youngest of the bedrock formations in the vicinity. At the time of its intrusion the rocks which now appear at the surface occupied a position deep within the shell of the earth (lithosphere), and while many masses of the Coast range diorite were forced through to the surface, it is doubtful whether any of these particular dikes ever extended as far as the surface which then existed. Taken together they represent intrusive material which was arrested en route, while larger masses of related rocks in the region are regarded as the once deep-seated portions of intrusions which probably had actual surface exit. In the underground workings the blind endings of certain of the dikes show that some of them do not extend even to the present surface. How much farther the larger ones may have penetrated the slates now removed by erosion cannot be estimated.

**BASALT DIKES.**—In several places in the mine workings basalt dikes, which cut all the other rocks, have been encountered. They are narrow, usually from a few inches up to 3 feet in width, and have sharply defined walls. Locally, the dikes occur in pairs and in several places are seen to divide, particularly when they occur in the zones of sheeted rock. The fissures in which they occur are transverse to the strike of the rocks and trend from N. 10° W. to about north and south, true meridian, with a rather steep dip toward the west. As a rule, they are not mineralized to any important extent, though a small amount of pyrite sometimes appears, and occasionally they contain a considerable amount of this mineral. In several places veinlets of calcite occur along the selvage, but these are readily determinable as of later origin than the greater part of the quartz and calcite which form a reticulation throughout the mass of the ore material.

(TO BE CONTINUED.)

## THE PROSPECTOR.

The rock samples from the Kingston range, San Bernardino county, Cal., are classified as follows: No. 1. Hornblende andesite. No. 2 is also apparently an andesite, somewhat altered. No. 3 is trachyte, showing large zonal feldspars. No. 4 is also trachyte, much decayed. No. 5 is rhyolite of glassy variety (pearlite). No. 6 is andesite; it is somewhat altered and shows considerable epidote in the form of yellowish crystals and spots. No. 7 is mica (biotite) andesite, in which the biotite predominates over the hornblende. No. 8 is a basic rock of the basalt family, but is of unusual type. No. 9 is trachyte. No. 10 is diabase, in which much silica has been infiltrated. No. 11 is diabase. No. 12 is also diabase. No. 13 is gabbro. No. 14 is a metamorphic rock, probably altered from diabase; the fibrous mineral with radiated structure is a variety of amphibole (tremolite). No. 15 is limestone. No. 16 is limestone, altered partly into silica with the development of magnesian silicates (tremolite, etc.); stains of green copper carbonate are also present in the specimen. No. 17 is limestone, in which occur quartz and iron oxide. No. 18 is an altered granite, consisting chiefly of granules of quartz, partly kaolinized feldspars and secondary mica. No. 19 is also granite, similar to No. 18, but containing iron ore, probably titanite. The twentieth piece is not numbered; it is quartz, on one side of which occurs bright, metallic-appearing specular iron (hematite).

The rock specimens from Orleans, Cal., are: No. 1. Amphibole rock. No. 2. Amphibolite schist. No. 3. Diabase. No. 2 may result from the alteration of such rocks as either No. 1 or No. 2.

The rock specimens from Custer City, S. D., are: 1. Apatite (calcium phosphate). 2. Black tourmaline. 3. Orthoclase (potash feldspar). 4. Biotite (black mica). 5. Rose quartz. None of these minerals has more than nominal value.

The greenish granular mineral from Denver, Colo., is glauconite, an iron silicate. Nickel silicate has a brighter color.

## Copper in El Dorado County, Cal.

Beside numerous gold mines in El Dorado county, California, there are a number of promising copper mines and prospects, and near Latrobe a quicksilver mine, though the latter has been idle for some years. Near Diamond Springs and about 2 miles east of the Union gold mine is a copper prospect—a vein 4 feet wide producing a good grade of copper sulphide ore. In that vicinity are also several other prospects of copper and gold. Near the Cosumnes river is a copper mine known as the Cosumnes copper mine. It

amount of development, including the sinking of a three-compartment shaft. One of the accompanying illustrations shows the tunnel entrance to the Contraband claim of this company, and the other shows an open cut on one of the veins from which considerable ore has been removed.

There are other prospects in the vicinity of Georgetown where drifts and shafts have been cut on large veins showing copper, gold and silver. The fact that these mines generally are several miles from transportation and are mostly in the hands of men who are inexperienced in the metallurgy of cop-



Entrance to Main Tunnel of the El Dorado Copper Co.'s Mine, Near Georgetown, El Dorado County, Cal.



Open Cut on Gold Property of the El Dorado Copper Co. at Georgetown, El Dorado County, Cal.

per and usually lack the means to properly equip them probably accounts in some degree for their not being producers at the present time.

About 7 miles east of Newcastle (Placer county) and in El Dorado county is a heavy gossan which can be traced at intervals for several thousand feet. One property, the Alabaster Cave mine, has been superficially developed, and is in places 30 feet wide. The ore contains 3% or 4% copper, beside gold and silver. Native copper, in sheets, is also found near the walls. The Cambrian mine, 10 miles northwest of Placerville, was originally worked for gold, but as the sulphide zone was entered copper made its appearance, and now forms an important portion of the values.

Near Georgetown, the El Dorado Copper Mining Co. owns a number of claims, including the old Contraband and Ford mines. They have done a large

per and usually lack the means to properly equip them probably accounts in some degree for their not being producers at the present time.

## A Valuable Bibliography and Index.

In compiling a "Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1903," F. B. Weeks, of the United States Geological Survey, has done work that will be of value to the student who desires to keep pace with the progress of science. It will serve him as a guide to the latest knowledge of the subjects which it covers.

The bibliography consists of full titles of separate papers, arranged alphabetically by authors' names, an abbreviated reference to the publication in which



the paper is printed, and brief description of the contents. Each paper is numbered for index reference.

The index is preceded by a classified key, in which are shown the subject headings, their subdivisions and arrangement. Reference is made in each entry by author's name and number of article in the bibliography.

This is the latest of a series of annual bibliographies prepared solely from publications received by the library of the United States Geological Survey. On January 1, 1903, Mr. Weeks was placed in charge of the Survey library and began to make an effort to procure the publications which were not noticed in bibliographies of previous years. Many of these are noted in the current bibliography, which is listed among the Survey's publications as Bulletin No. 240. J. M. Nickles assisted Mr. Weeks in the compilation of the work. It is published for gratuitous distribution, and may be obtained on applying to the Director of the United States Geological Survey, Washington, D. C.

### Wilfley Concentrator.

The Wilfley concentrating table, which has been on the market for the past eight years, has been greatly improved. Herewith is illustrated the table as it appears to-day; also is portrayed the deck and riffles of the table. Bulletin No. 6 issued by the Mine & Smelter Supply Co., Denver, Colo., says: "It is absolutely essential that a perfect concentrat-

the Mine & Smelter Supply Co., Denver, Colo., and each of their branch houses at Salt Lake City, Utah; El Paso, Texas, and 139 Liberty street, New York City, and the Mexico Mine & Smelter Supply Co., City of Mexico, Mexico.

### Observations on Gold Milling.\*

Written by J. G. McNULTY.

Beginning with the self-feeders back of the mortars, it is a good plan to have the adjusting parts to come on the left hand side, or opposite the belt side. This permits the millman to work with more freedom.

A plate iron lining is of benefit in the throat of the mortar, for, besides protecting the throat from wear, it serves as an apron to catch any ore dropping from the feeders. The iron plate rests on the throat of the mortar, comes up over the back part, and is turned over and out some 5 or 6 inches.

As it is frequently necessary to open and close the battery feed water supply, and several minutes are wasted in again securing the proper working flow, it will be found convenient to have a globe valve on the pipe leading from the main water supply pipe to the feed water pipe with two or more "bibs" at the top of the mortar. The globe valve is always set right for the amount of water required. In hanging

phurets.

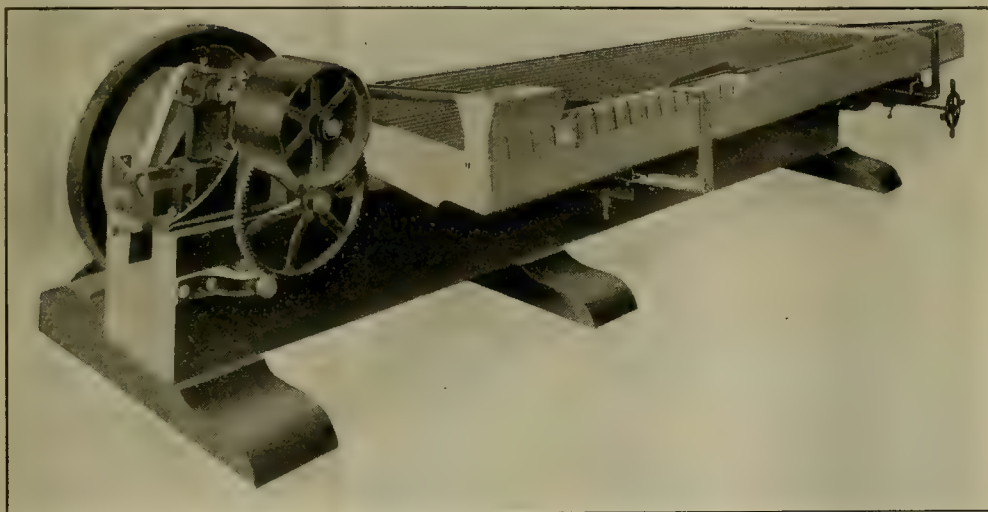
Various methods are to be found in our mills for attaching the screen to its frame. The following will be found efficient and convenient: The screen frame is made of 2-inch seasoned hard wood, framed, and provided with ten  $\frac{1}{4}$ -inch stud bolts, four along the upper and four along the lower sides of the opening, with one on either end. The screen is punched from a template to fit over these studs, and is held in place by an iron frame made of  $\frac{3}{16}$ -inch thick flat iron, 1 inch wide, bored to fit over the studs. The screen frame opening is 5x50 inches. With a suitable socket wrench the stud bolt taps are readily removed, and the screen taken out. One side of the screen frame is made wider than the other, so that by reversing, the depth of discharge may in a measure be compensated for. Intermediate posts are eliminated, thus admitting an uninterrupted flow of pulp along the entire length of the screen.

A convenient method for handling a roll of screen is to place it on a spool or reel, unroll the length desired on a table which has a slot running through the center its entire length, then with a stout knife, guided by the slot, the amalgamator readily cuts off the size desired. Low sides hold the screen fair on the table. This simple device keeps the roll of screen intact, and will be found quite a saving of time, especially in large mills.

There is a growing tendency in milling to utilize the stamp mill more as a pulverizer, and depend less upon the mortar as a means of saving the gold—that is, endeavoring to make a combination machine of the battery. The idea, I am aware, is quite at variance with the general mill practice of the province. Some months ago I made a series of special test runs, in a large mill then under my management, and the results convinced me that there was no practical gain in maintaining lip plates, chuck-block plates and the various other forms of plates interposed between the discharge and the apron plates, unless it might be that they offer a slight gain in plate area, but additional trouble in cleaning up. There is very little danger in having too much apron plate area. The coarse gold that may be present in a given ore will naturally find its way down between the dies, if conditions be favorable, while the apron plates will take care of the finer gold passing the screen as amalgam.

To maintain the plates up to a high standard of efficiency, they require constant care and attention on the part of the amalgamator. The promiscuous use of chemicals, particularly potassium cyanide, as a means of attaining this end should be condemned. Hard, persistent rubbing is by far the most efficient, and, indeed, the only method of keeping the plates in the condition they should be to do effective work. Rather than use cloths in dressing and working up the plates, a stout piece of rubber  $\frac{1}{4}$ -inch thick, cut to a desirable size—say 6x3 inches—will be found far more effective.

By having the apron plates in sections of say 3 $\frac{1}{2}$  feet in length, they admit of rotation, or having their relative positions changed in the series, ultimately making a plate equally sensitive and uniform throughout its entire length. The plates are arranged so



The Wilfley Concentrator.

ing machine should run at a uniform speed and without jar, as the effect of the motion in combination with riffled and plain surfaces is to form a stratification of the various products which may be in part de-

up the stamps the two "bibs" can be quickly shut off, and when opened again the flow of water is of desired volume.

I have made extended tests with the front water



Deck and Riffles of Wilfley Concentrator.

stroyed by excessive external vibration. The No. 5 table is supported upon a timber girder, which makes a much lighter support than the former tables had, and at the same time making the most rigid form of mounting possible. The girder frame we are now building is absolutely rigid and self-contained. Under this girder frame three timber feet are securely bolted. The No. 5 movement has some valuable improvements. The entire movement, including the elevator, is self-contained and mounted upon a well designed and strongly ribbed base made of close-grained cast iron. This frame is bolted rigidly to the girder support, making the whole as rigid as if it were one piece. The top surface is covered with linoleum upon which are a series of riffles ending along a diagonal line, forming a combination of a riffled portion and a plain surface."

These machines are on exhibition and for sale by

feed versus the top water feed, and have found the former an advantage, especially with ores carrying a considerable per cent. of sulphurets or clayey gangues. The crushing capacity is considerably increased, less slimes produced, and the sulphurets in better condition for concentration.

The water supply for the various purposes about a large mill should, so far as is consistent with the conditions, be independent, and the supply drawn from head boxes, which will give a uniform pressure. In case wood be used for fuel, it is a good idea to construct a large wooden hopper with a filter bottom, near the boiler room, as a receptacle for the ashes. The "leach" from the ashes, fed to mortars by drip cocks, will be found beneficial in keeping the mercury active, especially in the presence of considerable sul-

phurets. that succeeding plates average  $\frac{1}{4}$  inch, with about the same drop between plates. In construction, the plate taken should be substantial, readily adjusted, preferably by slot wedges at the lower end, and rest on supports independent of the batting or mill floor system, so as to reduce the vibration to a minimum. It is advisable to pass the discharge from aprons over a cross screen, which is nailed to a light frame and set into the launder at the foot of the table, before it enters the trap or passes to the concentrator, as coarse grains of pulp are apt to find their way on to the plates in changing screens, etc., and become a source of annoyance on the concentrator.

In order that the amalgamator may have the screens in full view at all times, special curtains in front of the screens should be discarded when possible.

In setting up concentrators with a view of securing

\*Abstract Trans. Min. Soc. of Nova Scotia.



the greatest efficiency, one can not observe too much care in providing a substantial foundation. A common method is to set the carrying frame for the concentrators on the mill floor and depend upon a few nails to hold it in position. In setting up tables of the Wilfley type, I have found it good practice to construct two rough walls of masonry, with anchor bolts to hold down a 6x8-inch frame, on to which the carrying frame of the concentrator is substantially bolted. This arrangement adds a very little to the cost of installation, insures the possibility of getting the best duty out of the machine, and materially reduces the cost for duplicate parts.

It has occurred to me that even though the amount of sulphurets in a given ore be not sufficient to justify concentration, it might be advisable to convey the pulp after amalgamation over a concentrator, having previously passed it through a "reduction" box, a large Spitzkasten, in order to sufficiently reduce volume of the pulp coming from the mill. The arrangement would certainly make a very efficient trap, producing a product which might be treated from time to time in a clean-up barrel.

In cleaning up I use a clean-up barrel and find it convenient for other purposes than the actual clean-up, in the way of working over the sweepings and workings of the mill floor, iron removed in cleaning amalgam, trash collected from behind the battery screens, etc.

The barrel is placed so as to admit of easy changing from the plate floor, with ample fall below for the installation of a sluice and head box to receive the discharge from the barrel. In discharging the barrel, the pulp passes over a small grizzly or coarse screen, within the head box, so as to separate any large pieces of material that may be present, to be afterwards hand sorted. The material passing the grizzly goes direct to the sluice, which is approximately 12 feet in length by 18 inches in width. The bottom of the sluice is laid with ordinary rubber door mats, butting ends, and held in place by cleats. This arrangement is simple and effective for collecting the mercury and amalgam. The mats are readily removed with their charge to the clean-up room. As a precautionary measure, the pulp from the sluice is run over a 3-tray rocker.

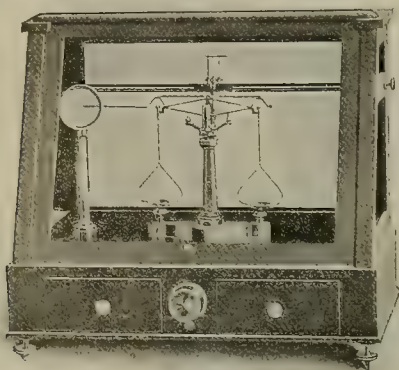
The mill flooring should be double and with sufficient slope to carry all washings into a launder extending along the entire length of the mill and discharging into a sump.

The provision for ample room and light are too often neglected in the average mill structure. Both are important factors in expediting the routine work and repairs.

In submitting these brief observations, I feel that while nothing verging on the original has been advanced, they may, in a measure, refresh ideas in connection with the subject.

### Button Balance.

Style "H" button balance, as illustrated herewith, has agate edges and bearings, star wheel ad-



justment, double-jointed skeleton hangers, fall away pan rests, thermometer and other improvements. This balance, although not classed as a portable, when provided with leather-covered carrying case, can be used for such purposes. The beam-locking device is applied to this balance. It has a sensitivity of  $\frac{1}{200}$  —  $\frac{1}{100}$  mg. 4-inch beam; dimensions of the balance are, 14"x12"x8"—35x32x20 centimeters. These balances are manufactured by the Denver Balance Co., 3000 Larimer street, Denver, Colo.

As an index of the present condition of the mining industry on the Witwatersrand, S. A., the following gives an approximate idea. During a single month of the past summer nearly 800,000 tons of ore were hoisted from the mines. This required 1,100,000 pounds of explosive and 670,000 shots were fired. Of course all of the rock broken was not ore, but the amount of ore broken and raised was equal to about 1.2 ton of ore to each hole. There are at the mines 1684 machine drills, 90% of which were in actual use. These figures indicate in a measure the activity in that single gold-producing district of South Africa.

### Exhibit at Louisiana Purchase Exposition.

The A. Leschen & Sons Rope Co. are extensively represented at the Louisiana Purchase Exposition in the Machinery Hall and also in the mining gulch. In the exhibit in the Machinery Hall is shown the classes of cable which they furnish and manufacture, besides aerial wire rope tramways, suspension bridge, haulage outfits and other equipments involving the use of wire rope.

The exhibit, as herewith shown, consists of an elaborate pavilion artistically arranged and built entirely of wire rope and wire rope fittings which they manufacture and supply.

East of this pavilion is a representation of mountain scenery with an operating tramway model 16 feet in length, built to a scale of 2 inches to the foot, showing the detail of the Leschen Co.'s automatic tramway built over a rugged contour representing a typical mountain scene.

A complete model of a wire rope suspension bridge is also shown in connection with the scenic effect, spanning a wide stream over an extensive waterfall.



A. Leschen & Sons Rope Co.'s Exhibit in Machinery Hall at the St. Louis Exposition.

Other tramways are also shown, carrying ore from different points to the millsites in the gulch below.

An aerial wire rope tramway of the Leschen Co.'s automatic system is shown in actual size in the mining gulch, with a length of 1250 feet. It is supported by two wooden intermediate towers and two steel towers. The track ropes on this tramway are  $1\frac{1}{2}$  inch and 1 inch, respectively, in diameter, made of flattened strand triangular crucible steel. The buckets hold 650 pounds of ore.

In the Leschen Co.'s automatic tramway the traction rope is guided by sheaves on the tower located at the same distance as the grip is placed below the track cable, so that the track rope is not lifted when a bucket passes a tower, and as a result no strain is developed.

One of the longest lines built was constructed for the North American Copper Co. recently at Encampment, Wyo., which was the Leschen Co.'s automatic type of machine, having a length of 16 miles and a capacity of sixty tons per hour.

A. Leschen & Sons Rope Co. have branch offices at New York City, Chicago, Denver and San Francisco. Their headquarters are at 920 and 922 North First street, St. Louis, Mo.

### Tin in the Transvaal.

While tin ore, up to now, was only known to occur in Swaziland and such parts of the Transvaal immediately adjoining the former, a new discovery of tin ore was made in May last in the center of the Transvaal, about 40 miles northeast of Pretoria. In Swaziland tin is found in pegmatite lodes, the occurrence in the Bushveld representing essentially different features. A large area of the center of the Transvaal is occupied by a red, coarse-grained granite, in which mica occurs in association with hornblende. In the parts where the new finds have been made there exists a broken zone striking north-south, along which a younger granite is found. The broken zone has been traced for 18 miles. This younger granite is red and contains scarcely any mica; it differs, however, from the old granite, as it is fine grained and richer in silica, being a variety of aplite. The fine-grained granite protrudes from the older granite in some parts in the shape of kopjes several hundred meters in diameter. The younger granite is the ore carrier. It will have to be proved by extensive prospecting work whether the occurrence of ore in the fine-grained granite will pay to be worked, or whether the narrow contraction fissures will concentrate locally so as to form workable zones.

Another occurrence of tin ore may be observed on the farm Enkeldoorn, where several prospecting shafts down to 30 feet in depth have been sunk on parallel quartz veins. These veins show a strike to the northeast (magnetic) and a steep dip to the east. The principal veins vary between 20 and 70 centimeters in width. On both sides of the quartz veins there are decomposed zones of the coarser-grained granite which are impregnated with tin stone.



A. Leschen & Sons Rope Co.'s Aerial Wire Tramway in Mining Gulch at St. Louis Exposition.

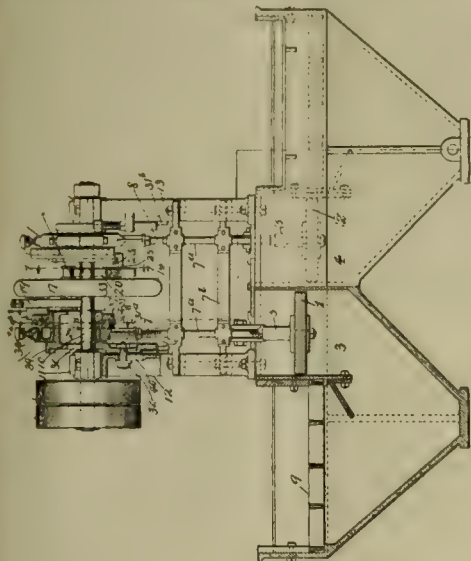


## Mining and Metallurgical Patents.

PATENTS ISSUED OCTOBER 18, 1904.

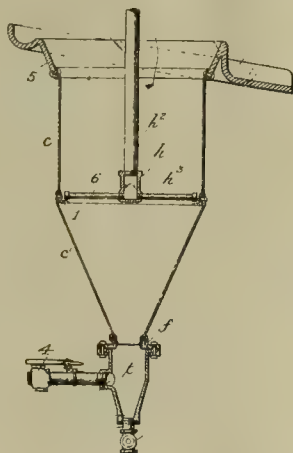
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

MINERAL OR ORE WASHING JIG.—No. 771,909; C. J. Hodge, Houghton, Mich.



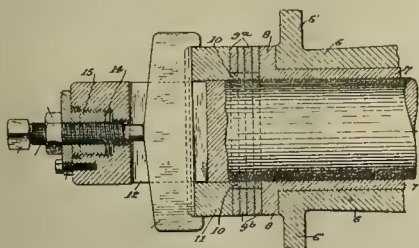
Combination of driving shaft, pair of eccentrics through which shaft passes and which are adjustable transversely of shaft, flywheel mounted on shaft between eccentrics and crank connection between flywheel and each of eccentrics.

PNEUMATIC HYDRAULIC SEPARATOR.—No. 771,874; W. R. Grant, Denver, Colo.



Apparatus for separating and classifying material comprising casing for holding liquid and having outlet at top for fine material and lower outlet for coarser material and means for introducing air to rise upwardly in casing, air introducing means being interposed axially between upper and lower outlets and at intermediate height in casing and diffusing air throughout entire cross sectional area of casing and leaving passages throughout cross sectional area for free fall therethrough of coarser material.

CRUSHING ROLLS.—No. 771,949; J. A. Thomas, Los Angeles, Cal.



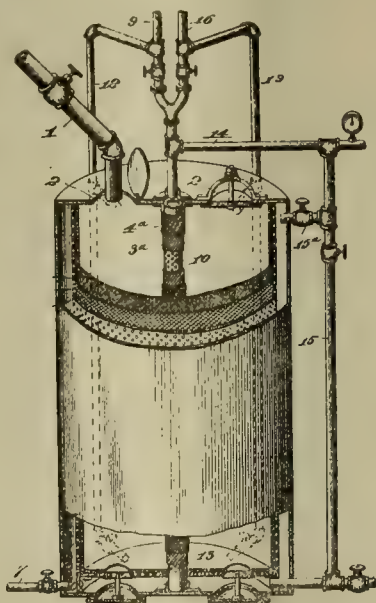
Combination with journal boxes, of movable shafts rotatably mounted therein, rolls fixed on shafts, shafts provided with slots, means operating through slots upon boxes, shafts provided at ends with seats, wear plugs within seats provided with threaded bearings, adjusting screws threaded into bearings and adapted to operate upon means, means locking wear plugs in seats, and lock nuts upon adjusting screws.

DUMP CAR ELEVATOR.—No. 771,899; E. O. Fehr, Orangeville, Ill.



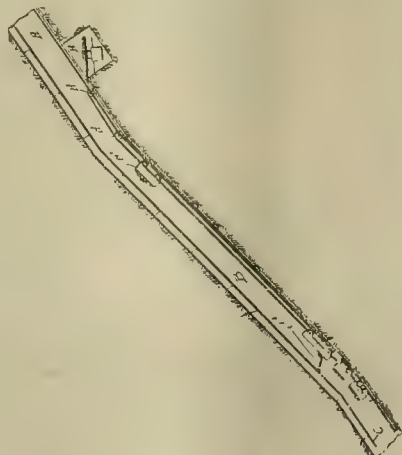
Inclined track having pivotally movable drop portion and connecting means underneath portion for moving and supporting latter with relation to former.

ORE DRAINAGE AND LEACHING TANK.—No. 772,389; J. F. Webb, Denver, Colo.



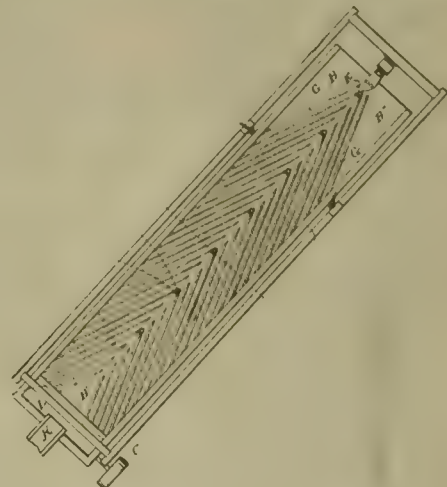
In metallurgic filter, outer imperforate tank separated by annular space from inner drainage and leaching tank with perforated sides and bottom covered with suitable filters, and having within circumference perforated lower end of hollow compartment or standpipe through which liquids or compressed air may be introduced into tank and forced by pressure to pass outwardly through filters and perforations thereof, and having pipes through which flow of such liquids or compressed air may be reversed from hollow compartment or standpipe into said annular space and be forced by pressure to pass inwardly through perforations and filters of tank.

AUTOMATIC COUNTERBALANCING SYSTEM FOR INCLINED RAILWAYS.—No. 772,733; E. C. Morgan, Chicago, Ill.



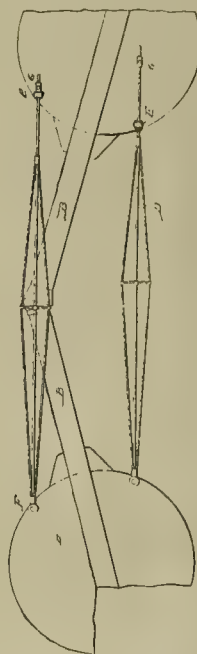
In counterbalancing system for railway trains, combination with locomotive and train of cars, of counterweight, counterweight proportioned to counterbalance weight of locomotive and cars and portion of load, and connections between counterweight and train.

CONCENTRATOR.—No. 772,540; C. A. Smith, Los Angeles, Cal.



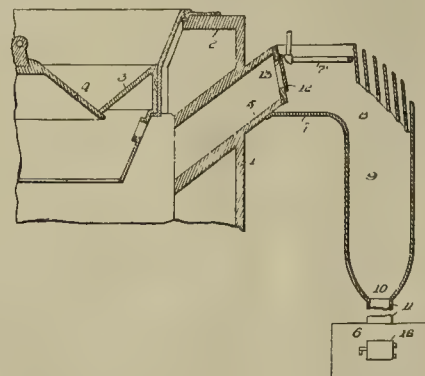
Concentrator table elevated in longitudinal center thereof, and having ports in longitudinal center; riffling on top of table leading downwardly from sides thereof to point adjacent to center; riffling being low at outer end and high at inner end; and means to regulate openings in center for discharge there-through of concentrates from table as they are separated from gangue, and means to give longitudinal swinging motion to table.

PIPE LINE FOR HYDRAULIC DREDGERS.—No. 772,330; L. W. Bates, New York, N. Y.



In combination with series of pontoons, pipe section carried by each pontoon; flexible joint between adjacent ends of pipe sections; pair of rods arranged upon opposite sides of pipe sections and pivotally connected to pontoons; and means for limiting movement of rods relatively to pontoons.

BLAST FURNACE.—No. 772,723; A. Latto and J. C. Callan, Braddock, Pa.



Combination with blast furnace of conduit communicating with blast furnace near top thereof, and dust collector composed of curved elbow, downwardly extending tube, angularly disposed plates arranged in elbow and having spaces between plates communicating with open air.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

The United States Geological Survey reports the lead content of ores smelted by works in the United States for 1903:

Source of Ore.	Tons.
Colorado.....	45,554
Idaho.....	99,590
Utah.....	51,129
Montana.....	3,303
New Mexico.....	6,9
Nevada.....	2,237
Arizona.....	1,493
California.....	55
Washington.....	538
Oregon, Alaska, South Dakota, Texas, Missouri, Kansas, Wisconsin, Illinois, Iowa, Virginia, Kentucky.....	1,765
	86,597

Total lead content U. S. ores smelted.....292,674  
Content miscellaneous or unknown.....2,831

Production of soft lead was 83,444 tons, being the lead obtained directly by smelting non-argentiferous ores in the works of Kansas, Missouri, Illinois and Iowa. As a whole, the year 1903 was a prosperous one for the lead mining and smelting interests of the United States. The principal increase in production was in southeastern Missouri, "though the rapid development of the Cœur d'Alene mines in Idaho has more than compensated for the steady decline in the lead product of Colorado. Utah has held its own."

## ALASKA.

In the Kayak oil fields, near Kayak, the English company has sunk eleven holes this summer and reports having struck oil in each. In one well they have obtained forty-five barrels by pumping. This is used as fuel by two rigs in operation. It is said the main body of oil sand has not yet been tapped. One hole is 800 feet in depth and another 400 feet. The Lippy Co. is down 400 feet in one hole and has struck gas and oil. The Kayak oil fields are 150 miles long by 40 miles wide and the surface of the land shows numerous oil seepages. The oil is of high gravity.

The gold output at Nome for the season of 1904, now closing, will reach \$3,000,000, reports the Nome Nugget. The spring cleanup is not included in these figures. A strike has been made on Little creek. Pans are running \$100. The streak is both deep and wide. Since June 13th last, \$3,251,665.40 in gold dust and bullion has been entered at the Nome custom-house for shipment, probably \$100,000 was sent outside through the postoffice prior to the order of the Postoffice Department, which virtually shut off the shipment of considerable amounts of dust through the postoffice.

## ARIZONA.

### Cochise County.

Work on the Gold Treasure (the San Jose) mine at Naco has begun and grading for the mill site is under way. The equipment of the mill will be twenty stamps and four concentrating tables. A 7250-foot tramway will be built from the mine to the mill. The ore carries \$12 per ton, gold, and six ounces silver. Development work aggregates 700 feet in drifts and tunnels.

### Gila County.

Manager Chittenden, of the Saddle Mountain M. Co., is refitting the copper smelter at the San Carlos group, near San Carlos. It is a 40-ton water jacket. The smelter will be started next month.

### Maricopa County.

(Special Correspondence).—J. D. Marlar is sinking a shaft on copper property which he has bought near Rogers Springs. —E. Howard reports that he will put men to work on his gold mines in the Cave Creek district. —J. Maddox is working a promising gold property in the White Tank mountains.

The Arizona Bismuth Co. will install a leaching plant at its bismuth mines.

A. W. Gregg and S. Christy have incorporated the Phoenix Slate Co. They propose to quarry slate from a property north of Phoenix which they have bought. Phoenix, Oct. 23.

### Mohave County.

It is reported the Keystone mine, near Kingman, will put on men and the main shaft will be sunk to 600 feet. The shaft is down 400 feet. The ore is largely copper.

### Yavapai County.

W. McDermott, mine superintendent of the United Verde M. Co. at Jerome, says he has 450 men under his direct supervision, although there are 1000 men working in and about the mine and works at Jerome. Many improvements are being made at the United Verde. They are making connection with the new flue dust chamber, and the smelter is closed down for a few days pending the connection. There are two shafts on the property,

one to 700 feet and the other 900 feet. C. W. Clark is general manager of the United Verde mines, smelters and railroad.

The Colorado F. & I. Co. of Pueblo, Colo., is developing a group of iron mines 16 miles south of Seligman. The mines were located over a year ago. Average of tests is said to show 50% iron. A shaft 200 feet in depth has been sunk and several other shafts were carried to a depth of from 50 to 70 feet. Fifty men are at work and a diamond drill is being used to explore the ore body below the 200-foot level. The vein is 100 feet wide and is near the north end of the Juniper mountains. The ore is said to also carry from \$3 to \$4 per ton in gold. The company will build a railroad from Seligman to the mines. Limestone and other materials for fluxing the ores are found near by. Coke can be had from New Mexico or Colorado, the company being a producer of both coal and coke.

## CALIFORNIA.

### Calaveras County.

Work on the properties of the San Andreas Blue Gravel M. Co. at San Andreas is reported progressing. The hoist is being reset and pump, motors and other machinery are being put in. —Manager Nelson has started work for the winter's run at his mines at Calaveritas. His company is hampered by the break of the Emery dam last summer and much water has gone to waste and time lost. The pipe line will have to be cleaned of rocks and debris that filled it during recent rains.

### El Dorado County.

A 10-stamp mill has been put in at the Monte mine, in Gold Hill mining district, near Placerville. The company has been using a 2-stamp, triple-discharge mill to test the milling qualities of the ore taken out. They are working on a 7-foot ledge. They will run both mills by water power.

### Nevada County.

In Willow valley, near Nevada City, the Lecompton mine has been making improvements and has sunk its shaft 100 feet deeper, says Manager W. H. Dunlap. At the Federal Loan mine Superintendent L. A. Sutherland has put in a new pipe line and has unwatered the shaft. The Posey mine has its mill running again.

The directors of the Blue Ledge mine in Willow valley, near Nevada City, will put in a larger pumping plant, says President P. L. Bliss. It is intended to resume work.

Indications at the Spanish Ridge mine, near Washington, are reported improving. Sacramento men, including E. W. Hale, F. Adams and Egan Brothers, are owners. There are ten stamps running. Ten stamps more will be placed. The millwright is framing timbers for the addition. The company has been driving a tunnel and at 180 feet a ledge 17 feet wide was found, assaying \$6 in gold.

The Pine Hill Con. M. Co. has been incorporated, with principal office at Wilmington, Del. Incorporators are J. F. Mase, J. Rosenthal and J. G. Gregg, all of New York City. The company is operating near Wolf, south of Grass Valley.

The New York-Grass Valley mine, near Grass Valley, is putting in a slimes plant. Ore is being taken out and development increased. Ample water power is available. Forty men are on the company's payroll.

### Plumas County.

G. H. Goodhue, manager, says the mill and reduction works of the Five Bears M. Co., near Genesee, has been put in operation. Electricity is used as power.

C. L. Adams of Taylorsville, superintendent of the Regal mine, reports he will equip the mine with gasoline engine, hoist and pump, after which a 10-stamp mill is to be put in, the plant to include concentrating tables. Power drills will be put in at the mine, and electrical apparatus and hydraulic piping.

### San Bernardino County.

(Special Correspondence).—At the Seal of Gold M. Co.'s property here the mill is built at the shaft and the ore dumped directly into the mill over a 10-foot grizzly into a 120-ton bin; from there it passes into automatic feeders, and then two 5-stamp batteries, 850-pound stamps, 105 drops per minute; from there it goes over 10-foot amalgamating plates, then into an hydraulic separator, where the slimes are separated from the coarse sands; the slimes are treated by two agitators and the results are satisfactory. The coarse sand passes to six leaching tanks of 45 tons capacity each, and is treated for five days with good results. They extract about 40% on the plates and a little over 50% in the cyanide treatment, the ore averaging \$15 per ton. The operating expenses are high on account of the long haul from the railroad and the expensive fuel (distillate). The motive power is two 35 H. P. gasoline engines, one 15 H. P.

and one 8 H. P. gasoline engine, and two 15 H. P. engines.

Dale, Oct. 25.

### San Diego County.

J. A. Wauchope, manager of the Noble gold mines near Descanso, says the company has been reorganized and J. H. Thring of London, England, is principal owner. Manager Wauchope will put in a 100-ton mill at the mines and expects to have it set up by Dec. 1. Development will be increased.

### Siskiyou County.

J. W. Martin, president and superintendent of the Pacific M. Co. at Sciad, near Etna, has completed a flume and ditch. He will start his giants. Men are clearing the ground, making roads and preparing pipe line. —H. Wood is fitting up the Portuguese Flat hydraulic mine, below Sciad, and expects to be ready to mine by the time water comes this fall. He will open up additional ground which prospects well. —The Van Brunt mine, below Happy Camp, operated by the Oregon G. M. Co., is being put in shape to operate this season. Two bedrock tunnels are being driven to a back channel. They will be used to handle the gravel. They have cut lumber for building a higher ditch and flume, to furnish pressure for giants on the high benches of ground.

### Tuolumne County.

The John Royal mine on Knownothing gulch, near Columbia, having reverted to the owner, W. S. Blakeley, will start up again. —Under management of M. Page the Old Tuolumne mine at Wet gulch is being retimbered. —Supply of water being assured for winter operations will start at the Star mine, near Columbia, says Superintendent Olson. A compressor has been ordered and work at the mill will be resumed.

Water having been pumped out at the Jumper shaft at Stent, the contractor is sinking 100 feet additional below the fourteenth level, says the Mother Lode Magnet. Twenty stamps are dropping in the 100-stamp mill. Eighty men are at work under Manager M. B. Kerr.

The M. McCormick Co. has bought the Sirius, Belle Italia, Minot, Indiana, Fortuna and Comet quartz mines, near Italian bar, near Columbia. —The Santa Ysabel shaft, near Stent, is continuing sinking under Superintendent Loftus.

Superintendent O. J. Olsen of the Star mine, near Columbia, has resumed work. There is now plenty of water.

D. Nagle will resume operations at the Pennsylvania mine, near Carters. —Work will be resumed on the Faxon mine on Bald mountain, near Sonora, by Munroe and Lauener. A hoist is being set up.

## COLORADO.

(Special Correspondence). — Suit has been started by J. D. Babcock against the Union Pacific Railway for a tract of land near Evergreen, Jefferson county. Should the land prove more valuable as mineral land than as agricultural, he may win his suit. He has produced some high-grade lead ore.

The suit of the State of Kansas against the State of Colorado for diverting water from the Arkansas river for irrigating purposes is on trial. This is a case where the one State claims that the other has no right to use the water from the river and asks an injunction against Colorado users.

A branch road has been extended from the Colorado & Northwestern Railroad into Sugar Loaf district, above Boulder. This will do away with the long haul by wagon to Boulder and will be much cheaper and will enable the mines in this particular district to mine at a profit. The C. & N. is laying rails on its extension from Sunset to Eldora and expects to be in operation by Dec. 15 of this year. Denver, Oct. 26.

### Boulder County.

The White Crow G. M. Co. has sold its property in Boulder county to E. S. Brockman of Pittsburg, Pa., and J. S. Miller of Colorado Springs. Owing to litigation the mines were closed down about twelve years ago. It is intended by Brockman & Miller to start work next month and to re-equip the mine.

### Chaffee County.

The Tiger Lily M. & M. Co. has started men to work on its mines, 2 miles down the river below Granite.

The Woods G. M. & M. Co. of Buena Vista is operating at Pieplant, in Taylor park. The company is hauling machinery into the park for cyanide mill. J. C. Woods is part owner.

### Clear Creek County.

Near Idaho Springs the Two Brothers tunnel, in Virginia canyon, which is being driven to open the Specie Payment vein, will cut that lode within the next 150 feet. The breast of the tunnel is in 1500 feet. Superintendent Johnson has charge of operations. The completion of the Two

Brothers tunnel to the Specie Payment vein will mean the diverting of the tonnage of ore now going to the Black Hawk mills and depot to the Idaho Springs mills and shipping point, says the Times. A wire rope tramway will be built at the tunnel mouth down the canyon. The greater part of the product is taken out by lessees, and the company will continue the leasing system after the vein is reached.

Lead-covered, moisture-proof telephones have been put in at each of the fourteen levels in the Gem shaft and raise at Idaho Springs, and a lead-covered, multiple-wire cable for the signal and telephone wires has been placed in the shaft. The variation in temperatures at the mouth of the Newhouse tunnel and at the Gem shaft causes changes in ventilation. Some days the air current is down the shaft and out the tunnel mouth, and other days the reverse. —J. & E. Edwards, leasing on the fifth level in the Comstock mine, report shipping ore which nets \$60 per ton. They have milling ore in addition to the smelting ore.

Repairs have been made at the Waltham mill, near Idaho Springs, and foundations laid for ten more stamps. The Elspass mill is working. The mill will be equipped with electric power. It is running on ore from the first level of the Ward mine. The vein at surface is 27 feet wide. The smelting streak in the hanging wall at the 60-foot level runs \$40 to the ton, being 8 inches wide. Unwatering of the lower levels will be started this week. Two drifts have been driven from the 145-foot level, one on each side of the shaft.

The Lincoln Mountain M., T. & T. Co. has started operations on a group of gold and silver-bearing lodes owned by it on Lincoln mountain, near Empire. The properties of the company (formerly the Duchess group) consist of fourteen lode claims and a tunnel site, the principal one of which is the Virginia City lode. It is developed to depth of 520 feet by a shaft, but difficulty of handling water has prevented profitable operation. The company will drive a tunnel to cut the vein below the bottom of the shaft, thus draining and opening additional ground. In driving to reach the shaft the other veins of the company will be opened. The directors of the company are F. A. Maxwell of Empire, W. C. Hood of Georgetown, M. J. Spaulding, W. C. Loughbom and W. P. Herrick of Denver.

Near Idaho Springs, the Allen mill, on Chicago creek, has resumed operations under management of T. B. Crow. Changes and additions have been made. The Allen mill is equipped with water and steam power, and has daily capacity for treating fifty tons. A number of mines which are closed down for lack of milling facilities will resume operations.

Near Georgetown, machinery is set up at the Sidney tunnel, owned by the East Argentine M. Co., and progress will be made in driving the tunnel. Power is furnished from a dam 2000 feet above the power building, having a fall of 225 feet. Manager Sidney says development shows bodies of high-grade ore. —A shaft is being sunk on the Kitty Owsley vein by the Manhattan Union Co. It is down 220 feet, the bottom showing 30 inches of galena. Drifts will be started both ways from the shaft.

### Custer County.

The owners of the Terrible mine at Ilse will replace the milling plant that burned a year ago. The mine produces cerussite (carbonate of lead).

The August Kappe smelter in Custer district has been sold to the Wolcott G. M. Co., operating the P. & O. mine, near the Bassick mine, at Querida. The plant will be overhauled and remodeled.

### Eagle County.

The Black Iron mine at Bell's Camp, near Red Cliff, has a contract from the Colorado F. & I. Co. for 8000 tons of iron ore and has completed a similar contract for 2000 tons for the Pueblo plant. The new contract will be filled at the rate of 500 tons per week.

### Fremont County.

Florence reports say improvements are being made at the Page mill. Foundations are made for a boiler that will add to capacity of the mill. For the present only the tailing dumps of El Paso and National mills are treated, but arrangements are under way for a supply of ore from Cripple Creek district. —The Great Western Coal Co., which has bought the Cuckoo mine, west of Florence, is building additional houses at the mine for the coal miners, and more men will be put on. —The Howells Oil Co. has been formed at Florence with T. M. Howells as president. It owns 160 acres of land south of the city. Work of drilling the first well will be started.

### Gunnison County.

Near Pitkin, the Gold Bar mine (formerly the Old Homestake lode), 800 feet



east of the Chloride, is owned by W. Scott, who has sunk a shaft and run a drift north for 100 feet, which is showing ore. —The Hilltop group, consisting of five claims, is owned by T. Stanley and G. Adams. Work has been going on in a tunnel. A shaft, also, is on the group. The owners will put up a hoist to sink the shaft deeper.

At Ohio City the Sharpe & Stevenson group of seven claims has been sold to the Raymond Con. M. Co. for \$10,000. The property is near the Raymond tunnel, which is showing 25 feet of gold ore. It is reported high-grade gold ore has been opened in the lower levels of the Maple Leaf mine. The vein is 4 feet wide, says Manager E. M. Lamont.

#### Lake County.

The Cloud City mine at Leadville is shipping 100 tons of manganese ore a month, and could be increased to 500 tons a month, says the Times. The last returns gave 18% iron and 35% manganese. This ore is taken from the lower levels, 504 feet. Drill holes have been sunk from the bottom of the shaft and it is expected the shaft will be sunk this fall to the lower zone. The territory is drained by the Coronado and Penrose mines' shafts.

At Leadville, the electric plant of the Yak Tunnel Co. includes a power house, an electric tramway extending over 3 miles of track underground, electric hoists and a lighting plant for all the properties entered or traversed by the Yak tunnel. The tunnel enters from California gulch under Iron hill and into Breece and Johnny hills. Both in its main line and its branches it passes through several important producers of mineral. The tunnel was first driven as far as the Silver Cord mine and then extended to Ibex No. 4 shaft, 2 miles from the mouth. Branches have been driven in several directions. There are three miles of tunneling completed. Up to the present, the power used in the operation of the drills and hoists in the Yak and other properties reached by the tunnel has been compressed air. The compressor plant is at the mouth of the tunnel. Ore was dropped into the cars through chutes coming down from the stopes and drifts to the main tunnel and its branches. Mules were used to haul the ore cars out of the tunnel. One mule would haul eight to ten cars at a trip and would make seven trips a day. About fourteen tons of ore or other material was thus hauled out by the mule at each trip. In the electrical installation the greatest difficulty to be overcome was the water. A heavy stream flowed through the tunnel. Superintendent J. E. Champion put the drainage ditch under the track. There were places in the tunnel where the cars had to be hauled through water which flowed over the bed of the tunnel to a depth of 8 to 14 inches. After the ditch had been placed the track was made dry with exception of a short distance where the water sometimes attains depth of 4 or 5 inches. The electric locomotive put in is 32 inches wide, double type, and arranged to run in 5 inches of water. It weighs five tons. It hauls twenty cars at a trip and makes fifteen trips a day (thirty-five tons a trip). The surface plant consists of two dynamos of 75 kilowatts each (about 100 H. P. each); 14,300 feet of trolley wire have been strung through the tunnel and its branches, 2 miles of it being the main tunnel, where it extends above the Peoria about 500 feet, or within 1500 feet of the Ibex No. 4 shaft. The voltage used is 250. Hitherto hoisting from the Cord mine has been done by means of compressed air. Compressed air has been used also in operation of the drills. The hoists and pumps operated with compressed air have been replaced by electric hoists and pumps. The compressor is now used only for driving of the drills and more drills will be put in. This increase in facilities of the tunnel company will lead to more liberal concessions in hauling waste from other properties reached through the tunnel, says Superintendent Champion. It will also enable the operation of properties farther in the tunnel than are being worked at present. There has been but little work done east of the Bob Ingersoll. It is expected the Golden Eagle and Ibex No. 4 will be put in operation. The Roe leases, which have been shut down because of former expense of operation, will be opened on the Sierra Nevada. An electric hoist will be put in. The Tankerstown and Bob Ingersoll, in which a body of mineral has been opened up, will be further developed. Ore is being shipped from the Silver Cord, the Tankerstown and the stopes in the Ruby and other properties reached through the Silver Cord.

Contractor T. Raney, sinking the shaft on the Bessie Wilgus claim on Rock hill, near the Reindeer mine, at Leadville, in twenty days after ground was broken for the shaft had the bottom down 209 feet from the collar, says the Carbonate

Chronicle. The shaft is still in the glacial wash and will enter solid formations in another week. The shaft is dry. The Reindeer, on the adjacent property, is a dry mine. This change from the conditions which prevailed in that region fifteen years ago when the Sequin shaft was sunk is said to be due to drainage of the pumps in the downtown district near Rock hill and to the drainage through the Yak tunnel. T. B. Wilgus is owner of the Bessie Wilgus.

The Iron-Silver M. Co., working on the Tucson shaft at Leadville, is making improvements in the surface equipment and in developing underground. The shaft is of two compartments, says Manager J. F. Walsh. A larger galloways frame has been built. Work is being carried on at the Moyer and North Moyer shafts, and from those two mines output of 11,000 tons a month is being taken. The Dome shaft is being sunk by the Iron-Silver Co. on Rock hill near the Reindeer mine.

At Twin Lakes machinery consisting of a 50 H. P. boiler and engine, a two drill air compressor, 2½-inch drills, pipe line, etc., are being put in by the Manhattan M. & P. Co. A tunnel is being driven to cut fourteen veins.

The Empire Tunnel Co., operating at Empire and Georgetown, in Clear Creek county, has started work on the Cloud City mine at Leadville and will sink the shaft additional 200 feet—to 700-foot level. The Cloud City group adjoins the Midas M. Co.'s mines. The Empire T. Co., which has its headquarters at Georgetown, proposes building a smelting plant and treating its own ores, and expects to develop fluxing ores from the Cloud City mine, says C. Jarbeau, secretary. W. S. Jones is manager of the Cloud City.

#### Ourray County.

The Ourray Plaidealer says the Camp Bird mine, at Camp Bird, has been bought by an English company. J. H. Hammond, who represents the English buyers, last week made final payments. Approximately \$7,000,000 has all been paid.

#### Pueblo County.

The capacity of the Philadelphia smelter at Pueblo will be doubled, says President S. Guggenheim. He states that all the smelters at Pueblo are to be operated in full.

#### San Juan County.

The Adelia M. Co., that has been erecting buildings and putting in machinery on the Waldron group near Mineral Point, near Silverton, is unwatering the 100-foot shaft. Coal and provisions are being put in for the winter. Twenty men are working.

#### Sao Miguel County.

The mines of the Tomboy G. M. Co., Ltd., in Savage basin, 5 miles from Telluride, report progress. J. Herron, manager, says the principal vein from which they have been extracting ore is 14 to 18 feet in width. The Tomboy vein is being worked by lessees. The lessees' ore is treated at the old mill, which has a capacity of 225 tons daily. The company is working the Argentine vein.

The Butterfly-Terrill G. M. Co., near Telluride, reports progress this season. The 30-stamp mill, connected with the principal workings of the mine by a wire tramway 1500 feet in length, has been operating steadily. The ore is free milling, and values obtained by amalgamation have run \$6000 to \$10,000 per month since January, 1904. It is intended, says Manager Bullock, to start work on a tunnel whose portal will be within a few feet of the milling plant. The tunnel will be from 2000 to 4000 feet in length, and will cut the Alta vein 750 feet below the present workings.

#### Summit County.

Manager J. S. Strickler of the Monte Cristo mine, near Breckenridge, says his company will build an addition to the mill and increase capacity to 100 tons output per twenty-four hours. The machinery will consist of tables, jigs and a crusher. —Ground has been broken for the mill of the Old Union Co. The mill will use zinc-separating process. —On the Montgomery shaft sinking is suspended and the shaft is being lined. A cage and other machinery are going in.

#### Teller County.

(Special Correspondence). —El Paso Con. G. M. Co., on Beacon hill, produced in August \$158,000. Beginning with October this company doubled its dividends from 1 cent to 2 cents per share. A large reserve fund is being put by for future use.

Elkton, Oct. 22.

(Special Correspondence). —The Santa Rita is being unwatered and put in shape for producing by A. C. Denslow. He is taking out ore in the stopes in the upper levels. A cyanide plant is under consideration by Manager Denslow.

Victor, Oct. 22.

(Special Correspondence). —A shoot of high-grade free gold and sylvanite ore

was struck in the Rose-Maud mine this week. The extent of the strike is not yet known.

Hedrick, Smith & Stowell are leasing on Block 11 of the Work M. & M. Co. They report opening high-grade ore. The shaft is down 314 feet, but all the work is being done from the 75-foot level.

The Anaconda and Colorado Moss mines are being operated by lessees. The Peggy is producing. The Morning Glory on Raven hill is operated by the Doctor-Jack Pot Co. and shipping 500 tons per month. Work is carried on from the 700-foot level up.

Anaconda, Oct. 22.

(Special Correspondence). —Twenty-five hundred tons per month is the shipping record of the Elkton Con. G. M. Co. on company account, not including lessees. About 140 men are on the payroll, working two shifts. Work is being done between the fifth and eighth levels, inclusive. The eighth level is being extended north and south from the shaft. On the seventh they are drifting south, also drifting south on the sixth, and on the fifth level drifting both ways from the shaft. A Crane washer has been put in. They also have a new sampling plant and all the ore is sampled before shipping. The ninth level of the mine has been drained by the El Paso drainage tunnel. E. M. DeLaveargne is manager and R. P. Windsor superintendent.

Elkton, Oct. 23.

(Special Correspondence). —Mining generally is in good condition throughout the district and more properties are being started daily. Everyone seems to be well pleased with the manner in which things have settled down. There are but few idle men in the district. Everyone is working who cares to. Rich strikes are being made daily and new bodies of ore opened up.

Cripple Creek, Oct. 23.

The City of Cripple Creek G. M. Co. has been incorporated by E. A. Norton, C. E. Miesse and B. W. Coleman. —J. A. McClurg has a lease on the Colorado & Cripple Creek property (the Rittenhouse) on Gold hill.

At the two-compartment shaft being sunk on the Pueblo claim of the Free Coinage mine, near Cripple Creek, Lessee A. C. Carper & Co. will put in a plant of machinery. —The Hull City placer, in Independence, closed six months ago by an injunction, has resumed operations. —The Vindicator company is pumping 300 gallons of water per minute, which enables the company to operate in the tenth level.

Shipments of 100 tons of ore daily are being made by the Stratton's Independence mine at Battle mountain, at Independence, giving average of \$50 to the ton. There are nine levels under operation, with 250 men employed by twenty-seven sets of lessees. Besides this the company has fifty men, divided into two shifts. When the mine was operated entirely by the company the average returns for ore were from \$20 to \$25 per ton. While there is now being from 100 to 150 tons of ore shipped daily, average \$50 per ton, when the property was being worked on company account the daily tonnage was 400 tons per day, and while the company was breaking the same ore shoot that is being mined by lessees they were breaking wider than at present. Lessee Merrifield and associates are washing the dumps of the Independence.

C. R. Burch says he will build a cyanide mill on the property of the Little Giant M. & M. Co. in Pony gulch, near Cripple Creek. It will be a 50-ton plant.

The District G. Extraction Co. has been incorporated and has started work on a lease of the Little May claim of the Magna Charta ground on Ironclad hill, Cripple Creek. The company expects to build a cyanide mill of 35 tons capacity. F. J. Buck, in charge, claims tests have shown \$4 per ton in gold. Besides working through the tunnel where a 7-foot vein is opened up, the company expects to sink a shaft on which a plant of machinery will be placed. A. M. Story is president and F. J. Brooke secretary.

The Olive Branch G. M. Co. has sold its property to A. C. Mackey. The Olive Branch Co. owned sixteen acres of ground on Ironclad hill, Cripple Creek, adjoining the Jerry Johnson group.

#### IDAHO.

##### Bingham County.

The mines owned by the Carriboo G. & C. Co. on northwest side of Carriboo mountain, near Carriboo, are showing values, says D. H. Swinehart of Pocatello, part owner. They will sink the shaft deeper to open up a body of the gold and copper ore. The company has six full claims and a fraction. There is plenty of water and timber accessible. The property is 42 miles from Soda Springs and 65 miles southeast of Idaho Falls, with a good wagon road all the way. —T. D.

Coder of Idaho Falls, operating in Spring Mountain mining district, 100 miles northwest of Idaho Falls, says the principal ores are lead, copper, silver and gold. Assays for gold carry from \$8 to \$20 per ton. The camp is 75 miles from a railroad, and it costs \$8 to \$10 a ton to haul to the railroad. Ore has been shipped to points East. J. Reed et al. of Curd d'Alene have bought mines in the camp and have bonded other property, and have men at work. They are shipping ore. The principal mines are the Winnie, Gilmore and Nichols. The Winnie has a shaft sunk 200 feet and has a 6-foot vein of galena. The Gilmore has a shaft of 150 feet and has a vein of galena containing gold. The Nichols has a shaft of 100 feet, principally lead, gold and silver. This mine is going to put in a 1000-foot tunnel this winter. At present this district is working 125 men.

##### Boise County.

At the Friday group, at Pearl, the mine and mill will be lighted by electricity. Power will be furnished by the Payette Power Co.

##### Idaho County.

G. L. Hedges of Lewiston has the Gold Seal group of four claims, in Four Mile district, 8 miles northwest of the Hogan property, near Elk City, and work is started. The Gold Seal M. & M. Co. has been incorporated by G. S. Bailey, G. L. Hedges, F. Nelson, J. Nelson and R. V. Kuhn. Hedges will also start work on the Missouri & Idaho mines and the 1-stamp mill will be run. The two properties are adjoining.

##### Kootenai County.

H. M. Williams, manager of the Panhandle S. & R. Co., reports work progressing. The buildings and flumes for the smelter near Sandpoint, on Lake Pend d'Oreille, are completed. The company expects to have machinery set up by Jan. 1st.

##### Shoshone County.

W. H. Smiley of Spokane, Wash., and Detroit, Mich., men have closed a deal for the Red Cloud group of nineteen claims, 8 miles southeast of Pierce City, for \$50,000. They have bought a stamp mill of the Pioneer group, 45 miles away, and are moving it to the Red Cloud.

The Idaho G. M. Co. has been incorporated by J. F. Stevens, F. Watson, W. Stevens, H. C. Belt and W. J. Thayer, with the principal place of business at Spokane, Wash., to operate near Wallace.

The Rex M. Co. has been incorporated by H. Wick, A. B. Campbell and J. A. Finch of Wallace, C. L. Andrews, D. L. Dutton, L. J. Coleman and M. H. Simons of Augusta, Me. J. C. Feehan of Murray is resident agent of the company.

J. B. Collins of Pierce City, near Greer, reports work increasing there. He has sunk a shaft on the Oxford mine and started crosscutting. He expects to put in machinery for deep working next spring. A 9-foot vein of high-grade copper ore has been opened up. The mine is 18 miles north of Pierce City. —Development work is proceeding on the Wild Rose and the tunnel is opening up a ledge at vertical depth of 110 feet. The ledge is 12 feet wide with mill tests returning \$65 per ton. —The Ozark is working a few men with satisfactory results. The 2-stamp mill is running.

At Mullan, under W. A. Bradley, superintendent, remodeling the Gold Hunter mill has been started. With exception of the jigs, all the machinery is being refitted and replaced. Sixteen concentrators will be put in, ten Wilfleys and six vanners. When the changes are complete, the capacity will be increased by 100 tons. Present capacity is 150 tons per day. The ore has been difficult to treat. It carries a heavy gangue. The Hunter ore carries 1½ ounce of silver to each 1% of lead. The Morning mine, adjoining, averages ¾ of an ounce of silver to each 1% of lead. The flume is also being entirely rebuilt. It is 4500 feet long. The mine is closed. Ore is blocked out ready to be extracted.

##### Washington County.

The smelter plant of the Ladd Metals Co. at Landore, near Mineral, designed to treat ores of the Seven Devils district, is said to utilize wood instead of coke or charcoal to generate heat for smelting the ore. Gas is made from wood in a furnace, and is fed through jets to the smelter stack. The smelting furnace is a combination stack and reverberatory. The reverberatory furnace system will be extended. No fluxing ore is used, and the product of the smelter is said to be 95% copper.

The Idaho M. Co. has started to work with men on its mines on Camp creek near Landore, near Mineral. C. F. Macey, principal owner, says they will build a wagon road from Landore up Indian creek to connect with the Ford road to Black Lake. A road will be built from Camp creek connecting with this road 2 miles above Landore to haul ores from Camp creek mines to smelter.



**KANSAS.****Wyandotte County.**

Last week fire destroyed three buildings of the plant of the United Zinc & Chemical Co. plant at Argentine, Kan., causing loss estimated at \$100,000.

**MICHIGAN.****Houghton County.**

The second shaft of the Calumet & Hecla mine at Calumet is reported bottomed in the Kearsarge lode. The first Kearsarge shaft of this mine is being lined with cement. Diamond drills are still working west of the mine, but have not yet found the Tomahawk conglomerate.

**MONTANA.****Jefferson County.**

The tunnel being driven into Red mountain by the Inter Ocean M. Co., near Basin, is in 1200 feet.

The Pennsylvania & Montana M. Co., operating the Hattie Ferguson mine in Cataract district, near Basin, is increasing development work. The shaft has been sunk to 150 feet. The company will build a concentrator, the capacity of which will depend upon result of developments on levels below the second. Concentrating tests have been made by means of a jig.

J. P. Porter, W. C. Draper, J. J. Fitzpatrick and D. Salvail of Helena have a bond on the Straumberg claims near Corbin. They are placing machinery and will sink on the vein.

J. McNaught, president, and R. J. McKay of Cleveland, Ohio, secretary, of the Basin & Elliston Railway Co., report it is proposed to build between Basin, on the Great Northern Railway, and Elliston, on the Northern Pacific. It is expected the line from Basin to the smelter of the Cataract Co. at Jack creek, 10 miles from Basin, will be running this fall. The road will be 40 miles long. It is the intention of the company to reopen the Ontario mines.

**Lewis and Clarke County.**

The Mono Metal Production Co., which has been building a dredger to work several hundred acres of the bars in the Missouri river near Canyon Ferry, has its outfit completed and will make a trial run this week.

F. C. Lavigne of Spokane, Wash., has a lease and bond on the London, Seventy-seven and Little Tom copper claims and will start development. The property is north of Meaderville, near the Jesse mine. The bond is for \$60,000.

**Madison County.**

The Moonlight M. Co. has been incorporated by Canol, Martin & F. L. Sizer of Helena and has bought the Moonlight mines in this county.

Removal of the 100 stamps, concentrators and other machinery in the gold mill above Pony, sold by the Mountain M. Co. to Denver, Colo., men, is under way.

**Missoula County.**

The Deep Creek G. M. Co. has been incorporated, with headquarters at Missoula. Directors are: N. B. Graff of Pittsburg, Pa.; A. E. Anderson, M. H. Hoey, J. C. Godfrey, O. T. Hilgendorf and C. E. Geissler of Chicago, Ill., and W. E. Hales of Missoula.

P. J. McGowan, J. S. Davey and A. Thompson have a lease and bond on the Boulder group back of Basin, and they are prospecting and taking out ore. Their lease also includes the stamp mill on Basin Creek mine of the group.

**Park County.**

The washers at the Chico placers having proved too small, the operations of the Con. G. M. Co. at Chico have been suspended for the season, says the Enterprise. Weather would compel a suspension of operations next month. J. Gegan has been in charge. A larger washer will be built, so as to be ready as soon as weather permits of operations next spring. A steam shovel is used.

**Silver Bow County.**

The station 800 feet below surface on the Reins mine, near Meaderville, has been enlarged to put in a heavier pump, and timbering is under way. The column pipe is being placed in position. The company will resume extraction of ore on the 800-foot level, says President Reins.

The United States Supreme Court, on the 24th inst., decided against F. A. Heinze in the case of Heinze vs. the Butte & Boston Con. M. Co. The case involves title to the Snohomish and Tramway mines, near Butte. Heinze claimed a half interest in the Snohomish claim and a third interest in the Tramway.

**NEVADA.****Esmeralda County.**

Weber & Ish have bought the Alhambra and Atlanta claims on Vincicator mountain, near Goldfield. They have also bought the Bonanza, south of Diamondfield, which adjoins the V. E. S. on

the east, and have made the first payment on the Mammoth and Amazon claims, between the Black Buttes and the Brooklyn group.—E. L. Mims & Co. have bought the Daisy, Belcher and Jockey claims, adjoining the Black Buttes at Diamondfield on the east, and have organized the Black Butte Extension M. Co. to operate the same. Men have been put in and development work started.

At Goldfield, Shove, Aldrich & Co. of Colorado Springs, Colo., have made payment of \$40,000 on seventeen claims, including the Lone Star group. On the Lone Star ore has been opened up in several places, and Patrick & Anderson have a lease in which they have 18 inches of ore at depth of 80 feet which averages \$100 per ton. The Lone Star M. Co. of Nevada will be organized. R. W. Griswold is interested.

**Lincoln County.**

At Searchlight, the Pompeii M. Co., says Manager F. J. Spare, will equip the mine with machinery for opening up at least three more levels. A 25 H. P. gasoline hoist and a Cornish pump will be set up. The work in progress consists of drifting both ways on the bottom level. Manager Spare will straighten the shaft.

**NEW MEXICO.****Eddy County.**

C. W. Maxson, T. E. Teegarden, D. L. and D. A. Casselmann of Los Angeles, Cal., with Eastern men, are putting in drilling equipment and will develop their oil lands northwest of Carlsbad, 30 miles, and comprising an area of four townships. L. G. Sarnow of Los Angeles is superintendent.

**Grant County.**

The Comanche M. & S. Co. has bought for \$1,000,000 the Hearst estate mines at Pinos Altos. Two one-third payments have been made. In the sale are included the Gillette mine, surface and underground improvements at and around Pinos Altos, office and store buildings, sixty dwelling houses, a 700-acre ranch and water right, a pipe line 6 miles long and a reservoir at the mines, besides the Thayer, Hearst, Pacific, North Pacific and other shafts. The company has a 200-ton smelter in operation at Silver City.

**Lincoln County.**

The Old Abe mine at White Oaks, which has been operating under a lease, has shut down.—A. Wingfield and J. Spencer, who have been working on the Little Mac mine, near White Oaks, are milling their ore in the Old Abe mill.—W. Watson and W. Hoyle are doing exploration work on the South Homestake mine at White Oaks, on which they have a lease.

**Rio Arriba County.**

Work is reported increasing in the mica mines at Petaca, 15 miles southwest of Tres Piedras. Several carloads of both sheet and scrap mica have been shipped.—Work continues on the Dillon Dev. Co. tunnel in the Bromide district, near Tres Piedras. The tunnel is in 500 feet. The shaft is above the tunnel and is in ore carrying copper, silver and lead. The company has an electric light plant, electric drills and air supply pipes.—The Tampa mine, in Bromide district, is down 450 feet. The company is putting in an 800-foot cable and an air compressor.

**OREGON.****Baker County.**

A strike is reported in the Emma group, Cracker Creek district, near Sumpter, bonded by A. P. Smith, who resumed development work by driving a drift. This when in 30 feet opened an ore body 6 feet wide assaying \$20. Another tunnel has been started below. Buildings are being erected. Ore from the upper tunnel will be sacked and hauled to the smelter.

Sumpter reports say that the Buckeye group, Cracker Creek district, has been sold to W. F. Kippen et al. of Spokane, Wash., for \$65,000. Ore is being taken out and sacked for shipment to the Sumpter smelter.

Baker City reports say fire broke out on the 21st inst. in the lower workings of the Baisley-Elkhorn mine, 20 miles west of there. A mountain stream was turned into the upper workings and after seven hours' work the flames were under control.

The Buckeye group, consisting of four claims, on divide between Bourne and Rock creeks, 20 miles northwest of Baker City, has been bonded to W. F. Kippen of Spokane, Wash., for \$65,000. Kippen also bonded the American, an adjoining claim, for \$20,000.—The double track tunnel to pierce Elkhorn mountain a distance of 3500 feet is in 230 feet. The tunnel is being run by the United Elkhorn M. Co. It will tap the main Elkhorn veins at a depth of 3000 feet. About forty men are working.

**Douglas County.**

It is reported that the Oregon Securities Co. will start to operate its 30-stamp mill at Bohemia by Nov. 10th. Sufficient water is in sight to continue work. Development is progressing.

**Grant County.**

M. A. Butler, secretary of the Consolidated M. Co. of Copperopolis, near Granite, reports work progressing favorably. The number of men at work has been increased and two drills have been put in, operated by compressed air. The ledge is 57 feet wide. Butler says a concentrator is being considered.

At the Red Boy mine, near Granite, 20,000 feet of lumber will be cut to be used in the construction of a flume from Olive lake to the mine. Two routes have been surveyed for the course of the flume, one being 4 miles and the other 6 miles. The flume will furnish water power for an electric power plant for operating a hoist and other machinery.

C. J. Allen, managing owner of the Monumental mine, has eighteen men working at the mine. The Monumental mine is 8 miles from Granite. The reduction plant at the mine is arranged for roasting, dry crushing by stamps, re-roasting and pan amalgamation, will be remodeled and equipment replaced by stamps for wet crushing, plate amalgamation, jig concentrators and cyanidation.

**Lane County.**

G. Waggoner, manager of the Oregon Blue River M. Co., operating on Blue river, east of Eugene, says considerable development work has been done and it is intended to build a 10-stamp mill in the spring.

The Great Northern Development Co., at its mines on Blue river, crosscut at the 100-foot level a body of ore 30 feet wide. Mill machinery is being put in to crush sixty tons of ore per day.

**Jackson County.**

A cinnabar mine has been opened on Palmer creek by J. H. Ray of Medford and A. McKee of Upper Applegate. A retort will be put up in the spring.

**Josephine County.**

Grant's Pass reports say thirty tons of machinery have arrived and is being set up at the power dam of the Golden Drift M. Co., near Grant's Pass. Four turbines have been put in and connections of shafts, pulleys and wheels are being made. Centrifugal pumps of five-step type will be put in. The Golden Drift Co. is preparing its placer diggings in the red clay hills above the dam for increased work this winter.

W. Kramer of Myrtle Creek, owner of the Kramer & Palmer mine, on Whisky creek, near Mount Reuben, says he will put a stamp mill on the property. It is free milling ore. Development work is being done on the Benton mine, owned by J. C. Lewis of Portland.

Grant's Pass reports say the Wilson & Meredith hydraulic mines of the Illinois River district have been leased for the winter by A. K. Anderson. The property includes 200 acres of ground on both sides of the Illinois river, but operations are confined to a bar of forty acres. A 7-mile ditch supplies water, four giants and a grizzly being operated. The sluices are provided with undercurrents for catching the black sand and saving the platinum values.

Samples of high-grade cinnabar are reported taken out of a quicksilver prospect on Pickett creek, north of Grants Pass, by J. M. Farmer. The ledge is said to be a contact between walls of shale and porphyry.

The Lucky Queen quartz mine at Leland is putting up a quartz mill.

The Maid of the Mist mine on Thompson creek, owned by B. Thurston of Applegate and White & Armstrong of Grant's Pass, has developed ore by tunnel driving. They will put in a mill and increase operations. They will start with a 3-stamp mill.

**SOUTH DAKOTA.****Lawrence County.**

The Tinton Tin Co. at Tinton last week shipped a sixty-ton lot of tin concentrates and closed down the mill to enlarge it to double its present capacity. There is reported a supply of ore uncovered to keep the enlarged mill running. The mill has paid expenses from shipments of concentrates, says Superintendent M. Lyon.

The Gilt Edge-Maid mill is enclosed and nearly all of the machinery is in place. It is expected the plant will be running by November 15th. Delays have been experienced in arrival of machinery, etc. The ore is expected to produce a large amount of slimes, and vats are being set up to handle that product. The machinery will be driven by electric motors. The transmission line from Pluma is completed. Several motors will be put in the mill for driving separate parts. The mill will contain a jaw crusher, the ore then

passing to a pair of roughing rolls and crushed to 1 inch. From there it will be elevated to a bin above the grinding mill, which will crush in cyanide solution to 20-mesh, equipped with silver-plated copper plates for saving the free gold, of which the ore contains a small amount. From that the pulp will be elevated to the separating department where it will pass through two 8-foot cones. The underflow from each of these cones will drop to two 54-inch cones for final classification, the overflow in all cases going to the slime vats and the coarser to the sand vats. The sand vats are three in number, 27 feet in diameter and 10 feet deep, having capacity of 200 tons. The slime vats are 20 feet in diameter by 20 feet depth, four in number. Below the leaching room is the precipitating room, in which are iron precipitating barrels and underneath are two sumps. Below the precipitating room will be pumps. On lower end of mill is the assay office and melting room. On the hill in the rear of the mill are the mine openings from which the ore supply will be drawn. The ore occurs in a porphyry dike, and the values are \$5 to \$6 per ton. The ore is oxidized, carrying but a small amount of pyrite. G. A. Duncan is manager, with offices at Galena.

**UTAH.****Beaver County.**

The Majestic C. Co. at Milford is shipping ore from the Old Hickory mine containing copper values. Product of the Harrington & Hickory lead-silver mine is also being shipped.

M. Cullen at Salt Lake City has put men at work on the Wild Bill and Burning Moscow mines in South Star district, near Milford.

From Frisco to Newhouse, distance 7 miles, the descent is 1200 feet. Camp Newhouse is near the edge of Wah Wah valley, 2 miles down from the mouth of the Cactus mine tunnel, which, when completed, will be over 1 mile in length. It is expected connection will be made in the tunnel by Jan. 1, 1905. About 200 men are employed in mine and tunnel, erection of concentrating mill, etc. The 700-ton mill will occupy a ground space of 96x250 feet. The iron smokestack, now completed, is 165 feet high. Superintendent of Construction J. Deidrich says he is handicapped on account of slow delivery of material. Grading of the railroad from the depot to the mouth of the tunnel, about 3 miles, is being done. The grade is 4½%. The ore will be brought down to the concentrator by gravity.

**Grand County.**

A company of Salt Lake City men is being organized by Manager W. R. Wheat of the Grouse Mountain Co. to operate at head of Miners' basin, near Basin, the coming winter. The company intends to tunnel into Mineral mountain from south side in Corsair gulch, and expects by spring to have ground opened sufficiently to warrant building a cyanide plant. Work is progressing on the Grouse Mountain plant, says Manager Wheat.

**Juab County.**

The Utah mine of Fish Springs has bonded the holdings of the Galena M. Co., operating at the same place. It is the intention of the Utah Co. to sink its shaft deeper. Before sinking is started more power will be provided and the boilers at the Galena will be moved to the Utah plant.

**Salt Lake County.**

(Special Correspondence).—The Queen mill of Butterfield canyon, Bingham, of which F. B. Whitmore is superintendent, is equipped with a Blake crusher, one 16x36-inch set of rolls, four three-compartment jigs, one single-compartment jig, one double and one single-compartment Michigan jig, two Wilfley tables, one 6-foot and two 4-foot vanners, ten stamps and three trommels. From the crusher the ore goes to No. 1 trommel, which is a 2-mesh, the oversize going to the rolls. The 2-mesh and under goes to No. 2 trommel, which has a 4-mesh and a 3-mesh screen. From 4 to 3 goes to No. 2 jig and the oversize (2-mesh) goes to No. 1 jig. The undersize of 4-mesh goes to No. 3 trommel, which has a 1½ m.m. and 3 m.m. punched screen. From 4-mesh to 3 m.m. goes to No. 3 jig, undersize from 3 m.m. to Michigan jig, undersize from 1½ m.m. to launder classifier, the coarse going to No. 4 jig, the fines to the Wilfleys and the overflow to 6-foot vanner. The two 4-foot vanners are used to handle slimes from the water that is pumped back. Having only twenty-five gallons of water per minute, it has to be settled and used over again. The ore runs about 9% lead and tailings assays show only a trace of lead. The middlings are elevated to the battery bins, where they are stamped to 14 mesh and run over No. 6 jig and tables. Owing to the small amount of middlings, it is necessary to run the stamps only about one day a week. The



mill is running one shift daily at present and handling about twenty-five tons per day.

Bingham, Oct. 24.

B. Sewall, vice-president of the American S. & R. Co., says his company proposes making extensive improvements at its plants at Bingham during the next year.

The management of the United Bingham mine of Bingham has leased the Heaton mill and will reduce its second-class ore to concentrates there, says the Deseret News.

The Utah C. Co., operating in the copper-bearing zone of Bingham, says Manager D. C. Jackling, has its concentrator in full operation at Copperton, in lower Bingham canyon. Development of the mining ground, 2 miles farther up the canyon, is under direction of Mine Superintendent McDonald. The first unit of the plant was placed in operation several months ago and the second unit has been completed. The plant is reducing to concentrates 600 tons of ore per day and is making a product which yields the company \$75,000 a month, says Manager Jackling. With the equipment provided, 1000 tons of concentrates are produced monthly which carry values of 35% copper, associated with it being values of gold and silver. The basis of concentration is twenty tons into one.

The 1200-foot tunnel contract awarded by the Great Western G. & C. Co. in Big Cottonwood mining district, near Alta, a year ago, has been completed. The tunnel is 1620 feet long, but is expected to take 400 feet more to cut the mineral zone. The work is to be continued through the winter. The Great Western adjoins the Daly-Judge group on the west. It is west of Park City. D. Evans is manager.

#### Summit County.

Manager G. D. Turner of the South Quincy M. Co., at Park City, says the pumps have cleared the underground workings of water and work of cutting out a station at 600-foot level, for a compound condensing pump is in progress. The pump has capacity of raising 300 gallons per minute from a depth of 1000 feet.

The Glencoe mine at Park City has ten men working under Superintendent G. R. Hancock. The mine is being put in shape for winter work. Sinking has already begun in the winze where ore was struck.

#### Tooele County.

J. Kirk, superintendent of the Con. Mercur mines and mill at Mercur, says he is putting through the mill 730 tons of ore daily and that the rock is maintaining payable average.—The roaster at the Sacramento Co.'s Mercur plant is again in operation.

The Ophir Tunnel Co. has been incorporated with A. B. Herrmann, president, B. J. Stewart and J. A. Butchart. The company owns mining claims in Ophir mining district.

W. L. Wiswall of Salt Lake City, manager of the Greene Reduction Co., which has a lease on the mill and tailings dump at the Geyser-Marion mine in Mercur, says the mill is handling an average of 150 tons of ore per day. The company has thirteen men on its payroll.

### WASHINGTON.

#### Ferry County.

Republic reports say the Midnight M. Co., which controls the Mountain Boy group at Park City, on the Colville reservation south of Republic, has men taking out ore. An assaying laboratory has been put up. C. E. Varrill, in charge, says for the present ore will be packed to Republic, but later, when the wagon road into the camp is completed, the ore will be shipped by wagon.

Work has been resumed in the Lucille Dreyfus mine, near Danville, and next week the lessees expect to begin shipping to the Grand Forks, B. C., smelter.

#### Stevens County.

Machinery for another 50-ton concentrator is being set up at the Portland-Velvet mine, on Sofia mountain, 15 miles west of Northport, on Big Sheep creek. This machinery will double the capacity of the plant, says Manager W. Thompson. Profit is being realized on \$8 ore from the dump. Concentration costs 75 cents a ton and Thompson says they save 85% of the values. The concentrates for the present are shipped to the railroad at Frontier, 9 miles distant.

A sufficient amount of coke having arrived, the smelter of the Le Roi C. Co. at Northport has resumed operations by starting furnaces No. 4 and No. 6. These furnaces have a side feed and greater capacity than the two end-feed furnaces recently closed down. The same number of men is working as before.

Near Northport, L. P. Larsen, who bought the Last Chance, on Deep creek, has made another payment of \$14,000. The mine is reported improving.—In same section, W. Brown of Seattle, of the

Collins Taylor M. Co., reports work being done on the Texas, Gray Copper and Telitha mines on Big Strap creek.

#### Snohomish County.

The Golden Chord mine, near Everett, is shipping 150 tons of ore per week. The tram, which will have a capacity of 100 tons a day, will be ready for operation Nov. 1st. The lower terminal is at the railroad switchback and the upper terminal is at the portal of the crosscut. The ore bins at terminals have a capacity of 100 tons each. The Irma vein has been opened up by the Golden Chord crosscut. The Golden Chord and Irma are on the north slope of Wilmans peak and owned by the Justice M. Co., Wilmans Bros. managers and principal stockholders.

### WYOMING.

#### Carbon County.

The Batchelder mine, 1 mile west of Dillon, is increasing development. In a drift from a shaft 100 feet below surface copper sulphide is being taken out.

### FOREIGN.

#### BRITISH COLUMBIA.

#### Boundary District.

The Granby M. S. & P. Co., operating mines at Phoenix and smelter at Grand Forks, reports for the year ended June 30, 1904:

Production amounted to 16,024,415 lbs. fine copper; 275,990 ozs. silver; 54,231 ozs. gold, for which was received total of.....\$2,948,551.73

This represents net proceeds at Granby works, freight to New York, refining and other charges being deducted from gross receipts:

Costs—	
Working expenses at mines and smelter.....	\$1,814,213.38
Foreign ore purchased.....	14,073.18
Foreign matte purchased.....	727,546.69
Dividend paid December, 1903.....	133,630.30
	\$2,689,463.55

There has been expended in new construction at the mines and smelter during the year, \$97,247.48. All development work and renewals and repairs have been charged to working expenses:

Mine development, lineal feet.....	5,698
Granby ore shipped to smelter, dry tons.....	514,387
Granby ore smelted, dry tons.....	516,059
Foreign ore smelted, dry tons.....	36,182
Foreign matte treated, tons.....	4,290

President S. H. C. Miner reports at the smelting plant two more furnaces with machinery to operate them and two new locomotives with slag cars have been added. The furnace building was enlarged to accommodate the same. Total operating costs have been reduced 44 cents per ton during the fiscal year and with improvements being completed they expect them to be reduced still further. The mines and smelter are in better condition than at any time during the past year, and the company is practically free from debt. The Victoria, Vancouver & Eastern Railway Co., controlled by the Great Northern, is building into Phoenix, and up to the smelter from Grand Forks, which will give the Granby company railway facilities with two transcontinental systems, the Canadian Pacific and the Great Northern.

D. McIntosh and North Dakota mine have bought the E. P. U. mines at Providence.—D. McGillis, M. Carvian and L. M. Knowles have leased and bonded the Combination mine in Providence camp. The Combination is on Boundary creek, above the Elkhorn mine.—Forest fires have destroyed the shaft house, boiler and pump at the Golden Eagle mine, on the North fork, entailing a loss of \$2500. The owners are W. H. Fox and S. M. Barrett.

Phoenix reports say the deal pending for a bond on the Skylark claim, 2 miles for Phoenix, has been put through, and development started by O. B. Smith, Jr., A. B. W. Hodges, W. S. Macy, R. B. Boucher and H. A. Wright of Phoenix. The amount is understood to be \$30,000. A pump has been set up to empty the shaft.

#### Cassiar District.

In the Skeena section, on Maple bay, Portland canal, near Port Simpson, is a group of fourteen claims, including the Blue Bell and Queen of Sheba group, and is owned by the Portland Con. M. Co. The vein is 6 feet wide and well defined, and the ore is pyritic, with chalcopryite predominating. Assays run in gold, silver and copper. It is near tide water. Development is being increased.—Port Simpson men are owners of the Bonanza group on Mineral creek, which flows into Goose bay, Observatory inlet. The ore is similar to that found in the Maple Bay group. The formation is said to be diorite with hornblende schist. The ore assays \$40 and is refractory. On the Bonanza group there are 800 feet of tunnel and crosscutting, and considerable ore exposed.—On Observatory inlet are nine claims in the Hidden Creek group,

1½ mile from Goose bay. This is a copper-gold proposition.

C. M. Hamshaw, managing director of the Amalgamated McKee Creek M. Co. at Atlin, says his company controls all the hydraulic claims on McKee creek. This has entailed consolidation of the McKee Creek Con. M. Co. and the Amalgamated McKee Creek M. Co. Next year operations on a larger scale will be carried out. Hamshaw states that the past season has been a successful one at Atlin.

Altin reports say the mining season is closed, most of the hydraulic plants having shut down owing to scarcity of water. Snow still remains in the mountains, as they have had a cool summer; in fact, there was never at any time sufficient warm weather to cause a flood. The fore part of the season furnished good supply of water, but the latter part was cool and the water was cut short. The Sunrise and Pine Creek Power Cos. have made final cleanup and report the year's operations satisfactory. The Societe Miniere on Boulder has shut down and its manager says the company's ground averaged \$6.50 per square yard of bedrock. S. Black in his deep diggings on same creek has struck payable gravel and has taken out 200 ounces of gold a week for the past month. The Otter Creek Co. operations were closed down early in the summer on account of shortage of water.—The Columbia Hydraulic and Upper Spruce has been hydraulic all summer on its upper gravel which carries fine gold, but as bedrock could not be reached except on the rim, small results were realized. A shaft was sunk 22 feet in the bed of the creek, but no bedrock found.—The Spruce Creek Power Co., on lower Spruce, reports good work for the season and opened up the Old Blue Lead. This ground, where drifted, is said to run \$10 per cubic yard. The owners are Blaine & Denny.—The British-American Dredging Co. started work in the spring and has been running its dredger steadily. The company is using a center bucket dredger of capacity of 1000 cubic yards per day. It is said the gravel handled so far has averaged \$2 per cubic yard.—The McKee Con. Hydraulic, Ltd., on Upper McKee creek, has spent the entire season putting in a bedrock flume to reach its deep channel. It is not on bedrock yet, although the face shows 40 feet of heavy wash.

The Amalgamated McKee Creek M. Co., Ltd., at Atlin, has taken out this season and paid royalty to the Government on \$52,000. The mine is operated by two hydraulics under 250-foot head, using 4 and 6-inch nozzles. The sluices have a heavy grade and all boulders up to 36 inches in diameter are passed through the boxes.

#### East Kootenay District.

The coke oven contract at Michel for the Crow's Nest Pass Coal Co. was completed last week. Michel has now 462 ovens.—Development work has been done by the Canadian Pacific Railroad on its coal claims on Fording river during the summer. An engineering party has been on the ground taking measurements and sixteen men, it is reported, are still doing development work. The work will continue during the winter.

The Bull River Falls P. & L. Co. has a site for its plant near Port Steele. Two miles of flume will be constructed, and during several months in the year the flume will be able to carry all the water in Bull river, leaving the bed dry and accessible to mining.

U. S. Consular Agent Pollock, at Fernie, writes the total output of the Crow's Nest Pass Coal Co., Ltd., during the year ended June 30, 1904, was 769,419 tons, of which 360,462 tons were converted into coke. The shipments of coke to the United States during the year amounted to 62,478 tons, valued at \$252,992, and the shipments of coal to 156,727 tons, valued at \$315,096. The three coal companies operating at Frank, Blairmore and Coleman, in Alberta, have been producing an average of 600 tons a day during the year. The entire product has been used in Canada.—New coal fields are being opened up on Elk river about 50 miles north of Fernie, but it will be necessary to build 35 miles of railway to place those fields in touch with the market.—Quartz mining in the district has not been very active during the year, but is showing improvement. The St. Eugene M. Co. (silver-lead), at Moyie, is working 300 men, and the Sullivan M. Co. (silver-lead), at Marysville, is working seventy men. These two mines have been closed down for nearly two years, but the bounty allowed by the Canadian government on lead has once more placed them among the shippers of East Kootenay. The output of the St. Eugene mine is shipped to Belgium. The Sullivan M. Co. is building a smelter at Marysville, and, when completed, it is expected to place other properties in the district on the producing list, as shipments of low-grade ores will not

have to be made to outside points. A smelter will be built by C. Fernau et al. in Fernie for handling zinc ores from West Kootenay. The ground has been secured for the plant and work started. The smelter will cost \$100,000 when completed and give employment to about seventy-five men.—The Great Northern R. R. Co. is extending its road from Morrissey to Fernie, a distance of 11 miles, and will be in operation about Dec. 1st. The main object of building this road is to have a direct haul from the coal mines at Fernie without transferring over the Canadian Pacific line between Fernie and Morrissey, as at present.

#### Roseland District.

The Caribou mine, near Roseland, adjoining the Jumbo mine, has been bonded to M. R. Galusha, J. C. Eden and R. C. Morgan, said to be for \$30,000. The Caribou mine is on Jumbo mountain. It is surrounded by the Gold King, Copper King and the Victor. The Caribou is crown granted, and developed by several short tunnels and open cuts. The principal showings are on the Jumbo vein, with a width of 50 feet. There is a second showing of quartz about 25 feet wide. Both veins carry gold values.

Two of the four units of the Elmore oil plant at the White Bear mill at Roseland have been tested and put in operation, says Manager Claudet.

#### Vancouver Island.

(Special Correspondence).—The Tyee Copper Co., Ltd., at Duncan Station, reports for September: Smelter ran twenty-four days; 4681 tons of Tyee ore smelted, giving a return after deduction of freight and refining charges of \$52,033. Duncan Station, Oct. 22.

#### Vernon District.

(Special Correspondence).—The Cherry Creek G. M. Co. is operating the McPhail and Morgan mines, near Vernon. The development consists of 1000 feet of tunnels, shafts and raises on the veins. The McPhail is equipped with buildings and has a 2-stamp experimental mill. The directors will confine development work to driving ahead No. 3 tunnel on the McPhail vein. In the spring the capacity of the mill will be increased to fifty tons per day. The officers of the company are G. H. McRae president, J. McClure vice-president, C. P. Nash secretary, G. R. Hibbe treasurer, A. H. Elftman consulting engineer. Vernon, Oct. 23.

### MALAY PENINSULA.

The output of tin and ore in the Federated Malay States during the seven months of 1904 ended Aug. 1st has not increased, compared with the corresponding period of the previous year, says the Far Eastern Review. Only in Negri Sembilan has there been an increase in export of tin, the amount being 3598 piculs, or 214 tons; and that State and Pahang show a decrease in output of tin ore. Jointly the decrease amounts to 5384 piculs, or 320 tons. In the four States, decrease in output of the metal, calculated at 68% of the gross weight, amounts to 3289 piculs (190 tons); and there is a corresponding decrease in the amount of duty collected by the Government, viz., \$1,108,486.10, the low price of tin being responsible; but the Government has realized \$467,626.39 more than estimated from this source of revenue. The district of Batang Pahang exported from Telok Anson 574.33 piculs of wolfram, and 54.88 piculs were exported from Seremban.

### MEXICO.

#### Chihuahua.

La Compania Metalurgica de Torreon is increasing development work on the San Diego mine at Santa Barbara. It is equipped with three gasoline hoists and one steam hoist. Plans are under way for a concentrating plant.

Dale Bros. & McDonald have twenty men working the Americano mine at Terazas. They are taking out ore above water level and some of it is being shipped.

F. F. Hagaman of New York, A. C. McNulty and E. G. Lindsley will operate the Sunset M. Co. group at Maguarichic, with S. L. Pearce, resident manager.

The Grub Stake M. Co. of Lawton, Oklahoma, has bought a group of mines at Santa Eulalia. J. A. Beam and C. A. Ramsower, at Chihuahua, are interested.

#### Durango.

M. C. Parke, developing a gold-bearing mine near Inde, says he will build a mill.

#### Jalisco.

The San Vicente mines, 18 miles south of Ameca, are being worked by the Philadelphia C. & G. M. Co. The tunnels and shafts within the 76 pertenencias of mineral land held by the company aggregate 6000 feet and ore is blocked out. The ore carries values in gold, silver and copper, and equipment for treating it consists of a 35-ton Chilean mill, a set of concentrating tables and an amalgamating outfit.



The company is shipping bullion. A. F. Hall is manager, with offices in Philadelphia, Pa.; J. A. Hall is superintendent at the mines.

M. D. Watson and J. R. Brickerdike of the company organized to work the Rosa Amarilla copper mines, southwest of Guadalajara, have applied to the Federal authorities for a concession to build an electric railway to connect the mines with the Pacific port of Navidad. The road will be about 40 miles long and cost about \$1,000,000. Electricity for operating the system and working the mines will be derived from power plants to be built on two rivers in the same section of the State.

#### Mexico.

A report covering the operations of the smelting plant of the American S. & R. Co., near Mexico City, for fiscal year 1903-1904 has been issued, showing 343,218,647 kilograms (or about 323,000 tons) of ore received during the twelve months. This was an increase of 39,750,640 kilograms over the preceding fiscal year. Average force employed in the smelter during the year was 1637 against 1564 in the preceding year, and the wages paid amounted to \$670,811, an increase of \$59,923. In construction of two more furnaces and in other improvements to the plant the company spent \$500,000.

#### Michoacan.

The Agostitlan Coal Co., Ltd., the successor of the Michoacan Coal Co., is building a narrow gauge railroad from Irimco station, on the Maravatio-Zitacuaro branch of the Mexican National Railroad to its coal property at Agostitlan. The road will be 48 kilometers long, of which 13 kilometers are graded. It is said development work is showing merchantable coal.

#### Sonora.

D. Richardson of Los Angeles, Cal., president of La Bufo M. & M. Co., operating at La Bufo, says he will do his freighting to Minaca, Chihuahua, on account of the Yaqui Indians interfering. La Bufo is 160 miles from Minaca and about same distance from Ortiz station, on the Sonora Railroad, the present shipping point. He says the company is smelting with a 30-ton reverberatory copper furnace built on the ground of silica bricks, and using dry oak wood for fuel. His company is putting up another 50-ton plant and the Cieneguita C. Co. is also putting up 50-ton furnaces. The 30-ton plant turns out three tons of 47% to 55% copper matte for every fifteen tons of ore. He uses only one American to a shift. It requires an American cord of dry oak wood to the ton of ore. It is claimed they can run a charge containing as high as 55% silica. The loss by the plant is about 4% of the silver and a small fraction of 1% of the copper. The bricks, which are made on the ground, are composed of non-mineral-bearing quartz, with one-fourth of clay. Air from the compressors is used instead of a blower. The 50-ton furnace being built is similar and is 36 feet long and 12 feet wide. It will cost between \$12,000 and \$13,000 Mexican money, excepting the stack which the company has for the present plant. This stack is 440 feet long, running up a hill, and has four dust chambers. The company has a calcining furnace and is experimenting with a refining furnace.

The Victoria M. Co. has been organized at Hermosillo to take over and operate properties at Minas Prietas, including the Esmeralda, North Esmeralda, Diamante, Denver and Victoria. The officers are: G. B. Underwood, president; L. B. Ramsdell, C. D. Rickey, W. B. Duvall, manager; S. W. Sawyer and A. Monteverde. The mill of the Zubiate M. Co. at La Colorado is running steadily and producing bullion. There is a scarcity of labor, in consequence of which the mill is not worked to full capacity, says G. B. Earnshaw, manager.

W. H. and M. A. Crocker have bonded La Cobreza mine, 6 miles from Huapac, on the Sonora river. They will put in a steam hoist and pump, having struck water at the bottom of the old shafts. The mine has not been worked for fifty years. Pockets of native silver have been found. In cleaning out one of the shafts they report taking outlump of a native silver that weighed twenty pounds.

The annual report of the Greene Con. C. Co., operating at Cananea, has been issued showing net profits of year ending July 31 as \$1,238,578. The total copper production was 55,000,000 pounds, and \$1,202,000 was spent for improvements during the year. The company expects with completion of the new concentrator to increase production to 6,000,000 pounds of copper per month. In the Capote mines, an additional 100 feet have been sunk, and the copper ore struck is said to average 11%. The company has from 20 to 25 miles of underground workings, and the copper so far produced has been largely from development work, says President Greene.

#### Zacatecas.

B. C. Wheeler, manager, says he will build a cyanide plant of fifty tons daily capacity at the La Mora mine, near Zacatecas.

### Personal.

T. B. CROW is superintendent of the Allen mill at Idaho Springs, Colo.

S. L. PEARCE is manager of the Sunset M. Co. at Maguarichic, Chihuahua, Mex.

E. D. BOYLE has assumed charge of the Schwab properties at Goldfield, Nevada.

S. A. KNAPP of Tonopah, Nev., has resigned as manager of the Ohio-Tonopah M. Co.

B. RICHARDS is superintendent of the New Albany mine for Bunting & Co., near Carters, Cal.

W. S. JONES is manager of the Cloud City mine at Leadville, Colo., for the Empire Tunnel Co.

W. B. MCKINLAY has resigned as manager of the Delta and Northern G. M. Cos. at Delta, Idaho.

D. R. WILLIAMS has resigned as superintendent of the Butler-Liberal mines at Bingham, Utah.

D. KEVANE has resigned as superintendent of the Chris Anderson mine, near San Andreas, Cal.

W. L. WATTS has returned to Los Angeles, Cal., after ten months' examination of mines in Mexico.

PRESCOTT ELY is manager of the Ohio-Tonopah M. Co. at Tonopah, Nev., vice S. A. Knapp, resigned.

P. WISEMAN has resigned as superintendent of the Fletcher M. Co. at Stockton hill, near Kingman, Ariz.

BARTON SEWELL, EDW. BUSH and A. EILERS, of the American Smelting & Refining Co., are visiting Puget Sound.

F. J. BUCK is superintendent of the District Gold Extraction Co., operating on the Little May mine, Cripple Creek, Colo.

CHARLES C. JONES is in southern Idaho looking after his mining interests and developing his phosphate discoveries.

A. W. JENKS having resigned from the staff of the White Knob C. Co. at Mackay, Idaho, is in Salt Lake City, Utah.

J. M. CARTER is superintendent of the Fletcher M. Co. at Stockton hill, near Kingman, Ariz., vice P. Wiseman, resigned.

E. R. CARY, C. E., of Troy, N. Y., has been appointed professor of geodesy and railroad engineering in Rensselaer Polytechnic Institute.

SUPERINTENDENT HEGGERTY is in charge of operations at the Chris Anderson mine, near San Andreas, Cal., vice D. Kevane, resigned.

C. C. GREENE, a mining engineer, recently of Middlebrough-on-Tees, England, has a position with the Yellow Aster M. Co. at Randsburg, Cal.

F. LYON, chief engineer of the United States M. Co., is in charge of the Mammoth mine being opened up by the company near Kennett, Cal.

A. F. HOLDEN, managing director of the United States M. Co., has returned to Salt Lake City, Utah, from the Mammoth mine in Shasta Co., Cal.

H. E. CLIFFORD is acting professor of electrical engineering at the Massachusetts Institute of Technology, Boston, Mass., vice L. Duncan, resigned.

A. H. ELFTMAN has returned to Minneapolis from a professional visit to Vernon, B. C. He will be in Utah next week inspecting properties at Park City.

G. Z. EDWARDS, formerly general superintendent of the Con. Mercur mines at Mercur, Utah, has a similar position with the Lincoln M. Co. at Pearl, Idaho.

E. J. EMMONS of Bakersfield, Cal., is president of the Wagram O. & M. Co., which has absorbed the Soyopa M. Co., operating copper mines in Sonora, Mex.

C. E. VARRILL is assayer and superintendent of the Mountain Boy mines of the Midnight M. Co. at Park City on the Colville reservation, south of Republic, Wash.

B. M. CORNISH, manager of the Pioche-Nevada Con. M. Co., returned to Salt Lake City, Utah, last week from London, and is at the company's mines in Lincoln county, Nev.

R. NICOLL has resigned as manager at the Radiant mine, at Radiant, near Florence, Colo., and will take charge of the

mine of the Great Western Co., near Chandler, Colo.

D. FERGUSON, recently superintendent of the New York-Bonanza mine at Park City, Utah, is superintendent of the Butler-Liberal mines at Bingham, Utah, vice D. R. Williams, resigned.

GEO. HARDING has resigned as chemist and superintendent of the Bismarck-Nugget Gulch M. Co., Sheridan, Mont., and goes to Coeur d'Alene City, Idaho, as manager of the water company and electric power plants.

LOUIS DUNCAN, PH.D., has resigned as professor of electrical engineering at the Massachusetts Institute of Technology, Boston, Mass., to devote his time to duties of electrical engineer for the New York Rapid Transit Commission and several railroad and telephone companies.

THE following appointments have been made to the teaching force of the Michigan College of Mines, Houghton, Michigan: A. A. Koch, instructor in chemistry; C. F. Bowen and E. T. Hancock, instructors in geology and mineralogy; C. H. Hoyt, instructor in civil and mining engineering; D. Copeland, instructor in metallurgy and ore dressing.

### Obituary.

W. GARLICK, president of the Colorado & Connecticut M. Co., died at Meriden, Conn., on the 10th inst.

H. J. STEMPPEL, a mine owner and pioneer of California, died at Iowa Hill, Placer county, Cal., on the 16th inst.

WM. JOHNS, a mine owner and superintendent of California, died at Alameda, Cal., on the 23rd inst. He formerly was in charge of the holdings of the London Exploration Co. Deceased was a native of England, aged 80 years.

M. D. RYAN, aged 47, a Colorado mining man, died at Cripple Creek, Colo., on the 19th inst. Deceased went to Leadville, Colo., in 1879, where he was foreman of the Maid of Erin mine. He then moved to Aspen, where he had charge of the Mollie Gibson and A. J. mines for twelve years, then going to Cripple Creek. He has been in charge of the Hamlin lease on Stratton's Independence.

### Books Received.

"The Black Hills of South Dakota," being the papers read before the Black Hills Mining Men's Association, and including a number of important contributions on mining and metallurgy in that region. These papers may be had, bound in paper, by application to the secretary of the Black Hills Mining Men's Association, Deadwood, S. D.; 135 pages, profusely illustrated. Price, 25 cents.

Under title of "Mineral Resources of the United States for 1903," the United States Geological Survey has issued: "The Stone Industry," "The Manufacture of Coke," "Occurrence of Sulphur and Pyrite and Their Production," "Production of Aluminum and Bauxite," "Production of Magnesite," "Statistics of the Clay Working Industries," with a paper on "The Sand-Lime Brick Industry."

"The Geology of Miller County, Mo.," by S. H. Ball and A. F. Smith, and "The Quarrying Industry of Missouri," by E. R. Buckley and H. A. Buehler, published by the Missouri Bureau of Geology and Mines, give the results of careful and systematic geological investigation in Missouri. These form important contributions to a series of reports on the geological conditions of Missouri. The first three chapters of the report on quarrying discuss the demands and uses of stone, the properties of building stones, and the methods of determining the value of stone for different uses. Following are descriptions of the various quarries and stone products of the State, including results of physical tests especially valuable to architects and builders. They are well printed and illustrated and give a good impression, not only of the authors, but also of the subject.

"Elements of Mechanical Drawing," by Pierce Jamison; 8vo, xii+226 pages, \$2.50; John Wiley & Sons, New York. The first part of the book is devoted to an exposition of the fundamentals of drawing, and the remainder to furnishing copies and directions for an exhaustive course in the laying out and execution of drawings. The chapters on lettering, projection and reproducing are good. The subjects of gearing and of patent-office

drawings are practically treated. While not originally written as a "self-help," but as a basis for class instruction, yet by following the explicit directions given, a conscientious student could attain such knowledge as would prepare him to pursue a course in engineering and such practice in drawing as would qualify him to do ordinary commercial draughting. This book will be sent postpaid, by the MINING AND SCIENTIFIC PRESS, on receipt of the price.

"Rock Excavation—Methods and Costs," by H. P. Gillette, is a practical treatise on a much neglected subject. The author treats on quarrying, open cut work, trenching, tunneling and underground excavation, giving much data whereby an inexperienced man might predicate the cost of rock work with some accuracy, and the experienced manager find how and where savings in the cost of production may be effected. The work is comprehensive, yet specific in its treatment and timely. While considerable of its contents is not of immediate application to mining, yet it puts widely scattered data into compact form. The book contains little that is new or original, being compiled from material most of which has already been published. The author opposes the "crater theory" of blasting, but gives nothing in its place, his idea seeming to be that little value can be obtained from merely theorizing. Published by M. C. Clark, 13 Park Row, New York. Sent postpaid from this office. Price, \$3, cloth; 5x7½ inches; 384 pages, illustrated.

"Untechnical Addresses on Technical Subjects," by James Douglas, LL.D.; 12mo, v+84 pages; cloth, \$1. Contents.—The Characteristics and Conditions of the Technical Progress of the Nineteenth Century. The Development of American Mining and Metallurgy and the Equipments of a Training School. Wastes in Mining and Metallurgy. John Wiley & Sons, 43-45 East Nineteenth street, New York City. The benefits derived from the modern spirit of voluntary interchange of thought and experience; the dependence of mining and metallurgy upon machinery and methods produced by American brains; the advantages enjoyed by the American manufacturers and miners over foreign competition—these form the texts for three addresses delivered before different audiences composed of students and members of the American Institute of Mining Engineers. They give a good general idea of the advance made in coal, iron and copper mining by intelligent competition. Statistics are largely drawn upon for comparison; these have been brought up to date and seem reliable. The whole forms an argument for encouragement of progress and may well be read by young men. The treatment is easy and readable. The sterling worth of the author is a sufficient guarantee as to the worth of the book. It will be sent postpaid, by the MINING AND SCIENTIFIC PRESS, upon receipt of price.

"Australian Mining and Metallurgy," by D. C. Clark, is a comprehensive and exhaustive review and commentary upon mining methods and metallurgical practices employed throughout Australia. The important mines of Western Australia, Tasmania, Queensland, Victoria and New South Wales are specifically treated, the geological conformation, the general resources and the possibilities for further development seem to be impartially and intelligently portrayed. Refractory ore, scarcity of water and wood, and other discouraging circumstances have been successfully overcome in Australia, but in the contest almost every known metallurgical process has been tried. This volume furnishes a valuable record of these, not only of their successes, but also of their failures, the latter of which are often the more valuable to the practical metallurgist. On the extraction, not only of gold, but also of silver, lead, tin and copper, methods are contrasted, treatment examined and appliances reviewed. The illustrations are numerous, but, judged by American standards, are deficient in quality. The value of the work would be greatly enhanced by a general map of Australia and of the districts described. A treatise of this character naturally contains much that has appeared elsewhere, but what does appear is presented in compact form and has been brought up to date. Its appearance suggests that a number of similar volumes treating on metallurgical practices of other countries would make valuable additions to this and that of Richards on "American Ore Dressing." With these as a basis, and a current mining periodical as a supplement to chronicle new processes and improvements, one would possess an invaluable record of what methods will give the best results under different sets of circumstances. The book contains 620 royal octavo pages, and is published by C. Parker, Melbourne,



Australia.. It will be sent postpaid by the MINING AND SCIENTIFIC PRESS upon receipt of \$6.

Commercial Paragraphs.

THE Roessler & Hasslacher Chemical Co. of New York have been awarded a grand prize at the Louisiana Purchase Exposition.

THE Salt Lake, Utah, Hardware Co. is advised that the Keller assay scales was awarded first prize at the St. Louis Exposition.

THE Ohio Steam Shovel Co., Toledo, O., are giving special attention at present to the installation of their shovels for irrigation purposes in Wisconsin, Michigan and Ohio.

THE Snoqualmie Falls & White River Power Co. of Seattle and Tacoma, Wash., by amended articles of incorporation, has changed its name to Seattle-Tacoma Power Co., and has increased its capitalization.

THE business of manufacturing the Boulder brand muffles and other shapes in fire brick, conducted at 1617-1627 North Street, Philadelphia, Pa., for sixty-nine years, has been incorporated under the title of the Boulder Manufacturing Co., Inc., and will be continued at the same address.

THE Brown Corliss Engine Co., Corliss, Wis., have received orders for one 20x42-inch heavy duty Corliss engine for the Grand Rapids Desk Co., Muskegon, Mich; one 16 & 26x16-inch vertical compound non-condensing high-speed engine; one 13 & 22x12-inch vertical compound non-condensing high-speed automatic engine, both D. C. for electric lighting service, and one 9x9-inch single cylinder high-speed automatic engine for Columbia, Mo.

COLORADO IRON WORKS CO., Denver, Colo., report the sales of twelve single bowl slag trucks to the Cananea Copper Co., a carload of Bartlett concentrating tables to the Pittsburgh-San Jose R. & R. Co., and four impact screens to the Avino Mines, Ltd., all in Mexico. All the machinery for the concentrating mill of the Ruby Basin M. & D. Co. has been shipped and when finished this plant will be one of the most complete in Colorado.

R. SPRADO has resigned the management of the Lake Shore Engine Works, Marquette, Michigan, and goes with Chalmers & Williams, Railway Exchange, Chicago, as their consulting engineer. Messrs. Chalmers & Williams, while dealing in machinery and supplies for mine, mill and smelter, will make as one of their specialties, the Sederholm boiler, adopted by the Pennsylvania Railroad, Homestead mine, and other large concerns. The exclusive manufacturing rights to this boiler have been bought by Chalmers & Williams from E. T. Sederholm.

THE Blaisdell Co., Los Angeles, Cal., have completed at the Cleveland works of Wellman-Seaver-Morgan Co., a 22x9-foot 6-inch class "A" excavator and have under construction at the same plant a 40x6-foot class "A" excavator and 40-foot class "Z" distributor. This equipment goes to the El Oro Mining & Railway Co., Ltd., El Oro, Estado de Mexico, Mexico, where it will be in operation about March, 1905, to automatically fill and empty the sand vats of the cyanide plant more economically than is possible with Mexican labor at 25 cents gold per day.

Trade Treatises.

The good qualities of Smooth-On iron cements for repairing leaks or making connections in steam or hydraulic work is finely set forth in a 100-page booklet issued by the Smooth-On Manufacturing Co., 572-574 Communipaw avenue, Jersey City, N. J.

"Hydraulic Turbines and Governors" is the subject treated in "Publication 112" of the Allis-Chalmers Co., who have become the sole licensees in North America for the manufacture and sale of the hydraulic machinery of Escher, Wyss & Co., of Zurich, Switzerland, and announce the fact in their usual sumptuous style.

"Graphite for the Motor," from the Joseph Dixon Crucible Co., Jersey City, N. J., devotes twenty-four handsome pages to the subject of graphite lubrication for automobiles. Copies of the brochure will be freely sent to all interested in the operation of motor cars and motor boats. It is 5x7 1/2 inches and handsomely illustrated.

Latest Market Reports.

SAN FRANCISCO, October 28, 1904.

METALS.

SILVER.—Per oz., Troy: London, 26 1/2 d (standard ounce, 925 fine); New York, bar silver, 58 1/2 c, refined (1000 fine); San Francisco, 58 1/2 c; Mexican dollars, 47c San Francisco, 46 1/2 c New York.

COPPER.—New York: Standard, \$13.25; Lake, 1 to 3 casks, \$13.37 1/2; Electrolytic, 1 to 3 casks, \$13.37 1/2; Casting, 1 to 3 casks, \$13.12 1/2; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £60 17s 6d spot per ton.

LEAD.—New York, \$4.42; Salt Lake City, \$3.50; St. Louis, \$4.12; San Francisco, \$4.50, carload lots, 4 1/2 c 1000 to 4000 lbs.; pipe 6 1/2, sheet 7, bar 5 1/2 c; pig, \$4.85. London: £12 7s 6d long ton.

SPELTHER.—New York, \$5.35; St. Louis, \$5.00; London, £24 10s 3/4 ton; San Francisco, ton lots, 6 1/2 c; 100-lb. lots, 7c.

TIN.—New York, pig, \$28.50@28.62 1/2; San Francisco, ton lots, 29c; 500 lbs., 29 1/2 c; 200 lbs., 30c; less, 31c; bar tin, \$ b., 32 1/2 @ 35c. London, £131 10s spot.

PLATINUM.—San Francisco, crude, \$18.50 @ oz.; New York, ingot, \$19.00 @ Troy oz. Platinum ware, 75 @ 82c @ gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 @ flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBIT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6 1/2 c; extra, 17 1/2 c; genuine, 31 1/2 c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100 lb. lots, 16c.

ZINC.—Metallic, chemically pure, \$ b., 50c; dust, \$ b., 10c; sulphate, \$ b., .04c.

NICKEL.—New York, 40@47c @ \$ b.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$12.85 @13.10; gray forge, \$12.00; San Francisco, bar, 3c @ \$ b., 3 1/2 c in small quantities.

STEEL.—Bessemer billets, Pittsburgh, \$23.00@23.00; open hearth billets, \$23.00 @23.00; San Francisco, bar, 7c to 12c @ \$ b.

CHICAGO CURRENT QUOTATIONS.

Bessemer .....	\$14 50@14 75
Charcoal .....	15 50@15 75
Foundry Northern 1 .....	14 25@14 75
Northern 2 .....	13 75@14 25
Northern 3 .....	13 25@13 75
Southern 1 .....	13 15@13 65
Southern 2 .....	13 65@14 15
Southern 3 .....	13 15@13 65
Forge .....	12 65@13 15
Billets, Bessemer .....	—@22 50
Bars, iron .....	1 40@1 45
Bars, steel .....	—@1 47
Rails, standard .....	28 00@28 00
Rails, light .....	21 00@23 00
Plates, boiler .....	1 72@—
Tank .....	1 57@—
Sheets, 27 store .....	2 17@ 2 22
Angles .....	1 57@—
Beams .....	1 57@—
Tees .....	1 57@—
Zees .....	1 57@—
Channels .....	1 57@—
No. 1 railroad wrought .....	12 50@12 75
No. 1 cast, net ton .....	11 00@11 50
Iron rails .....	16 50@17 00
Car wheels .....	11 50@12 00
Cast borings .....	4 50@ 5 00
Turnings .....	7 25@ 7 50

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6 1/2 c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, 1 1/2 c @ \$ b. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, 1c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6 1/2 c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city @ bbl.

CEMENT.—Imported, \$2.15@2.65 @ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 @ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7c; Hallett's, 6 1/2 c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8 1/2 c; 100-lb. lots, 10 1/2 c. POWDER.—F. o. b. San Francisco: No.

1, 70% nitro-glycerine, per lb., in carload lots, 15 1/2 c; less than one ton, 17 1/2 c. No. 1\*, 60%, carload lots, 13 1/2 c; less than one ton, 15 1/2 c. No. 1\*\* 50%, carload lots, 11 1/2 c; less than one ton, 13 1/2 c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9c; less than one ton, 11c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11 1/2 c @ set; 14 oz., 40s., 10c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Walsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c @ \$ b.; carloads, 23@24c; in tins, 30c; soda ash, \$2.00 @ \$ b. 100 lbs.; hyposulphite of soda, 3@3 1/2 c per lb.; caustic soda, in drums, 3@3 1/2 c @ \$ b.; Cal. a. soda, bbls., \$1.20@1.40 @ \$ b. 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2 1/2 @2 3/4 c; powdered sulphur, 2@3c; flour sulphur, French, 3@3 1/2 c; alum, \$2.00@2.25; California refined, 1 1/2 @2c; sulphide of iron, 8c @ \$ b.; copper sulphate, 5 1/2 @5 3/4 c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66 1/2 B, 1 1/2 @2c @ \$ b.; nitric acid, carboys, 8c @ \$ b.

OILS.—Linsed, boiled, bbl., 53c; cs., 58c; raw, bbl., 51c; cs., 56c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19 1/2 c; Astral, 19 1/2 c; Star, 19 1/2 c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20c; cs., 24c; Mineral Sperm, cs., 26 1/2 c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22 1/2 c; 88° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19 1/2 c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c @ \$ b.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburgh. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburgh.

BORAX.—Concentrated, 6@7c @ \$ b.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c @ \$ b., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, \$ b., 7c; less than 500 lbs., 7 1/2 c. LITHARGE.—Pure, in 25-lb. bags, 8@9c @ \$ b.

MOLYBDENUM.—Best, \$2.75 @ \$ b.

CHROMIUM.—90% and over, \$ b., 80c.

PHOSPHORUS.—American, \$ b., 70c.

SILVER.—Chloride, \$ oz., 90c@91.00; nitrate, 55c.

MERCURY.—Bichloride, \$ b., 77c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—\$ b., \$2.75.

SODIUM.—Metal, \$ b., 50c.

BISMUTH.—Subnitrate, \$ b., \$2.10.

URANIUM.—Oxide, \$ b., \$3.50.

FIRE BRICK.—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

CORK EXTRACTOR.—No. 772,888 Oct. 18, 1904. Joseph Kaiser, San Francisco, Cal. The object of this invention is to provide a simple, inexpensive, compact means accompanying every bottle for removing the cork entire. The device takes up no room, is inserted into the bottle is sealed, preserves the cork by leaving it entire and enables the cork to be reused. The top projecting portion of the extractor becomes a combined cap to protect the cork and a means for extracting the cork.

SAW FILING MACHINE.—No. 772,538. Oct. 18, 1904. M. P. Schell, San Francisco, Cal. Assigned to Folkers Saw Filing Machine Co. of same place—a corporation. This invention relates to improvements in machines for sharpening saws, and particularly in machines of the type employing power-driven helical file members. The object of the present invention is to lessen the cost of manufacture of the file members, provide means in conjunction with the file members for the proper en-

trance of the latter into and their departure from the teeth, and further to provide a simple, convenient and adjustable means for supporting the saw relative to the file members, whereby the original locus of the teeth points may be maintained.

ENGINE VALVE GEAR.—No. 772,535. Oct. 18, 1904.

E. A. Rix, San Francisco, Cal. This invention relates to a new and improved valve motion for use in reciprocating engines that compress or expand an elastic fluid. It consists of one or more circular valve seats having ports at opposite sides of the center connecting with opposite ends of a cylinder and a rotatable guided valve fitting each seat and having inlet and outlet ports which are successively brought to register with the ports of the valve seat and which ports remain fully open the longest possible time. Supply and exhaust passages connect with the ports controlled by the valve.

VEHICLE WHEELS.—No. 772,573. Oct. 18, 1904.

Wm. Morck, Oakland, Cal. One-half assigned to James H. Drake of Morcan Park, Ill. This invention relates to improvements in vehicle wheels, and is especially designed to provide a substantially elastic wheel which will relieve the jar and shock to the vehicle in travelling over the ground. The object of the invention is to provide a substantially indestructible wheel which is especially valuable for use upon automobiles and like carriages, and may also be employed for bicycles, and for other similar and equivalent purposes.

WIPE STRETCHER.—No. 772,556. Oct. 18, 1901.

Emil Denison, San Francisco, Cal. This invention relates to improvements in stretchers or grippers for use by linemen and others in stringing wires, cables and the like. The object of the invention is to provide a gripper and stretcher or tightener which is simple in construction, powerful and durable, which is adapted to take either a fine wire or a cable an inch or more in diameter, which will not kink a wire, which may be run out any distance in mid-air on the wire and then engaged, and which can be made to release its grip automatically on the wire at any time and at any point.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING OCTOBER 18, 1904.

772,866.—INCUBATOR.—H. A. Brooks, Los Angeles, Cal.
772,556.—WIPE STRETCHER.—E. Denison, S. F.
772,791.—CARBURETER.—E. L. Dow, Oakland, Cal.
772,558.—STOVES.—K. A. Duff, S. F.
772,880.—PUMP.—M. M. Fulton, Pomona, Cal.
772,888.—CORK EXTRACTOR.—J. Kaiser, S. F.
772,618.—TRAP NETS.—T. E. P. Keegan, Tacoma, Wash.
772,565.—SHINGLING GAGE.—J. J. Knox, Los Angeles, Cal.
772,839.—SPLIT PULLEY.—G. F. McLynn, Cottage-grove, Or.
772,728.—OIL WELL PACKER.—J. E. Merritt, Bakersfield, Cal.
772,573.—VEHICLE WHEEL.—W. Morck, Oakland, Cal.
772,744.—BRACKET.—J. E. Packard, Los Angeles, Cal.
772,746.—FIREARM.—E. E. Redfield, Glendale, Or.
772,535.—VALVE GEAR.—E. A. Rix, S. F.
772,679.—FIRE LADDER.—O. A. Sarvela, Rockley, Cal.
772,538.—SAW FILING MACHINE.—M. P. Schell, S. F.
772,540.—CONCENTRATOR.—C. A. Smith, Los Angeles, Cal.
772,594.—GAS BURNER.—R. H. Walter, Los Angeles, Cal.
772,546.—OIL BURNER.—H. H. Watts, Bakersfield, Cal.
772,854.—SHOE LACE.—P. Wilehart, Oregon City, Or.
772,487.—LOCK.—G. W. Winckfield, Oakland, Cal.
772,488.—VAPOR GENERATOR.—G. E. Witt, S. F.

ASSIGNMENT NOTICES.

MARINA MARISCANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of October, 1904, an assessment (\$2.40 of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 207 Battery street, Room 15, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of December, 1904, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 26th day of December, 1904, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
CHAS. BOYDNE, Secretary.  
Office—207 Battery street, Room 15, San Francisco, California.

DELINQUENT SALE NOTICE.

ORLEANS CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 2) levied on the 6th day of August, 1904, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Certs.	Shares.	Amt.
Geo. P. Thurston, Trustee.....	233	1000	\$75 00
J. C. Diamond .....	475	50	3 75
J. C. Diamond .....	475	53	3 97 1/2
D. F. Bell .....	206	75	5 70
J. F. Lang .....	209	16	1 12 1/2
John Jose .....	219	2 1/4	19

And in accordance with law and an order from the Board of Directors, made on the 6th day of August, 1904, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company at San Francisco, California, on MONDAY, the 31st day of October, 1904, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

W. H. SMITH, Secretary.  
Office—Room 10, No. 324 Pine street, San Francisco, California.



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Paris, France: E. H. Cadot, 12 Rue St. Georges.  
New York Office: 74 Cortlandt St.



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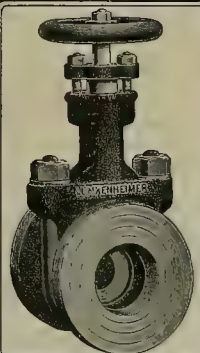
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## PATENTS.

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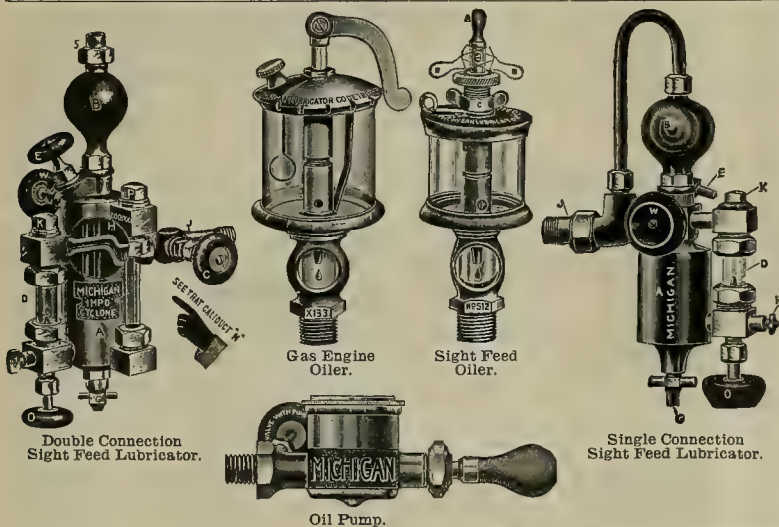
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# MINING AND SCIENTIFIC PRESS

Whole No. 2311.—VOLUME LXXXIX.  
Number 19.

SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 5, 1904.

THREE DOLLARS PER ANNUM.  
Single Copies, Ten Cents.

## The Promoter and His Commission.

One of the most important matters in the promotion of a new mining enterprise, from the standpoint of the promoter, is the amount of commission there is in it for himself, and next to this consideration is the finding of those who will be willing to put up the amount of money called for regardless of the actual showing made by the property.

"The laborer is worthy of his hire," and it is only just and proper that the promoter should be paid—and well paid—for his services in engineering the financing of a mining proposition, as much so as he who undertakes a similar office for any other industrial enterprise; but the commission demanded by the mine promoter is often so disproportionate to the sum paid the owner, or put into the development and equipment of the property, as to seem absurd. These commissions are not, as a rule, characterized by their relative diminutiveness, but, on the contrary, are generally proportionately munificent. Sometimes to such an extent is this the case that the promoter and his assistants get practically "all there is in it,"



Reduction Works Afterthought Mine, Shasta Co., Cal.

(See Page 313.)



Ten-Stamp Mill Granite Hill Mine, Grant's Pass, Or.

(See Page 309.)

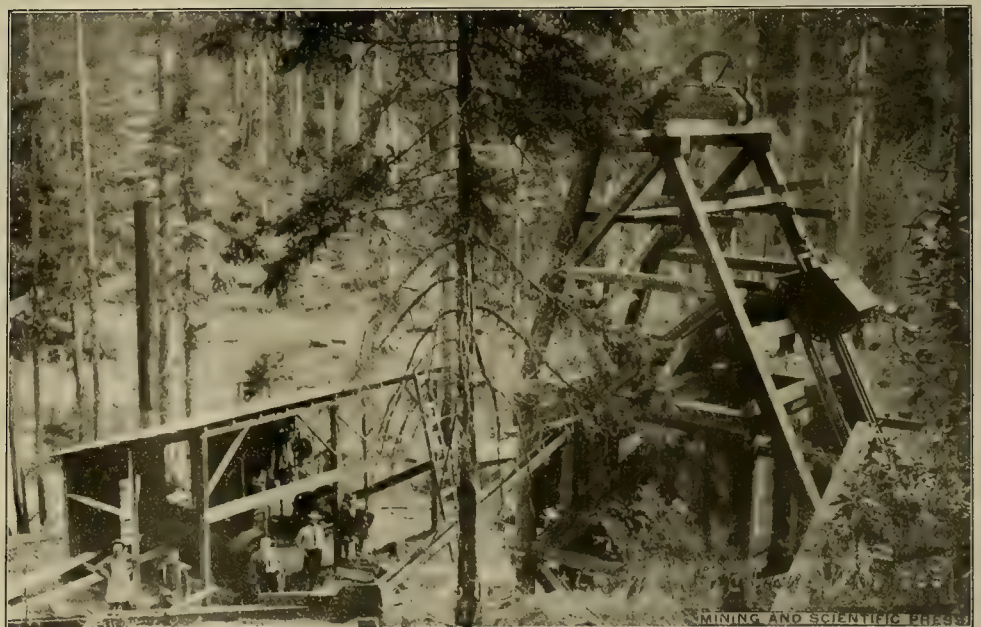
and another failure goes of record. Not infrequently good mining property comes into the hands of some one of these professional organizers of capital and the commission demanded, though perhaps a large amount, is not greatly excessive as related to the entire sum involved in the transaction.

The promoter accepts a report made for the owner, presumably by a competent engineer, and if the deal is a large one he takes the necessary precaution to verify the report if possible, for the promoter with a good following cannot afford to offer any proposition to his clients that will not bear examination. He is put to considerable expense of time and trouble, and as there is usually a time limit to his contract with the owner, and he may continue development under a bond, he assumes a certain risk.

In some instances the promoter has to deal with those who pertinently inquire, "Where do we come in?" And this class of men are sometimes inclined to secure the property as cheaply as possible, and to that end set about ascertaining the limitation of the promoter's agreement and the amount of commission he is to receive. The result of these investigations often leads to an attempt to "do business" without the aid of the promoter. The would-be investor

procrastinates, and still does not refuse to buy, his object being to keep the promoter "on the string" while killing time. At almost the last moment they will sometimes offer to take the property at a price somewhat in advance of the owner's figures as stated in the bond, but cutting heavily into the promoter's commission, who must accept or let the property revert to the owner. There are important instances known wherein the promoter refused emphatically to accept such terms, and lost the sale and further opportunity to sell the property as well, but the scheming capitalists and their agents failed to get the mine, for the reason that the owner at once advanced the price of the property to a figure considerably beyond the demand of the promoter. The mine had developed and was worth all the promoter asked, and more, but the would-be investors were unwilling he should make so large a commission, and not only defeated the promoter, but themselves as well.

In other cases people of this class ignore the promoter entirely and undertake to negotiate with the owner directly. In some cases the attempt is successful, but in others, as in the case above referred to, they fail to get any advantage.



Head Frame and Equipment Granite Hill Mine, Grant's Pass, Or. (See Page 309.)



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## Estimating Mining Costs.

Many mining reports contain what purport to be carefully prepared estimates of the cost of equipment, development and the operation of the property upon which the report is made, and it is found subsequently that these estimates often fall far short of the amount actually required to accomplish what it was designed to do. Occasionally the careful engineer will overestimate the amount of capital required; but rarely is this the case, whether the report be for the seller of the property or for the buyer. The reason for these discrepancies may be found in the fact that often the one making the report fails to anticipate the conditions which present themselves upon a further development of the mine. The estimated figures of installing hoisting and metallurgical plants are usually near the proper amount, as these may be readily approximately arrived at or may be done by contract; but it is in the unseen portions of the mine that errors of judgment are more likely to be made. The character of the ground may change to such an extent as to greatly increase the cost of development; the veins or ore bodies may contract, rendering estimates of capacity and cost of mining too low; water may be found in much greater volume than was anticipated, requiring increased capacity to handle it—in some instances requiring the enlargement of a shaft or the sinking of a new one in order that mine drainage may not interfere with mining operations. There is, however, apparently an ever present temptation to underestimate or understate operating costs. The man who reports for the seller is led to do this to make the property show to the best advantage, and he who reports to the buyer adopts the idea, possibly, to "set the pace" for the superintendent or manager to whose lot it may fall to attempt to live up to these estimates. Each engineer probably figures as closely as the information available will admit, and then discounts them if others are to have the handling of the mine, or adds to them, as a factor for safety, if he is to undertake the work himself.

## Corporate and Practical Mine Management.

Not infrequently mines which appear to have the elements of success in the volume and value of the ore available, yet which fail as commercial propositions under corporate management, when directed by practical men at once sustain the previously good opinion entertained of them. A case in point is that of a gold mine in Shasta county, Cal. This property was operated by an Eastern company under bond, and although the ore was considered abundant enough and good enough to afford a substantial profit to the operators, the management appeared to be unable to "make ends meet," and found the income insufficient to meet obligations. The Eastern investors, who had gone into the enterprise in the belief that it would prove a profitable proposition, refused, or, at least, failed to put up the necessary money, and the miners employed asked to be allowed to work the property on their own account with the object of paying themselves from the proceeds of their efforts.

This arrangement was accordingly made and the workmen soon found themselves in funds sufficient to settle the indebtedness. They then took a lease on the property and now continue to work it with good advantage to themselves.

This is an object lesson from which many may derive profit, as it shows clearly the important difference between corporate and practical management. The corporate management may be experienced and also as economical as conditions will admit, but in the very nature of things, under a corporate management there are always extraneous expenses, which are usually grouped under the term "general expenses." Among these are the maintenance of a city office with its clerical force—a manager, often an assistant manager, and a superintendent (when the latter should alone be sufficient to direct operations and attend to the business). There are traveling expenses for manager and directors, long telegrams and many other items which in the aggregate amount to a considerable sum—in some instances the extraordinary expenses are as heavy as the actual operating cost of the mine.

That this was the case in the instance here cited it is not claimed, but the fact that the miners have made the mine pay under their co-operative plan justifies the belief that it was the extraneous expenses which caused the mine to fail under corporate management. In seeking for the reason for this difference, it must be understood that the miners have the benefit of all the development work previously performed, and also the use of the machinery installed at the mine. The tools and the entire paraphernalia are at their disposal, and neither the cost of these nor their deterioration are figured in the working costs. Moreover, there is a certain personal equation which cannot be overlooked. The miners, working for themselves, realize that their success depends largely upon their individual efforts, and will work more faithfully. No laggard is permitted to share in the operation. Every man will do his best without urging, and all who have had experience with men when working by the day, and with the same men when working on a profitable contract, realize that the personal equation is a large one.

The lessee divests the cost sheet of every unnecessary item. No expense is permitted that is not absolutely necessary. All engaged in the work are practical and experienced men, and the combination of energy and experience, with large salaries, heavy office expenses and other miscellaneous charges peculiar to corporate management eliminated, makes success possible, where failure before resulted. The Cripple Creek district of Colorado is another exemplification of this principle, demonstrated in a great many mines. In that district a number of the mines which were profitably operated under corporate management are now wholly, or in large part, in the hands of lessees, who divide good profits, and, in instances, very large ones from their work.

It would seem that corporations might learn much to their advantage in the manner of handling mining and metallurgical operations from lessees. There are a great many large and successful mining propositions which are run upon a narrow margin of profit—such, for instance, as the Homestake mines of

South Dakota, where it requires a production of about \$5 to pay \$1 in dividends. The Treadwell mines of Alaska are also run upon a very narrow margin of profit, but these enterprises, though conducted on a large scale, are nevertheless run on the lines of the strictest economy. It does not follow that because a mine produces gold, or silver, or copper, that it can be run extravagantly and still prove profitable. The day of spectacular mining has passed, and the mine of to-day, whether high or low grade, must be operated with due regard to business principles and with experienced and wise management in which neither extravagance nor parsimony have a place.

## Experimental Mining.

There are few branches of industry which offer better opportunities for experimentation than mining, and it may be said with truth that it requires a good mine to survive a period of experimental operation, particularly if the experiments are conducted by inexperienced and incompetent persons. There are many mines which possess the elements of success, but which do not achieve fame or even moderate success, because their resources are wasted in ill-advised experiment. There are, however, times when experiment is not only justifiable, but absolutely necessary, and it is important that these trials be made by one experienced in the business and competent to judge of their relative efficiency and cost, and the results obtained. It has been said any one can successfully run a rich mine, which is doubtless true, but the best managers are those whose experience has been gained where the cost had to be carefully considered and where extravagance was an impossible factor in the road to success.

The manager of a large mine was advised to install a plant consisting of rolls, trommels, jigs, sizers and concentrators, to handle a particular portion of the output of his mine. He declared, however, that he had experimented long enough, and knew that the plant suggested would not prove suitable. Instead he installed, at double the cost, a stamp battery, which gave a capacity of less than one-half that which would have resulted from the rolls, and with a saving in operation considerably below that which might have been realized with proper equipment. When this manager said he had experimented sufficiently he believed himself in the right, as he had done nothing but experiment through his entire career at the mine in question, but had never had an opportunity to gain experience elsewhere, and moreover, as he was not a reader of technical and practical papers, from which he might have obtained much useful knowledge, his experience was limited to this one spot, and the devices largely of his own creation. Still he thought there was little about mining and metallurgy he did not know. He was a constant experimenter, but his endeavors were mostly misdirected, because of his lack of knowledge of what others were doing.

The manager of another large and successful mine was wont to content himself with the statement: "I permit my neighbors to do the experimenting, and when they evolve something superior to that which I already have, I am ready to adopt it." This man represented directly the opposite extreme. He was experienced in his own work, and believed he was doing the best that could be done, and was so self-satisfied that he even declined to admit the possible advantage of experimenting to see if any additional saving could be made. Here were two extremists—the one continually experimenting, though not intelligently, the other refusing to experiment. Both were wrong; but however desirable and necessary experimenting may be, let it be done by those whose knowledge and experience fits them for the important work.

THE Klondike district of the Yukon Territory presents an interesting phase of the gold dredging industry in the instance of a dredger, built at great expense to operate on a large concession in that district, abandoning the dredging for gold in its own territory and accepting contract work on the Klondike river on a 50% royalty basis. The natural inference is that the managers of the company owning the river have discovered that their lease is likely to prove much more profitable than their own concession.



## CONCENTRATES.

ONE horse power may be safely transmitted by a belt 1 inch wide running 1000 feet per minute.

THE freight on the concentrator from Denver, Colo., to Livingston, Mont., would be \$2 per 100 pounds; on the ore crusher, \$1.72 per 100 pounds.

THE commercial efficiency of a dynamo is the ratio of the useful energy, or output, to the power actually absorbed by the machine in being driven.

DIVIDENDS are paid only on the issued capitalization. Treasury stock does not participate in dividends; it belongs to the company and is retained to be sold as occasion requires.

THE magnetic needle of a transit or compass should not be clamped if within the influence of strong electric currents. The instrument should not be brought near dynamos or motors.

To clean platinum of impurities and to polish without much loss, rub the surface with moist sea sand. The cleansing is made easier by first fusing bisulphate of potash or borax in or around the dish.

THE standard of boiler horse power adopted by the A. S. M. E. is the hourly evaporation of thirty pounds of feed water at 100° F. into steam at seventy pounds gauge pressure. This corresponds with the delivery of 33,305 B. T. U. per hour.

IT is more expensive to operate an air compressor at a high altitude than at sea level, for while it will take less power to run the same compressor, yet the capacity will also be less at the higher level. At 9500 feet the extra expense amounts to about 20%.

WHERE a vein occurs wholly without the lines of a placer claim but the surface boundaries take in a portion of the placer, the lode claimant may renounce any claim upon the included placer ground, or the placer claimant may adverse the lode claimant.

A MINING LEASE AND BOND or other similar instrument expiring in ninety days, and dated July 22, 1904, will expire on the 20th day of October, 1904. Any other transaction which reached a final conclusion in ninety days after July 22 would expire on October 20.

NUMEROUS trials by various means have been made to measure the temperature of the electric arc. All of these experiments indicate that the temperature is not lower than 3600° C., while it is considered probable that the absolute temperature is from 3900° to 4000° C.

THE owner of a placer claim may proceed to patent, and any vein discovered in the bedrock of the placer subsequent to the issuance of the patent becomes the property of the owner of the placer, and he may work all that portion of the vein lying within the boundaries of his claim, but he is entitled to no extralateral right.

TO SET a belt on a quarter twist on a concentrator, find the central point on the face of each pulley at the extremity of the horizontal diameter where the belt will leave the pulley; then set that point on the driven pulley plumb over the corresponding point on the driver. This will cause the belt to run squarely on each pulley.

IN British Columbia the mining laws permit any person over the age of eighteen years, or any joint stock company, to obtain a free miners' certificate by paying the required fee, which for an individual is \$5 per year and to a joint stock company having a capital stock of \$100,000 or less \$50 for one year. If capitalized for more than this sum the fee is \$100 per year.

COPPER PYRITES (chalcopyrite) is believed to contain the copper in the form of cuprous sulphide (according to Bloxam), its true formula being  $\text{Cu}_2\text{S}$ ,  $\text{Fe}_2\text{S}_3$ , for if copper be present as cupric sulphide ( $\text{CuS}$ ), the iron must be present as ferrous sulphide, and the mineral would then have the formula  $\text{CuS}$ ,  $\text{FeS}$ . Ferrous sulphide ( $\text{FeS}$ ) is easily attacked by dilute sulphuric or by hydrochloric acid, which is not the case with copper pyrites, though nitric acid attacks it violently.

THE apex of a vein which is buried beneath a later lava flow, a bed of gravel, a land slide, talus, or other superficial covering, has all the legal force and is entitled to all the rights and privileges incidental to an outcrop or apex occurring at the surface. If a shaft is sunk through a rock stratum or a layer of any material and a vein is discovered beneath, the discovery is equivalent to one made on the existing surface, and such a vein is entitled to the extralateral right as much as any other discovery.

CHROME IRON is found in a number of counties of California. The deposits known to "Concentrates," nearest Los Angeles, are in San Luis Obispo county, in the Santa Lucia mountains in the northwestern part of the county. Chromic iron also occurs in Fresno county, 6

miles southwest of Tollhouse. But little chrome is produced at present in California, owing to the small profit to be derived from mining and concentrating the ore. There are deposits near Livermore, Alameda county, and also in Tehama, Shasta and Trinity counties.

IT is generally cheaper and usually more satisfactory to allow the cyanide solution to dissolve the metallics than to try acid for that purpose. Metallics are usually removed because they tend to choke the boxes, coagulate into lumps and prevent the even flow of solution through the zinc sponge. If necessary, the metallics might first be cleared by dilute acid, then dipped into a solution of mercury, when, after retorting, they would be in the form of fine powder, eminently suitable for rapid solution in the acid.

IN every installation where petroleum oil is used as fuel there should be provision made to remove the water from the bottom of the supply tank, as even a small amount of water pumped to the burners will interfere with the efficient and proper work of the installation. It has been demonstrated that the evaporative efficiency of refined and crude oil is essentially the same, regardless of the locality from which the oil may come, but the danger is much greater with crude oil. Great benefits are derived from heating the air blown into the burner with the oil.

PRODUCTION of aluminum in the United States increased from 83 pounds in 1883 to 7,500,000 pounds in 1903. The Pittsburg Reduction Co. is the sole producer of aluminum in the United States, with two plants at Niagara Falls, and one each at Massena Falls, N. Y., and Shawanegan Falls, Quebec, Canada. There are four companies in Europe producing this metal: At Foyers, Scotland; Le Praz and St. Michel, France; Neuhausen, Switzerland; Rheinfelden, Germany; Lend Gastein, near Salzburg, Austria, the last three plants being owned by a single company.

IN measuring the depth of workings on a vein, it depends upon the purpose for which such measurements are made. If figuring ore in sight, then the measurement should be made on the vein, either perpendicular to its strike or on the trend of the ore shoot, if that be known. It is more common, however, to measure on a line normal to the strike of the lode—that is, along its true dip. If the measurement is to ascertain to what depth a vertical shaft must be sunk to reach a given point on the vein, the measurement must be made vertically. Some mines that are opened to a depth of 2000 to 3000 feet on the dip of the veins are in their lowest workings only a few hundred feet below the surface.

A PROSPECTOR cannot enter a placer location claimed by another for the purpose of searching for an unknown lode, by excavation or otherwise. In the event of a lode being discovered in the working of a placer claim, the owner should claim it as a lode, at once, or failing to do so, any other person may locate the lode. The occurrence of the lode outside of the placer, the outcrop of which does not extend directly up to the line of the placer cannot be assumed as sufficient evidence that the vein also exists in the placer, for it may not be presumed that the vein extends a foot farther than it can actually be traced. If the lode is opened directly up to the placer line the fact that it extends into the placer is demonstrated and the lode may be claimed within the placer location.

BAUXITE is a hydrous oxide of aluminum, essentially  $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ , and when pure contains 39.2% Al. It is the principal ore of aluminum and is produced in commercial quantities in Georgia, Alabama and Arkansas, the total for the year 1903 being 48,087 long tons, valued at \$171,306. Bauxite from France can be laid down at New York, Philadelphia or Baltimore, including the import duty of \$1 per ton, cheaper than the ore can be delivered by freight from the mines of the South or West. The French ores contain iron oxide, making it unsuitable for manufacture of aluminum sulphate, but are used to obtain aluminum hydrate, utilized in manufacture of the metal. Most of the bauxite consumed in the United States is for production of the metal, but over 25% is used in manufacture of chemical salts of aluminum. There were 14,889 long tons of bauxite, value \$49,684, imported during 1903.

WHERE the apex of a vein occurs on an agricultural patent, within a placer or on patented railroad land, the vein on its dip passes beyond the side line of such land, and the miner may sink a shaft and may locate a claim predicated upon the discovery of a vein in his shaft. This point of discovery may be properly considered a legal apex, and without doubt the discoverer may take 1500 feet along the strike of a vein so located, and he may pursue it on its dip to the full width allowed by law—300 feet from the center of the lode—but that he is entitled to take the extralateral right has not been determined by law. This is a matter upon which there has been no specific legislation, and, as the Supreme Court of the United States has never passed upon it, it still remains an open question. Such a discovery as above contemplated is not that of an apex in fact but is a discovery upon an arbitrary line on the lode some distance below the real apex.

IN the case of the claims located in Nevada, where A's claim was located across the lode and B's claim subse-

quently located along the lode, abutting upon A's west side line, B's claim would hold in law, as he has done sufficient work upon it in 1904, but it would be well for B to make an amended location, stating the facts in the location notice. The Nevada State law provides that "if at any time the locator of any mining claim shall apprehend that his original certificate was defective, erroneous, or that the requirements of the law had not been complied with before filing, or shall be desirous of changing his boundaries or of taking in any part of an overlapping claim which has been abandoned \* \* \* such locator, or his assigns, may file an additional certificate, provided that such relocation does not interfere with the existing rights of others at the time of such relocation, and no such relocation or the record thereof shall preclude the claimant or claimants from proving any such titles as he or they have held under the previous location."

THE direction of air currents in the natural ventilation of a mine is determined by the relative weight of two columns of air. One may be in a shaft, the other outside, or there may be two shafts connected below, their mouths having different elevations. During the day the air in the shaft and level, being colder than the outside air, has a tendency to fall and the deeper shaft becomes a "down cast." At night the outside air may become cooler than that in the mine, and the shorter shaft becomes a "down cast." At a time when the mine air and that outside have about the same temperature and density the ventilation of the workings becomes poor, as the air currents are almost at a standstill. It is for this reason that the smoke often hangs in mine workings when shots are fired in the early evening, or about sunrise in the morning, when the air currents are sluggish. Shots fired at midnight or at noon in the same workings will usually clear away rapidly, except on days when the atmospheric conditions render the temperature in the mine and outside about equal.

ALL forest reserves (not national park reserves) are subject to the operation of the mineral land laws; an owner of a valid and subsisting mining location in a forest reserve has the right to fence such claim, to carry on mining and agricultural pursuits on such claim, and to cut the timber thereon for actual mining purposes. In creating the forest reserves it was not the purpose of the government to antagonize the mining industry, but to protect the forest timber from destructive fires and other waste, that it might be used for mining and agriculture. Mineral claimants in forest reserves are also permitted to use water thereon. They may also take stone and timber from the general unoccupied reserve for use on the claim when the supply on the claim itself is inadequate. This privilege does not extend to corporations. Forest reserves are open for all proper and lawful purposes, including that of prospecting, locating and developing the mineral resources thereof, provided that such persons comply with the rules and regulations covering such forest reservations.

THE fact is well established that no rights can be initiated or acquired on the public domain by forcible entry when another is in possession. One can not hold public lands by mere occupancy, not complying with the requirements of the law. A location must be made according to law. The court decisions lead to the conclusion that if a person goes upon the unclaimed mineral lands of the United States and makes settlement thereon without complying with the requirements of the mining laws, and relies wholly upon the fact of possession and work performed, a second party may enter said lands and make a valid location, provided he does so peacefully and complies with all the requirements of the mining laws, and he is entitled to the possession of such mineral lands, to the extent of his claim, as against the prior occupant, who is from the time the second party has perfected his location and complied with the law a trespasser. The peaceable entry of the locator and the perfection of his location by compliance with the law, operates in law as an ouster of the prior occupant.

THE bessemerizing of copper matte in converters was suggested by the success of the Bessemer process in steel making. It is accomplished by blowing air into the molten matte, which has been drawn from the smelting furnace into the converter. The attempt was first made in steel converters, but when the copper began to separate from the slag, the tuyeres became clogged. Steel converters were eventually lined, after many experiments, with magnesite and other refractory substances, but with these materials the outside of the converter became too hot, due to the high conductivity of the lining, while the interior became too cold. It was finally found that the best lining consisted of crushed quartz— $\frac{1}{2}$ -inch to fine, all mixed together—with clay. These linings have constantly to be replaced, as in the combustion of the matte the formation of ferrous oxide occurs and this unites with the silica of the lining, rapidly destroying it. Numerous attempts have been made to introduce silica into the matte, to satisfy this demand of the ferrous oxide, but without success. Early in the experiments in this direction fine quartz sand was blown into the matte with the air blast, but the silica at once rose through the charge to the surface where it floated about in lumps, an infusible mass. The lining of converters is work requiring skill and experience. The converter lining at the Parrott works at Butte, Mont., weighs 9600 pounds for each converter.



## Quicksilver in Pan Amalgamation.

Written for the MINING AND SCIENTIFIC PRESS by W. J. ADAMS.

Some few weeks ago the writer was asked the causes of the flouing of quicksilver in pan amalgamation, but without specifying any local conditions. The question covered such a wide scope that it was thought advisable to take the subject up and try to explain all the causes for this condition.

In order to bring this matter clearly before the reader, not only must the condition and handling of the mercury be considered, but also the character of the ore, the method of operation and the personnel of the operative.

The difference in amalgamation between the process in pans and that on plates is so great that it is rarely that a man eminently successful in using the first will become proficient in battery amalgamation, while if plate amalgamation is thoroughly understood it will not be found so difficult to change the method to suit the new conditions.

The repeated failures of silver millmen to handle successfully any but the richest grades of gold ores are principally due to the employment of the quicksilver. Any good gold amalgamator will be as chary of adding the quicksilver to the ore beyond what the actual gold contents call for as a shipwrecked mariner of the contents of his small fresh water cask. He will watch the consistency of the amalgam on the plates and will add traps and other saving devices to his plant; will save all the dust from the floors, the iron scraps and screens from the mortars, and pan out the amalgam and mercury from them. He will keep everything clean (from grease particularly) and will periodically dress the plates, and always keep the quicksilver in the best possible condition. In spite of all this care, on the semi-monthly or monthly weighing it is always found that there has been an appreciable loss, so that it is a common saying that quicksilver disappears even from looking at it, while it is a well-known fact that the flow of clear water into a bowl of mercury will flour and carry away an appreciable amount, even though it can not be detected by the eye. When such a man takes charge of a silver mill, his watchfulness having become second nature, he stops every possible leak, because in gold work where quicksilver is lost so also is gold, and, though silver is of less value, the same logic must hold true. The gold man will probably fall into one error at first, but if he enjoys only a modicum of common sense he will rectify this in a very short time—i. e., where he formerly used a globule he must now employ flasks, and at first he cannot understand the necessity of this and employs far too little in each pan charge.

On the other hand, the silver man is accustomed to using these flasks with each charge, allows it to flow from pan to settler and from settler to straining sack, falling with a "plump" into each iron lid; hits the sack with a club occasionally, then dumps the contents into an iron car or vessel and throws it into the retort with a shovel. He has not time to thin the pulp in the settler between charges and never runs the tailings through traps or other saving devices. Take such a man and put him at battery amalgamation, and he is unique if he is even able to grasp the minute quantity to use, so that in general his plates are sloppy, his loss in quicksilver enormous (considering the quantity used), and in consequence it is found that only the coarse gold is saved, while even the silver of his copper plates has disappeared.

There is shown the personality of the operative, and it is one great factor in the loss of quicksilver in pan amalgamation.

In regard to the character of the ores, such a wide field is opened up that it can only be touched on in this article. Pan amalgamation is essentially a silver process, though the ores frequently carry a greater or less value in gold; but as a process on a gold ore, pure and simple, it is not commercially successful, and in general also not a success metallurgically, as compared with other well-known methods.

Silver ores that are amenable to this treatment can be divided into two general classes—free milling and rebellious. Free milling ores contain the silver either as native, chloride and bromide or sulphide. The ores become refractory when, in addition to the above, they contain arsenical and antimonial compounds, such as proustite, pyrrargyrite, stephanite and tetrahedrite.

In the first case the ore is crushed wet and amalgamated raw, while in the second it is necessary to crush dry and before amalgamating subject it to a chloridizing roast with common salt, so as to eliminate the arsenic and antimony and change the silver to chloride. In either case, even with the simplest ore, carrying only chloride of silver, it is found advantageous to add certain chemicals to the pan charge before adding the quicksilver, and the quantity and variety of these depend largely on the impurities in the ore, as well as the baseness of the silver minerals. These impurities are generally cerussite (the carbonate of lead), pyrolusite, or some other compound of manganese, and in the case of roasted ore the semi-sulphides and chlorides of lead and copper. The success of pan amalgamation depends on the proper use and quantity of these chemicals, which consist of sulphate of copper (bluestone), common salt, sulphate

of iron (copperas) and sulphuric acid. The ore must be studied practically with varying quantities and proportions of the chemicals, till the smallest amount is determined that will give the highest extraction of the precious metals. These chemicals must all be added to the charge and thoroughly incorporated before any quicksilver is used, or not only will the bullion be base, but from that fact quicksilver is floured and lost. Carbonate of lead will largely increase the amount of amalgam and put it in a shape which will prevent any close separation of the free quicksilver, even when strained hot.

(TO BE CONTINUED.)

## The Mother Lode in Tuolumne County, California.

NUMBER VI.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

Southward from the Mazeppa mine, last referred to, the lode is intersected by the canyon of Sullivan creek. The general and characteristic features of the lode are obscure in this section for a distance of over 2 miles. Some superficial prospecting has been done, but thus far no very valuable deposit of gold ore has been developed. Most of the land is held un-

west vein, which latter in some instances is fully 140 feet in width, and divided by a soft clay gouge, showing marked northwest movement from numerous striation marks. (See accompanying sketches.)

The middle vein, as a matter of distinction from the west or boulder vein, also contains sufficient value to be workable, while the west or boulder vein contains very little value.

The ankerite zone appears to be confined to the west vein, but is not as prominent as around the Rawhide mine and at Quartz mountain.

The so-called east vein is confined to the mineralization of the amphibolite schists composing the hanging wall of the middle vein. This mineralized zone is limited in lateral extent to the immense "blow out" of quartz forming the crest of Eagle hill, and owes its origin undoubtedly to fracturing accompanying dynamic occurrences and subsequent mineralization.

The east vein has been a source of considerable profit to the company and has a maximum length of 900 feet and a depth of 600 feet or more, the stopes in some instances being 50 feet wide.

There are no walls defining or confining the mineralization, a gradual feathering out and extended floors being characteristic features.

A continuation of this mineralization has been found by extensive diamond drilling to a depth of 1800 feet below the surface, showing that the fracturing is



Fig. 3.—Geological Map Eagle-Shawmut Mine.

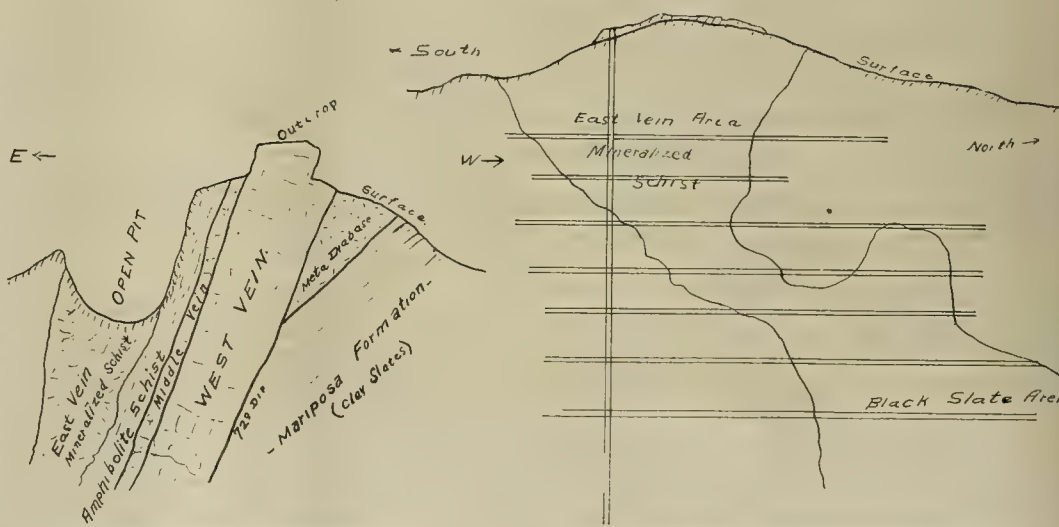


Fig. 1.—Cross Section Eagle-Shawmut Mine.

Fig. 2.—Longitudinal Section Eagle-Shawmut Mine.

der agricultural patent, which may in some measure account for the lack of activity on this portion of the lode.

The most important development next south of that portion of the lode previously described is in the properties of the Eagle-Shawmut Company, about 2 miles southeast of Chinese.

The country rocks are clay slate, amphibolite schist, diabase (intrusive), serpentine and dike rocks of more acid type than the greenstones. The most striking feature in the Eagle-Shawmut mine is the heavy wall-like outcrop of white quartz which forms a prominent object in the landscape.

The superintendent Charles Uren, says of these mines that the Eagle-Shawmut present quite a different geological condition from the mines to the immediate north, inasmuch as we do not work the west or "boulder vein," as it is locally known, operations being confined to what we term locally the middle vein and east vein.

Geologically, this so-called middle vein may be considered the mother lode, as veins are not always simple, following one line of fracture, but composed of a series of parallel veins.

The middle vein seems clearly of secondary origin, resting immediately upon the hanging wall of the

deep seated, yet not extensive, consisting of narrow bands of mineralized schist following closely the strike and dip of the schist.

The geological conditions are illustrated in the accompanying sketch showing surface geology. Fig. 1, a cross-section roughly showing underground conditions. Fig. 2, a longitudinal section for the same purpose.

Fig. 3 shows the surface geology immediately surrounding the shaft and mine proper, and also the open pit, or "glory hole," as it is locally known, which is excavated in the decomposed mineralized schist of the east vein, and is 500 feet in length, 100 feet wide and 100 feet deep, being connected by a series of chutes to the levels below connecting with the shaft.

Fig. 1 shows a cross-section taken through the open pit, and the relative position of each vein and adjoining formations.

Fig. 2 shows geological conditions of importance governing the working of the mine.

The east vein mineralization shows a connection on its strike with the middle vein, forming a continuous shoot in black slate laminated with quartz seams, this latter formation having a distinct northerly trend and extending to the lower levels of the





100-Stamp Mill, Eagle-Shawmut Mine, Tuolumne County, Cal.



Chlorination Works, Eagle-Shawmut Mine, Tuolumne County, Cal.



Old Mill and Plant, Eagle-Shawmut Mine, Tuolumne County, Cal.

mine. Development consists of twelve main work-levels, the lower of which is about 1900 feet below the surface, and operations are carried on at all points from the open pit to the lowest level. Below a point 600 feet from the surface all work is confined to the middle vein, and development shows little change in geological conditions, except, as previously noted, the east vein ceases to be an important factor.

**TREATMENT OF ORE.**—The ore contains about 4% sulphurets, and in milling the proportion of free gold is about 30%, the balance being in concentrates. The 100-stamp mill is operated by water power under a head of 900 feet and there are excellent facilities for crushing and handling the ore cheaply. (See accompanying illustrations.) The ore is crushed so as to pass a No. 2 punched tinned screen and the mill handles on an average 500 tons of ore a day.

Concentration is accomplished by means of forty 6-foot Frue vanners.

A chlorination plant having a maximum capacity of twenty tons per day, consisting of a mechanical and a hand reverberatory furnace, treats the sulphides by the barrel process, using a 10-ton and a 5-ton chlorinating barrel.

Costs of mining and milling, with a liberal depreciation, has been considerably under \$2 per ton for some time.

(TO BE CONTINUED.)

### The Laws Against Water Pollution.

A review of the laws forbidding the pollution of inland waters in the United States, which may be of practical benefit to the public, has been prepared by E. B. Goodell for the United States Geological Survey. It is published as No. 103 of the series of Water Supply and Irrigation papers.

The purpose has not been to prepare a complete work on water pollution for the use of members of the bench and bar, but rather to put into the hands of public officials, legislators, water companies, miners, manufacturers, farmers, and others interested in the subject, a guide for their action, and to furnish references to the sources from which a more exhaustive knowledge of the subject may be obtained if required.

No attempt has been made to present a detailed statement of the entire law against water pollution as it exists independently of statutes, but the broad legal principles under which anti-pollution statutes become operative are explained and important court decisions are quoted to show authority for various deductions. These principles and decisions have been classified and are presented in three groups:

(1) The rights of riparian owners to pure water as against one another.

(2) The rights of the public (as distinguished from individual owners) to have inland waters kept free from pollution by riparian owners or others.

(3) The conditions under which, and the extent to which, public municipalities may use inland waters in the disposal of sewage matter from public sewers.

The statutes enacted in various States are classified according to their general scope and an opportunity is thus afforded to compare their effectiveness and desirability. In some States there is nothing more than a simple provision making it a crime to poison wells and springs, while in others elaborate provisions have been made to check and, so far as possible, absolutely prevent all pollution of all waters by the refuse products of animal life or the waste of human industry. In citing the statutes, Mr. Goodell has grouped the States together logically to show the stage of growth in sanitary education at which each has arrived.

It is hoped that the publication and distribution of this paper will help to bring about a general apprehension of correct principles upon the important subject of water pollution.

THE Chinese problem in the Rand mines seems to have been solved, in a measure, the principal thing being the obtaining and breaking in of more coolies. On Oct 7 a ship with over 1400 Chinese landed at Durban, and three days later another ship having on board over 2000 more left Tientsin for South Africa. During September the number of laborers employed by the Rand mines was 68,545, of whom 9039 were Chinese. The addition of the 3000 referred to will aid materially in helping along the situation there. At a recent meeting of the Chamber of Mines at Johannesburg it was stated that the Chinese drillers who had commenced the first month of their employment by drilling an average of about 12 inches of hole daily, improved to 15 and 16 inches, and had further increased this rate by the middle of September to 28.1 inches, while many of the more expert men were drilling 3 to 4 feet per day. As among the workmen of all other nations in performing any class of work, the personal equation is a large one. Some of the Chinese drill after two months' practice but 21 inches, and from that there are those who drill as much as 54 inches in a single shift. The mine managers agree that the success of the experiment has exceeded their expectations. It is stated that by January 1, 1905, there will be upward of 40,000 Chinese laborers on the Rand.



## White Horse Copper Camp, Yukon Territory.

Written for the MINING AND SCIENTIFIC PRESS by W. M. BREWER.

Although volumes have been written descriptive of the northern Yukon country, but very little information has been given by the mining journals relative to the southern Yukon, of which the town of White Horse, situated at the head of navigation on the Lewes river, is the metropolis and distributing center.

This portion of the Yukon occupies the unique position of being the only section in that vast territory in which, up to the present time, have been discovered productive metalliferous lode mines.

The first discoveries of copper-bearing ore were made in 1898 by Jack McIntyre, a Klondike prospector. These are situated about 4 miles northwest from the present site of White Horse.

Because of the remoteness of the district at this early date, no systematic development work was attempted, but on the completion of the White Pass & Yukon Railway several prospectors commenced an

Valerie, 50 tons; and from the War Eagle a trial shipment. All of this ore was bornite, except that from the Valerie, which was chalcopryite, and the values obtained varied from 5% in copper, \$3.50 in gold, and five ounces in silver, to 46.6% in copper, \$2.00 in gold, eleven ounces in silver. The bulk of the ore ranged between 19% and 30% in copper.

It is only fair to the district to call attention to some of the difficulties with which these operators of limited means have had to contend. In the first place, all the ore so far hauled out has been transported from the mines to the railway in the winter months on sleighs, and because of the high cost for horse feed, and teamsters' wages, the rate per ton for even a 4-mile haul has necessarily been high, when compared with the prices paid for hauling in those sections to the south. This difficulty, however, can be easily overcome by the construction of surface tramways, the cost of which, owing to the easy grades from the mines to the railway, will be low. In fact, one proposition was submitted to the owners of the Grafton claim, to construct a tramway for horse haulage for \$3800. Of course this meant wooden rails. Another difficulty was the fact that the men working in the mines, even in the dead of winter, would quit work suddenly to stampede to some newly discovered placer camp, no matter how far distant. As the camp becomes more settled

eral contact between limestone and igneous rocks are concerned, this zone or belt practically maintains continuity for its entire length.

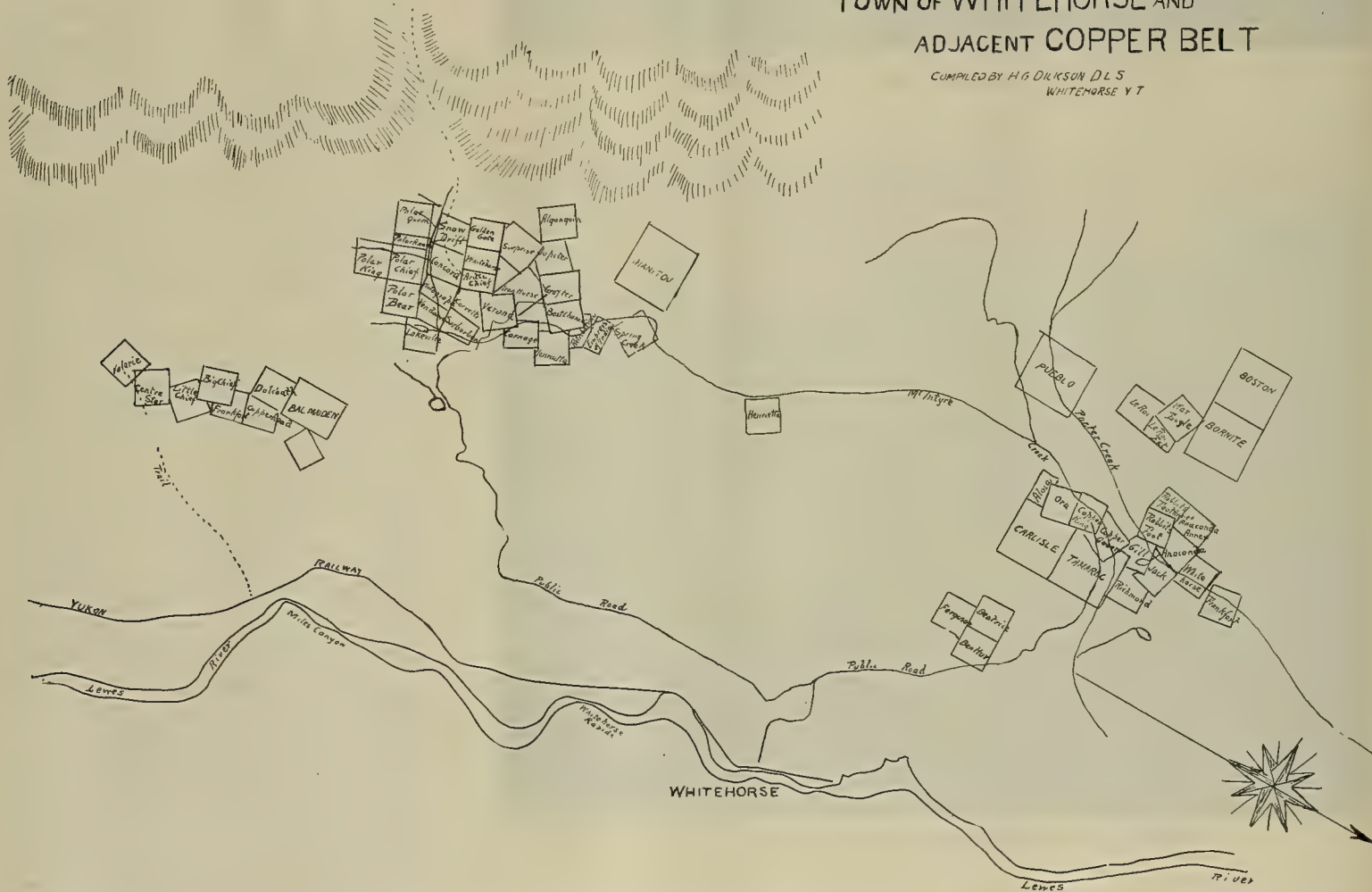
In many places along the Lewes river, especially from Miles canyon to the foot of White Horse rapids, the geology of that portion of the district can be easily studied because of natural exposure, but west from the river, and between it and the copper belt these exposures are seldom met with, consequently any attempt to map the geology in this intervening space, which averages about 3 miles in width, would lack much accuracy in detail.

The topography of that section, including the copper belt and the intervening space between it and the river, is a slightly rolling plateau, with all the indications that at some remote period it formed an inland sea, from which the waters have receded until at the present day such are confined between the banks of the Lewes river.

The rock formations occur in the following series: Basalt, in the vicinity of Moles canyon and other points along the river; west from the basalt, a belt of granite and granitoid rocks, the exact area covered by which it is impossible to estimate, because the natural exposures are few, and because so much of this portion of the country is covered by glacial moraine; next in the series is found a belt of crystalline limestone of variable width, then garnetite and

## TOWN OF WHITEHORSE AND ADJACENT COPPER BELT

COMPILED BY H. G. DICKSON D. L. S.  
WHITEHORSE Y. T.



earnest effort to develop the claims they had staked previous to the building of the railway.

In the fall of 1900 the first sample shipment of ore was sent from the Copper King mineral claim (the discovery claim of the district) to the smelter at Everett, Washington. There were about eight and one-half tons of bornite ore, mined from within 20 feet of the surface, the copper values in which, according to the smelter's certificate, was 46.6%.

For various reasons, however, one of the chief being high freight rates, no further shipments were made from this camp until January, 1903, when a through rate from White Horse to the B. C. smelters was arranged. As a result of the granting of this concession, serious attempts were made to develop the Copper King, Arctic Chief, Grafton, War Eagle and Valerie mineral claims. But as all the capital employed was local, the work was not prosecuted as extensively or as continuously as would have been the case had corporations possessed of large capital been operating the properties. For this reason, every allowance must be made for the comparatively limited extent of the development work, which will be referred to in detail later in this article.

Up to the present time the following shipments have been sent out to B. C. smelters: From the Copper King, about 400 tons; from the Grafton, 150 tons; from the Arctic Chief, 150 tons; from the

though, most of the difficulties which have had to be contended with in the past will disappear. The railroad company and the smelters are to-day co-operating to such an extent that, even in this far distant camp, ore of a uniform value of \$15 per ton can be mined, freighted and treated at a profit, if it is shipped in bulk, and close hand sorting is not found necessary.

**GEOLOGY.**—The White Horse Copper Belt, as the mineralized zone in which the copper ores occur is locally designated, extends in a general direction from south to north for a distance of about 16 miles. It is situated westerly from the Lewes river, having its trend or line of strike nearly parallel with the channel of the river. So far as at present known, the width of this copper ore bearing zone varies from about 1 mile to nearly 3 miles, the maximum width being reached near the northern extremity. (See accompanying map.)

Owing to the fact that in many places along this zone, rock in place is not exposed by nature, but is hidden by glacial moraine and wash gravel, any map of the district will show spaces of variable extent, on which no mineral claims have been staked, but a careful survey along the line of strike of the mineral bearing zone will determine that so far as outcrops of copper ores, or of garnetite associated with iron ore, indicating the presence of copper, and the gen-

felsite (it is at the contact between these two rocks that the copper ores usually occur); to the west of these rocks granite dikes occur as intrusions, and apparently mark the western boundary of the copper belt. Beyond and to the west of the limits of this mineral bearing zone there is a range of hills which, so far as the writer's observations have gone, is made up of a much altered quartzose rock, and beyond this, conglomerates and sandstones of the Cretaceous era in which occur several workable seams of coal.

As the igneous rocks all occur as intrusive dikes and masses, there is necessarily much irregularity with regard to the shape of the ore bodies. These are all lenticular in structure, are of variable extent, and the lines of strike, although having a general trend from south to north, conformable with the trend of the country rock, vary in portions of the belt, sometimes being a few degrees to the east of north, and at other times a few degrees to the west.

A superficial geological survey of the copper belt impresses one that apparently similar conditions prevail with regard to the ore body, as are found on Texada island, situated in the Strait of Georgia, between the mainland of British Columbia and Vancouver island, and also to some extent similar to those found in the Bisbee district of Arizona. So far as magnitude is concerned, sufficient development



work has not yet been done in the White Horse Camp to enable the writer to predict what the conditions in this respect will eventually be determined to be. The high grade of the ore in copper values, as well as the fact that grade holds good from the grass roots down, and is found to be fairly uniform from the foot to the hanging wall side of the various deposits on which serious development work has been attempted, should make the field a very attractive one to operators who are conversant with the geological conditions which prevail.

When the first development was attempted on Texada island that camp was adversely reported on, yet since then, on three different properties situated in close proximity to each other, development has been carried down to a depth of 600 feet, to which depth the ore bodies are found to maintain their continuity, and on that level the showing is such as to warrant the assumption that they are persistent to a much greater depth.

Apparently at some portions of the White Horse Copper Belt the mineral zone has been thrown either to the east or to the west, through faulting, but at the northerly end of the zone a much greater width is shown than towards the south end, there being three parallel zones of an aggregate width of nearly three miles. At some other portions of the belt there are apparently local duplications, because, take for instance on the Grafton mineral claim, crystalline limestone forms the foot wall to the ore body, but on the adjoining claim to the east the limestone is on the hanging wall side. However, there has not yet been a sufficiently close survey of the geology attempted to describe it in detail with any degree of accuracy.

So far as the genesis of the ore deposits is concerned, no attempt has yet been made to determine whether replacement has been the controlling influence, or some other cause. One feature is very noticeable, which is that almost invariably the highest grade ore is found next to the limestone, which is fully crystalline, from metamorphism. Another is that usually the dip of the limestone is variable from about 30° to 70°, owing to the wave lines, caused by its solubility. Another is that, so far, on none of the prospects on which considerable development has been attempted has any well defined hanging wall been exposed; the solid ore usually grades into ore with tremolite, garnetite, or felsite for its matrix; next into garnetite or felsite, in which are found grains, crystals, and masses of ore as impregnations; next we find entirely barren garnetite or felsite, followed by granite or granitoid rocks.

On the Arctic Chief mineral claim the area covered by outcroppings of magnetite, with impregnations of bornite, had not been fully determined by stripping at the time of the writer's last visit in May, 1904, but an open trench had been made about 60 feet in length, and about 10 feet in width, which showed outcroppings to be continuous to that extent.

The development work at that time consisted of about 150 feet of tunneling and 35 feet of sinking below the tunnel level. An ore body had been intersected at about 70 feet from the portal of the main tunnel, and a crosscut started from this point showed a body of solid ore (magnetite and bornite) 22 feet in width. On the supposed foot wall a winze was sunk about 35 feet in ore, but at the bottom the magnetite had given place to garnetite.

During the progress of this development work 400 tons of ore were taken out, but no overhand stoping was done. About 125 tons of ore were shipped during the winter of 1904, but further shipments were suspended owing to the excessive cost for sacking and hauling on sleighs to the railroad.

On the Grafton mineral claim, situated about 1500 feet in a northerly direction from the Arctic Chief, a working shaft has been sunk to a depth of 72 feet, and a level opened at about 60 feet, on which about 200 feet of tunneling has been driven, 150 feet being deadwork paralleling the ore. On this level an ore body was crosscut 12 feet 6 inches in width and drifted on 51 feet. One hundred and twenty-five tons of ore were taken out and shipped, there still remaining about 250 tons on the dump, of which a part is clean, solid ore, and the balance ore mixed with some waste. Active operations were suspended on this mine, notwithstanding that the bottom of the shaft and both faces of the drift were in ore of a grade sufficiently high to pay a profit if transported to the railroad on a tramway.

On the Copper King mineral claim, about 4 miles northerly from the Grafton, the ore body, which is made up of bornite and chalcocite in a matrix of tremolite and felsite, has been followed to a depth of about 200 feet on its dip. A vertical shaft has also been sunk to a depth of about 60 feet on an ore body which is apparently a distinct lens from that on which the incline shaft has been sunk. No indications are apparent other than that the ore bodies are continuous to an undetermined depth below that already reached. From this mineral claim about 400 tons of ore in the aggregate have been shipped.

On the War Eagle claim, situated about 1 mile due west from the Copper King, an ore body has been exposed and sunk on to a depth of about 30 feet, while on the Rabbit's Foot mineral claim, situated between the Copper King and War Eagle, an ore body has also been opened. These occurrences of ore lie almost parallel to each other, and demon-

strate that this portion of the belt is wider than farther towards the south.

About 8 miles in a southeasterly direction from the Copper King mineral claim is located the Valerie, together with several adjacent claims. The ore bodies on these apparently occur in a parallel zone to what may be termed the main zone. There are two features peculiar to the occurrence of ore on the Valerie claim, which indicate that this ore body occurs in a distinct belt from that in which occur the ore bodies on the Arctic Chief, Copper King and other claims. The first of these distinctive features is that all the ore is chalcopyrite instead of bornite, which predominates on the other claims. The second is, that there is apparently no felsite in contact with the crystalline limestone, but instead a pyroxene rock closely resembling diabase. A third is the fact that the occurrences of ore on the Valerie and some of the adjoining claims are found very much nearer to natural exposures of basalt, than is the case in other portions of the White Horse camp.

On these last mentioned mineral claims crystalline limestone forms the hanging wall to the ore bodies instead of the foot wall, as is usual in other portions of the belt.

The White Horse camp is favorably situated as regards transportation facilities all the year round, and mining operations can be and are carried on during the winter months without interruption by reason of extreme cold or snow.

## The Granite Hill Mines of Southern Oregon.\*

[FROM A STAFF CORRESPONDENT.]

The Granite Hill mines of the American Gold Fields Company of Chicago, Ill., are on Louse creek, Siskiyou mountains, 8 miles from Grants Pass, Oregon. Deep sinking and the reduction of ores by improved and up-to-date machinery are rapidly changing the status of affairs in mining in Oregon; gold quartz mines are in demand and mining engineers are investigating for capitalists.

The development of the Granite Hill mine was desultory and unsatisfactory and with frequent change of ownership; but five years ago the property came under the management of C. L. Mangum, who, with a few associates, expended thousands of dollars in development, aided by a 5-stamp mill. Before and at this time three arrastras were in use. The showing made two years ago determined the company to purchase the entire property for the American Gold Fields Company of Chicago, of which W. J. Morphy is general manager.

Since that time development has been constantly pushed; systematic and modern equipment has superseded primitive methods. There are 1200 acres of mineral land in the holdings, upon which there are seven distinct veins, occurring in two formations. The contact passes through the center of the property and has an east and west strike, which is parallel to the strike of the Granite Hill vein. Nearly all of the veins thus far developed strike east and west, with the exception of the Red Jacket and High Tariff, which have a nearly north and south course. On the northeast and lying against the granite is a dike of highly mineralized diorite.

Granite Hill is an almost solid body of granite, surrounded by diorite, with true fissure veins cutting through. The main ledge, upon which are the principal workings and improvements, is from 3 to 6 feet in width, with a dip of about 30°. The ore outcrops at the surface near the mill and can be traced continuously for 1000 feet, and, at intervals, for 2 miles. In development the ore is encountered in shoots of 50 to 100 feet or more. The vertical shaft is of two compartments of equal size, giving sufficient room for the pump and air line in one and ample room for the cage in the other. In sinking the shaft the ledge was cut through at about 160 feet, and a mill run of 100 tons at this depth gave \$9 gold on the plates. The ore of this shoot was heavy in galena, with free-gold quartz in close proximity. At the 207 level a station was cut in the shaft and drifts run 250 feet east and 350 feet west. On the 307 level drifts are run 100 feet west and 50 feet east. On the 107 level the drifts run 200 feet east and 100 feet west. Upraises at different points in shoots of ore connect the different levels, thereby giving good ventilation. The ore treated at the mill has been mostly from development until recently, when stoping began east and west of the upraise in a shoot of ore in the second level.

At a depth of 230 feet in the shaft a water course was cut, which necessitated driving a crosscut 20 feet north of shaft and cutting a sump to hold 10,000 gallons. Beside the No. 9 pump which was first installed, a second No. 9 pump is in position, pumping 150,000 gallons per day, and is capable of doubling that amount. The vein of the Granite Hill is a ribbon quartz, carrying galena, iron and copper sulphides, with considerable free gold, the greater values being next to hanging wall. The average value, as de-

termined at the mill from the combination of the ore of the Red Jacket and Granite Hill mines, is about \$20 to the ton and assays of the tailings give 90 cents to the ton.

To the south of the Granite Hill shaft, 2000 feet, are the workings of the Red Jacket property. The vein is from 18 inches to 3 feet of mixed diorite and quartz, both walls being defined. This is intersected at intervals by cross fractures which form the ore shoots. The ore is free milling, with very little sulphurets. This ore will mill five tons to the stamp daily and is mixed with that of the Granite Hill sulphurets ore. Development consists of a 350-foot tunnel, a 75-foot and a 40-foot upraise, and a winze being sunk to 100 level, a 20 H. P. boiler and a self-dumping skip. At an early date an aerial tram will be placed between the Red Jacket and the mill on the Granite Hill claim. A sawmill is cutting 6000 feet of lumber and mining timber per day. On the 1200 acres is a large amount of timber.

The head-frame and skip shown in one of the illustrations on the front page was erected a few weeks ago at the Red Jacket mine and is giving excellent satisfaction. The head-frame is erected at the collar of an inclined shaft and does service for both prospecting and operative work. The double-compartment shaft is heavily timbered, though only one compartment is thus far used. It is calculated that the head-frame will serve all purposes to a depth of 1000 feet, and even to greater depth, when a more powerful hoisting engine is installed later.

The head-frame is simple and durable. It is built of 10x10-inch squared timbers of tough yellow fir, tied with 3/4-inch iron rods and bolts. The formation of the mountain side at the collar of the shaft is very firm, affording a solid foundation, the hill being graded for the purpose, dispensing with the necessity of a concrete foundation.

The two main posts of the frame, which continue above the collar of the shaft, are at the same angle as the shaft. The posts are set well apart, to give ample room for the skip dump and a wide platform for loading and unloading timbers and other materials.

The entire mechanism is operated by one man, who serves also as engineer and fireman of the hoist engine and boiler. There are two automatic, or self-dumping, arrangements, one each for ore and waste. By a signal from below, the engineer knows whether ore or waste is coming up, and, by throwing in or out the short-hinged section of the skip track on the head-frame platform, the dumping point of the skip is fixed, either for the waste pile or the ore bin.

In addition to their quartz mines, the placer ground of the American Gold Fields Company embraces about 400 acres in a basin between the Granite Hill and Red Jacket workings and may be worked by hydraulic method. To make this deposit available it will be necessary to drive a bedrock tunnel along the bed of an ancient river channel a distance of 1500 feet and this will be done next year. It will tap the basin at its lowest depression and give an outlet to the debris from the hydraulic plant. Test shafts have been put down at various points.

The Greenback mine is also in Josephine county, Or., on Grave creek. In July, 1897, two months after its location, specimen ore was found in a feeder to the main vein and an arrastra was put to work. During the following year the owners took out about \$2000 per month. In the early development the main vein was opened by four levels, the lowest 175 feet below the surface. In 1898 the property was bought for W. H. Brevoort of New York and D. Moffat & E. Smith of Denver, Colo. The whole control and ownership is now vested in Mr. Brevoort. The opening to the vein at the old mill is by a 275-foot crosscut, cutting it at 500 feet on its dip. At the new mill the 9th level tunnel follows the ledge, and by upraises and winzes the several levels to the 1200 will be connected and all ore will be taken to the mill through this tunnel. Sinking is also being vigorously pushed from the 1200 level. This mine has a pay shoot 700 feet long, the values being uniform and comparatively high. It is developed on the 500 and 900 levels. The ground above the 500 level has been stoped out. The quartz is mixed with filling, giving the ore a mottled appearance. The pay ore occurs in a series of lenses, usually on the hanging wall of the fissure. The distance between walls ranges from 3 to 5 feet. The ledge has an east-west strike and is in greenstone. The value of the ore as treated is \$12 to the ton. There are seven veins in various stages of development beside that of the Greenback proper. The walls are from 3 to 6 feet apart, the values being principally in small stringers of high-grade ore, in connection with tellurium. The tendency of the Greenback ledge is to show richness in spots and at the same time carrying values throughout the pay shoot. The 200-foot winze sunk from the mill level gives a total depth on the vein of 1100 feet, and the proportion of gold saved on the plates at this point is as great as on the ore from higher levels. The percentage of sulphurets in the ore does not exceed 1%. The equipment comprises the old mill of 10 stamps, the new mill of 30 stamps, Wilfley concentrating tables and a cyaniding plant of 1000 tons daily capacity. The mine and plant is lighted by electricity, the drilling is done by machinery and ore is blocked out for four years' steady run of the milling plant. C. W. Thompson is superintendent.

\* See illustration of mill on front page.



## Geology of the Treadwell Ore Deposits, Douglas Island, Alaska.\*

NUMBER V.

Written by ARTHUR C. SPENCER.

**GENERAL DESCRIPTION.**—The occurrence of the albite-diorite dikes which constitute the Treadwell ore bodies has already been given. The ore consists mainly of rock impregnated with sulphides, principally pyrite, and in part shattered and filled by reticulating veins of calcite and quartz, which also carry sulphides. The ore bearing dikes are considerably mineralized throughout, and often the whole mass can be mined. Locally, however, the values are too low to pay for extraction and portions of the rock must be left.

Three sorts of ore are recognized by the miners—"quartz," "brown ore" and "mixed ore." The so-called quartz ore, which constitutes the bulk of the workable material, is essentially mineralized diorite, but it usually contains calcite and quartz, the former disseminated or in veins, the latter only in veins. As a rule, its color is white or light gray, but in many places it has a greenish cast. The brown ore is derived from a comparatively small amount of productive mineralization occurring in the walls or in the narrow horses of slate, where the presence of gold-bearing sulphides is commonly recognized by a brown color, which leads to the popular designation of this ore. The brown material grades into the ordinary black slate, and its color is apparently due to decarbonization of the carbonaceous rock by percolating sulphide solutions. Impregnation of the slate is by no means always present, and where it occurs it seldom exists for more than 2 or 3 feet from the walls of the main ore mass. The mixed ore, which is more abundant than the brown, is composed of slate intricately intruded by small dikes of very fine-grained diorite, the whole being impregnated with sulphides in the same way as the ordinary ore.

The value of the material mined varies from, say, \$1 to \$5 and even \$10 or more per ton, though in the course of development a great deal of less valuable rock is extracted, and in working the open pits large amounts of worthless slate must be moved, much of which goes with the ore to the stamps. In general the average value of the rock has been a few cents over \$2 for the past two or three years. From 60% to 75% of the gold is free milling, and the concentrates, which the mill records show to be about 2% of the material treated, assay from \$30 to \$50 per ton.

**SHAPE OF THE ORE BODIES.**—The impregnation of the dikes in which the ore occurs is, for the most part, so general, and the presence of at least small amounts of gold is so constant, that it is impossible to recognize any well defined masses which may properly be distinguished as ore shoots. Though the values are by no means uniformly distributed, from the assay plan they do not appear to occur in any regular way, and, indeed, the distinction between ore and rock too lean to pay for extraction is often the matter of only a few cents. The actual differences in gold tenor of several contiguous samples taken from the ore are usually much greater than the difference between the average of any considerable block of ore and the contents of intervening masses of poor rock. In several places mere joints or seams may be noted separating the ore and the poor material, and it frequently happens that blocks of the latter, which show assays from a trace up to \$1, are entirely surrounded by ore averaging \$2 or more. Structural limitations, such as joints, however, are difficult of observation, because the sides of the drifts are everywhere covered with dust.

In general, the best ore is that which contains the greatest number of quartz and calcite veinlets, and though their absence is not an infallible indication of valueless material, it seems that the irregular distribution of the gold has resulted mainly from original differences in the amount of crushing and the consequent varying permeability of the rock. Where the metasomatic replacement of the diorite by secondary albite is absent, the sulphides usually replace such minerals as hornblende or mica, and it is suspected that in these cases the gold content is ordinarily low.

In planning the position of stopes the assay charts often enable locating the pillars in relatively poor material, but as a rule the low-grade rock is not found to persist for the whole distance between two mine levels. The largest masses, which have been left because of their leanness, are on the foot wall side of the south dike in the Treadwell workings, but even here there are great variations in the gold tenor at different places. On the 110-foot level all the rock was minable. On the 220-foot level from 10 to 40 feet of low-grade stuff was left on the foot, excepting for a distance of about 150 feet. On the 330-foot level good values were found up to the slate, excepting for 200 feet along the west end, where 20 feet or so were left, while on the 440-foot level not over half of the rock gave assays over \$1. The relative position of the high-grade and low-grade material is

shown in the plan of the 440-foot level and in section 16 given in Figs. 10 and 11.

**PERSISTENCE IN DEPTH.**—The ore dikes have been developed along the dip for a distance of, approximately, 1000 feet in all three of the mines now operated. The Treadwell workings reach about 700 feet below sea level, the Mexican 600 feet and the Ready Bullion 800 feet. In no case has it been possible to make out any progressive change in the character of the ore as depth was attained. The assay charts show the ore in the lowest levels to be quite as good as in the upper workings, and it is evident that variations along the dip are not greater than those observed from place to place along the strike. It is true that the mine records for a period of years show a gradual decrease in the per ton value of the material which has been treated. This is especially noticeable in the case of the Treadwell mine, which has been the longest in operation, but it is the result of increasing the tonnage by mining low-grade rock, rather than an indication that the average value is decreasing with depth.

It seems fair to assume that the ore will continue to at least a considerably greater depth without important change in average value. There is nothing in the character of the ore to indicate any important secondary concentration of values by oxidizing waters near the surface. On the other hand, the characteristics of the deposits are believed to indicate that it was formed in its present condition by the direct action of ascending waters. If this idea is correct, there can be little doubt that the mineralization and the values will continue to a much greater depth than has been reached, and it may be fairly anticipated that the limit of deep mining will finally depend more upon increased costs attendant upon hoisting and pumping than upon the exhaustion of the ore.

**VEINING IN THE ORE BODIES.**—In almost all parts of the Treadwell deposit reticulating veinlets of calcite and quartz are prominent features of the mineralized dikes. The veinlets are often composed entirely of calcite, but this mineral is usually accompanied by quartz, though the latter seldom, if ever, occurs by itself. The veinlets are rarely more than a few inches in width; many are only a fraction of an inch across, and the microscope shows the presence of minute fracturing between the veins visible to the naked eye. The veins are usually closely spaced, and an estimate based on a study of all the mine workings indicates that infiltrated materials make up nearly one fifth of the mass of the ore.

The boundaries of the veinlets against the enclosing rock are sometimes distinct, but in many cases there is an apparent gradation from the vein matter into the altered diorite. When the amount of introduced minerals is large in proportion to the mass of the matrix, in small specimens it is difficult to distinguish the vein stuff from the rock, though in large fragments or on the stope faces the general extent of the different portions of the ore material is exhibited. The microscope shows that the merging of the interstitial veinlets with the rock which they cut is due to the penetration of the latter by calcite, which is intercrystallized with secondary albite, formed at the expense of the original feldspar.

Veinlets traverse the rock in different directions, but the greater part of the filling occurs in fissure-like openings constituting two well-marked systems. One set of fractures strikes and dips approximately with the structure of the enclosing slates; the other, which is the more prominent, strikes slightly oblique to the structure of the country and dips in the opposite direction—that is, toward the southwest.

In places where the mineralized dikes are narrow, the set of fissures parallel to the country structure usually diminishes in importance, and often only the cross-fractures have been developed. This may be explained upon the supposition that the tendency to motion parallel to the walls of the intrusions was taken up outside of the massive rock in the slates, while the transverse strain affected both the slate

the diorite (Fig. 12). Throughout the mines it is the rule that all transverse gash-veins stop at the walls of the diorite, and while there are a few exceptions the quartz seldom penetrates the country rock to any great distance, and when it does it diminishes rapidly in thickness. However, this is not always due to the non-continuance of the fissures, for they may be frequently observed continuing from the diorite into the slate in the form of well-marked joints.

**GANGUE MINERALS.**—Feldspar, calcite and quartz are the three important non-metallic minerals of the Treadwell ores. Part of the original feldspar of the intrusive diorite remains in the ore, and with a considerable amount of secondary feldspar forms the principal gangue mineral. Other minerals of the unaltered rock were hornblende and mica, but these are present in relatively small amounts, as is also epidote, which has been formed as a product of alteration from them. Calcite and quartz occur in veinlets penetrating the diorite, and make up perhaps one-fifth of the material which is mined. Calcite is also found disseminated irregularly in the more altered parts of the diorite, unaccompanied by quartz. When sulphides and calcite are both present, they are almost invariably in contact with each other, but the secondary feldspar also carries a great deal of pyrite.

The occurrence of ferruginous calcite is common in the superficial workings, where it may have been formed by the action of iron-bearing solutions upon the primary calcite of the deposits. It occurs also in small amounts in deeper parts of the mines, where it is possibly an original mineral. A small amount of pink carbonate, probably a mixture of calcite and rhodochrosite, has been observed in the open pits of the Ready Bullion.

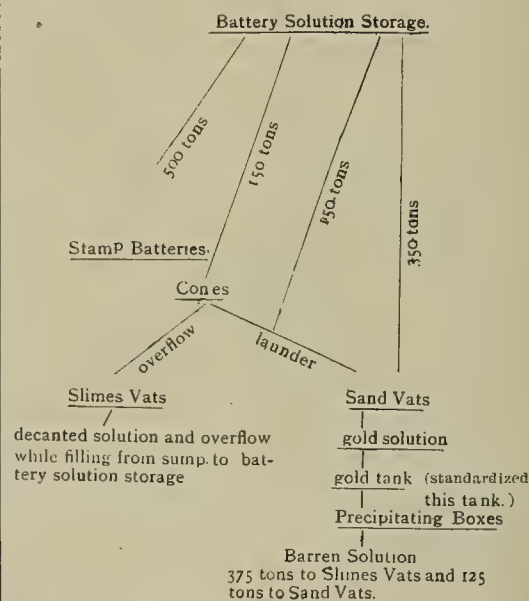
(TO BE CONTINUED.)

## Crushing in Cyanide Solution as Carried on in the Black Hills, S. D.\*

NUMBER VII.—CONCLUDED.

Written by C. H. FULTON.

DISTRIBUTION OF SOLUTIONS AT THE MAITLAND MILL.



**THE PRECIPITATION OF THE VALUES.**—In general no troubles in precipitation are encountered in the form in which the process is employed at the present time. In the earlier practices of the mills, when decanted slimes solution was passed through the zinc boxes with the idea of keeping the battery solution practically free from gold values, trouble was experienced by getting a very bulky and low-grade precipitate on account of the accumulation of fine ore slimes in the boxes, but in the present practice this trouble is avoided as described. At the Dakota and Horseshoe mills precipitation is carried on in barrels. These, at the Horseshoe mill, are 2 feet in diameter and 2 feet high, holding 5 cubic feet of zinc, or 25 pounds. One hundred and twenty of these barrels are in use. The barrels can be readily taken up on a pulley gear running on a trolley and conveyed to the cleanup tank for discharge and cleaning. At the Horseshoe mill, where 225 to 250 tons of ore are treated per day, 1000 tons of solution are precipitated every twenty-four hours. The zinc consumption is 1 pound per ton of ore treated. At the Hidden Fortune and the Maitland mills precipitation is carried on in the usual form of iron zinc boxes. At the Maitland mill, treating 120 tons per day, there are boxes of eight compartments each, the compartment having a capacity of 7 cubic feet of zinc. From 450 to 500 tons of solution are precipitated every day, there being 2.13 tons of solution for each cubic foot of zinc. The solution entering the boxes is kept at 2.5 pounds of cyanide per ton, for a lower tenor

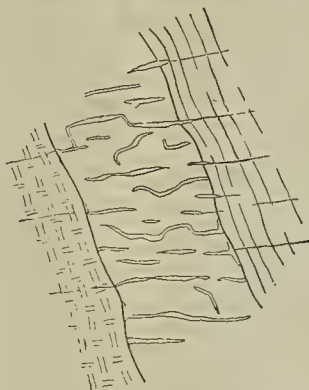


Fig. 12.—Dike of Albite Diorite.

and the intrusive rock, the latter being specially susceptible to cross-fracture because of its small mass and brittle nature. Cross-fractures, filled with vein stuff and limited to a narrow dike in the slates, may be seen to good advantage at the east end of the Ready Bullion pit, near the southernmost outcrop of

\* Abstract Am. Inst. Min. Engs.

\* Bulletin No. 7, South Dakota School of Mines.



causes trouble by copper precipitating, which the solutions carry to a small extent. The zinc consumption is 0.3 of a pound per ton of solution precipitated and 1.33 pound per ton of ore treated.

**TREATMENT OF THE PRECIPITATES.**—The precipitates are refined at all of the mills by the usual sulphuric method into bullion, which is disposed of to the United States assay office at Deadwood. The fineness of bullion varies at the different mills, as the silver contents of the ores vary considerably. However, at most of the mills the bullion produced ranges between 400 and 600 fine in gold. In order to dispose of the bullion to the Government assay office at Deadwood, the bullion must have a minimum fineness of 600 in gold, and at some of the mills in the smelting of the precipitates a matte is purposely formed so that the resulting bullion will be above the minimum limit. The slags from the smelting of the precipitates are disposed of to the smelters at Denver, although at the Horseshoe mill the slags and matte from the smeltings are refined by melting with litharge and cupelling the resultant bullion.

**GENERAL EXTRACTION FIGURES.**—The extraction at the mills varies from 68% to 75%, according to the ores treated. At the Maitland mill, where the extraction is 73.2% and where approximately half the ore is treated as slimes and half as sands, the extraction is distributed as follows: In the batteries and cones, 39%; in the slime treatment, 16.5%, and in the sand treatment, 17%. As a general thing the recovery of bullion is either 2% or 3% higher or the same amount lower than the assays of the ores, tailings and solutions call for.

**THE COST OF TREATMENT.**—The following is the detailed cost of treatment at the Dakota mill during a period in 1902. The average value of the ore was \$4.70 per ton:

	Cents.
Labor	45.3
Superintendence	9.0
Cyanide	21.1
Zinc	3.3
Slime	1.2
Power	22.6
Shoes, dies, etc.	9.5
Repairs	2.7
Refining	3.0
Assay office	4.0
General expense	5.0
Total (\$1.27 per ton)	126.7

The mill during this period treated 100 tons per day. The cost at the Dakota mill, owing to a somewhat increased capacity, has been reduced to \$1.17 per ton.

The cost at the Maitland mill (treating about 125 tons per day, and which is not situated on the railroad, so that the cost of supplies is considerably increased) is \$1.79 per ton. The cost at the other mills ranges between the costs at the two mills given.

**Inexperience in Mine Management.**

**TO THE EDITOR:**—There has appeared from time to time in the columns of your journal protests against the error of appointing men to the management of mining and milling property who are untrained in the necessary branches of science underlying this work, and while perhaps no one hopes to immediately stamp out this fallacy, still all that can be done should be done to lead the investor, whether he be from the East or West, to consider well who is being placed in charge of his property.

The Western investor is a man who is usually familiar with mining, and therefore selects a man

who is experienced, but how is it with the Eastern man? No man who has been long engaged in active mine or metallurgical work has escaped the nephew or son of some president or director in the East who has tried and failed at law or medicine, or has, perhaps, been a postmaster. He comes with the belief that the payment of low wages and purchasing of cheap supplies is the whole matter. The result in most cases is the mine fails to pay. He makes one or two characteristic efforts, such as attempting the concentration of telluride ores, and then our friend goes back to his home in the East and enlarges to his constituents upon the uncertainties of mining. He passes over the field of possibility and does not discover that the mere execution of business is insufficient; that his endeavors involved the principles of pneumatics, hydraulics, mechanics, physics and chemistry. Then out will come some doctor of medicine, whose knowledge of chemistry usually stands in his own light, and a man who believes that the amount of gold in a ton of ore can be increased by some mysterious operation suggested by this or that fakir, and in evidence of his good faith he will spend his people's money, and when the process fails—for want of a little more money for further experimentation—he, too, will fold his tent and retire disappointed, but filled with rare ideas of the possibilities of the industry.

One will find all sorts of absurdity expressed and practiced. A tanner will say that cyanidation is just the same as tanning—the bark is leached in exactly the same manner as the ore. You will be told that in a system of water pipes, under static conditions, the closing of a valve one-half will reduce the pressure one-half in the side opposite the initial pressure. You will be told that the power developed by a water wheel depends upon the size of the wheel—force and volume not considered. You will see a concentrating table drawing a streak of mineral—one-half being saved and the other half being discarded. You will hear that the cheapest power is electricity and that the time is coming when all power will be electric, etc.

It is not my wish to belittle the knowledge of these men; they are as important in the commercial world as the miner; they are men of business ability, but they are not men who will be successful as mine managers until they have learned what is axiomatic, "that to succeed in business one must understand that business, its underlying laws and principles." Mining involves more than the usual business routine. In fact, a great number of natural laws are involved, and it follows that a knowledge of these is essential to successful operations.

Mining is looked upon by many as a gamble, a game of chance, and it ever will be so long as inexperienced men are to direct its operations. Any enterprise is one of chance so long as its governing laws are not understood and observed, and as a corollary it follows that when these laws are understood and observed the operation becomes one of exactness.

We speak of the value of experience, and experience is the final court, but let it be remembered that

men gain experience in proportion to their scientific training.

Mining is a beneficent avocation, for its products are added to the world's wealth. Mining is not a gamble and it should not be so considered, for the number of uncertain factors are no greater than in other lines of industry.

MINE MANAGER.

**Little Giant Drill Sharpener.**

The illustration herewith is that of the Little Giant drill sharpener manufactured by T. H. Proske, 1734 Fifteenth street, Denver, Colo., designed to meet the demand for a one-man drill sharpener, as there are many mines that do not use to exceed 350 drills per day. According to the manufacturer, one blacksmith without a helper can, with this machine, sharpen 350 drills per day.

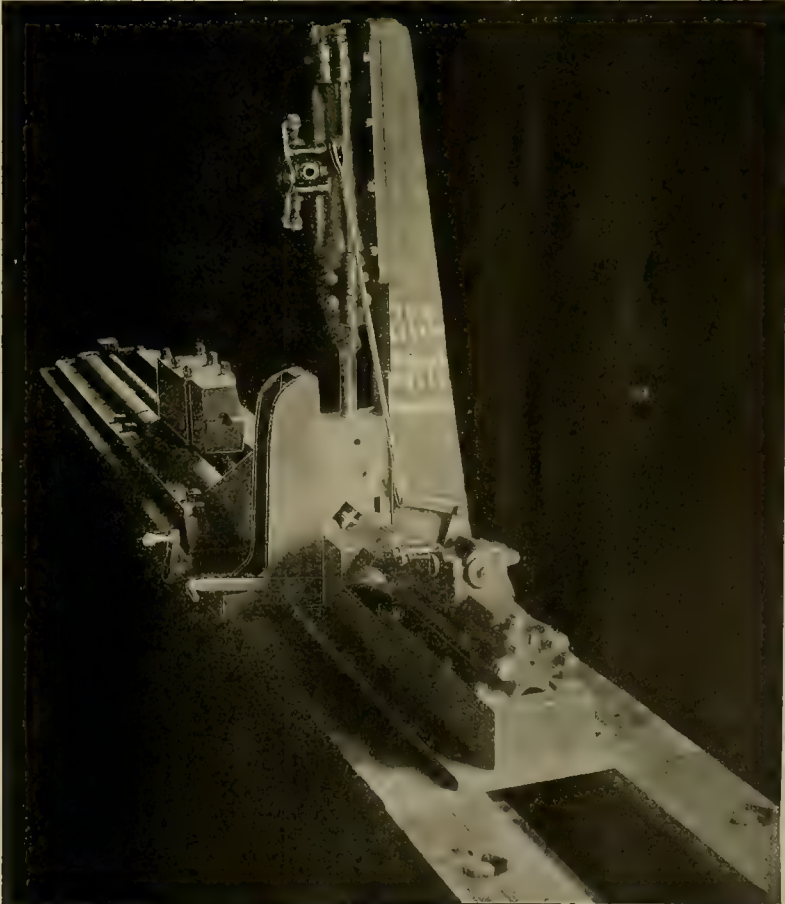
In this machine the upright hammer and the horizontal hammer are attached to the heavy duty timber frame, which permits of the drills being side set and cross formed in the same die that the upsetting is done in, an auxiliary valve connected to the upright hammer permits the hammer die to be held up while the drill is being entered. A slight shifting of this valve allows the hammer to strike the drill, forging the cross form and at the same time forming the bevel or cutting edge on the face. This portion of the hammer die is so arranged that the taper, or clearance, is formed at the same time that the cross is formed. This leaves only the upsetting and finishing of the drill to be done by the dollie. To do this the drill is placed in the opening to the left of the cross forming part of the die. The upper, or hammer die is then held down on the lower die by means of a further shifting of the auxiliary valve, which permits the air pressure to get above the piston of the upright hammer and hold it down. While this is held in this position the dollie strikes the face of the bit, upsetting it into the die and reducing it to the exact gauge. The dies are so arranged that almost any size drill can be made in them, requiring only the changing of the dollies for whatever size of drill is to be made.

The tail block for taking up the blows of the horizontal hammer is a casting weighing about 425 pounds, provided with steel flanges that act as guides, and slide in guides provided on each side. This is carried back and forth for the different lengths of drills by means of a heavy steel screw which, in turn, is operated by a crank attached to a counter shaft, provided with a bevel gear that meshes into a similar bevel gear on the steel screw. This is placed in a handy place and is easily operated.

It is furnished complete with air hammers, ready for mounting upon timbers, and for attaching the air line to, and can be transported from place to place. The standard machine will sharpen drills up to 9 feet 6 inches in length, and weighs about 3200 pounds. Where longer drills than 9 feet 6 inches are to be sharpened a specially long machine is furnished.



Mouth of Main Tunnel Afterthought Mine, Shasta County, Cal. (See Page 313.)



Little Giant Drill Sharpener.



## Mining and Metallurgical Patents.

PATENTS ISSUED OCTOBER 25, 1904.

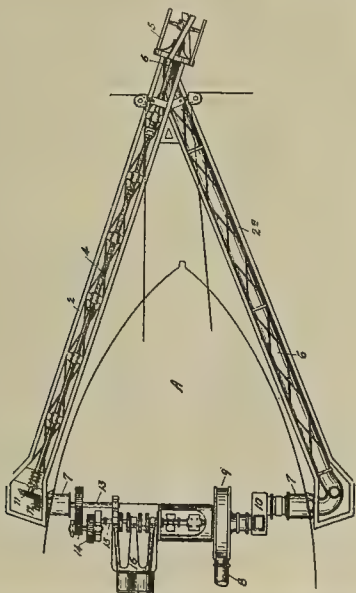
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

MINING MACHINE.—No. 773,310; W. O. Wood and J. H. Miller, South Hetton, England.



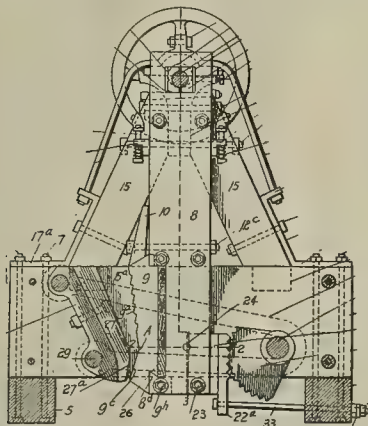
Mining machine comprising stationary principal frame, sliding frame supported in guides upon principal frame, means for supplying motive power, means for cutting and drill, means and drill being mounted on sliding frame, drill spindle, bearings for drill spindle adapted to swivel and to be adjusted to any position, semicircular guideway and means for clamping bearing in position in guideway and swiveling steadying block upon stationary frame for drill also adapted to be pivotally adjusted to any desired position.

DREDGER.—No. 773,337; R. A. Perry, Oakland, Cal.



Sea going vessel having projecting hydraulic dredging apparatus extending to front thereof, apparatus having Y-shaped ladder, one arm of which extends from junction with vessel in straight line diagonal to longitudinal axis of vessel and other arm extends from opposite side of vessel and intersects first named arm at point between vessel and outer end of arm.

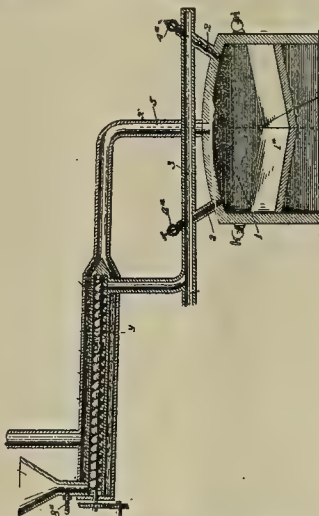
ROCK CRUSHER.—No. 773,107; C. Wallace, Denver, Colo.



Combination with a suitable frame and an operating shaft, of a lever bar connected with the shaft, the latter being connected to impart to the bar an eccentric or crank action, a block pivotally attached to the lower extremity of the lever bar, a breakable safety pin, against which said block bears. Combination with eccentric shaft and suitable frame on which shaft is journaled, of lever bar hung on eccentric of shaft, and provided with crushing jaw, co-operating stationary jaw, abutment forming fulcrum for lever, and yielding means giving cushion support to lever bar during downward movement, means comprising bolts mounted on frame and slid-

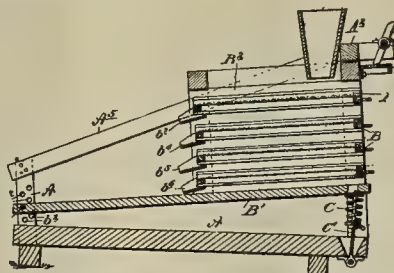
able in lugs fast on lever bar on opposite sides, and coil springs located below lugs and surrounding bolts between the lugs and bolt heads.

ROASTING AND SMELTING FURNACE.—No. 772,925; H. Cockell and W. H. Fish, Columbus, Ohio.



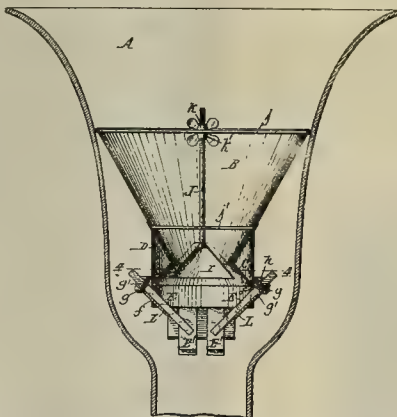
In ore roasting and smelting apparatus, furnace, outlet for products of combustion therefrom, ore feeding and roasting chamber located in outlet having separate discharge into furnace, and fuel supply communicating with discharge.

SEPARATOR.—No. 772,860; F. H. Bemis, Bingham Canyon, Utah.



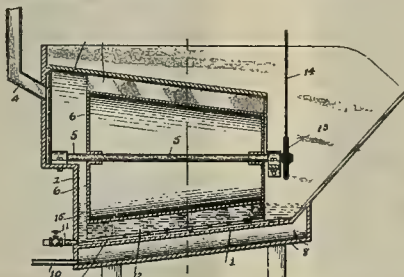
Separator comprising inclined spring-supported screen-carrying frame pivoted at lower or tail end in fixed bearings, means for depressing and suddenly releasing frame, and rigidly secured bumper or contact piece at head end to check upward throw thereof.

MAGNETIC SEPARATOR.—No. 773,246; J. W. Carnoghan, Silver Creek, N. Y.



Combination with downwardly tapering mill hopper, of magnetic separator comprising downwardly tapering funnel seated loosely in mill hopper, and separating magnets supported on funnel at outlet thereof.

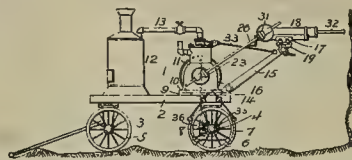
AMALGAMATING MACHINE.—No. 773,266; G. C. Scott, Columbus, Ohio.



In amalgamating machine, combination of horizontal tapered mercury-containing casing closed at

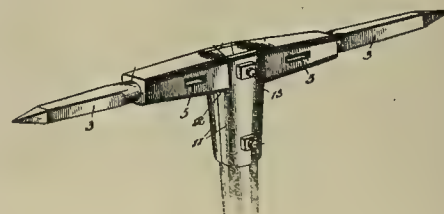
larger end and open at smaller end with inlet for larger end, steam jacket for lower portion of casing, and closed amalgamating body carried axially upon shaft, tapered with casing and provided with longitudinal radial blades, means for rotating amalgamating body and inclined tailings discharge chute located adjacent to smaller end of tapered amalgamating body and forming continuation of tapered casing.

ROCK DRILL.—No. 773,112; T. E. Adams, Cleveland, Ohio.



Combination with wagon, drill and arm pivotally connected to wagon and to drill, of engine adjustably mounted on wagon and adjustable means for transmitting motion from engine to drill.

PICK.—No. 773,507; B. H. Laughhunn, Centralia, Ill.



Combination of tool head provided at side faces with recesses and having socket extending upwardly from lower face and terminating short of upper face, handle fitted in socket, combined clamp and brace composed of sections arranged at side faces of head and handle consisting of upper flat portions fitting in recesses and lower approximately semi-tubular portions embracing handle and having side edges fitted together to form continuation of socket, upper ends of semi-tubular portions being fitted against lower face of head, and upper and lower transverse fastening devices piercing upper and lower portions of combined clamp and brace, upper fastening device being located beyond handle and passing through head, and lower fastening device being located beyond head and passing through handle.

## THE PROSPECTOR.

The mineral specimen from Wallace, Idaho, arrived in the form of coarse sand. The material consists of much decayed feldspar and a dark-colored mineral also much decayed, but seemingly originally hornblende or augite. Without doubt the material is a dike which has intersected the vein, and as the distance beneath the surface at which the drift is driven is but 50 feet, it is likely that the width of the dike may be ascertained by an investigation on the surface. Perhaps a few pits may be necessary. It is probable that the ore shoot will be found to continue beyond the dike, but it may not be found directly in line with the portion already opened. If not found there search should be made to the right and left until its continuation is found. The displacement, if any exists, may be small or it may amount to several hundred feet. In the latter case it would be well to take up a new location upon the vein, as some dispute may arise as to its identity and continuity.

The rock samples from Boise, Idaho, are: No. 1, apparently a dike rock, but greatly altered. It contains little or no quartz, and any bisilicates it may have originally contained have been removed by the alteration of the rock. The rock has a porphyritic structure, but the feldspars are so completely altered as to make the identification difficult. No. 2 is aplite, a dike rock of the granite family. It sometimes is very siliceous and occasionally contains gold. It is also frequently found associated with gold-bearing veins.

The ore from Copperopolis, Or., is chalcopryrite in a gangue consisting largely of quartz and tourmaline. This is a somewhat unusual occurrence. The cleavage faces and fracture joints of the tourmaline are plated with the copper sulphide, and, in some instances, it looks as though the tourmaline had actually been replaced by the copper ore.

The rock specimen from Custer, Idaho, is garnet. This mineral is sometimes used as an abrasive. It has a hardness of 6.5 to 7.5, some varieties being harder than quartz, which is 7, in the scale of hardness.

The tallow-like mineral from Acton, Cal., is saponite, a hydrous silicate of magnesium and aluminum. It occurs filling cavities in the lava. The other specimen is foliated talc, or soapstone.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
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## ALASKA.

At Snettisham, on Snettisham bay, the Alaska Snettisham G. M. Co., J. N. Tisdale superintendent, has a 20-stamp mill, with eight Frue vanners. Steam and water power are used and a dynamo furnishes lights for the mill and dwellings. The company also has a sawmill.

Over 3000 tons of copper ore will be shipped from the mines at Ellamar to the Tacoma, Wash., smelter, says the Douglas Island News.

Reports from Copper Mountain state the tram will be enlarged to capacity of 800 tons per day, by the Alaska C. Co., and drifting will begin on the vein in the lower tunnel. This shows sulphide ore. Eighty tons per day of carbonates are being taken out near the top of the New York vein and sent down the mountain by gravity tram. The carbonates and the sulphide ores will be mixed, to make them self-fluxing. The smelter is expected to be in operation by November 15.

## ARIZONA.

### Gila County.

Superintendent Fuller is increasing development work on the Pinto creek mines near Globe, and machinery, including air compressor and air drills, has been received.

### Mohave County.

The Cerbat Mountain M. Co. has been incorporated by St. Louis, Mo., men and is under management of J. Boyle, Jr. The company proposes to take over the Vanderbilt mine at Cerbat. It is intended to put in a hoist and sink a shaft several hundred feet.

J. P. Wallace of the Burro and Telegraph mines, at mouth of Burro creek, near Kingman, reports the lower tunnel has cut the vein at depth of 100 feet below apex and 490 feet in. The ore body shows 6 feet and it is proposed to build milling and cyaniding plants on west side of the mountain.

B. F. Hall, manager of the Golden Gem M. Co., operating near Mohave, says it is intended to put in a plant for making tests of the ores from the Gem mine.

### Pinal County.

Manager A. C. Sieboth of the Lake Superior & Arizona C. Co. at Superior says they were making satisfactory progress in development of the mine. Compressor has been set up. In the shaft they are cutting a station at 300 feet. As there is an overburden above the collar of the shaft of about 400 feet, the 300 level is 700 feet below apex of the hill, says Sieboth.

The Model M. & M. Ex. Co., H. P. McIntosh, president, has an option and lease on the Red Hill group, in Red Hill district, 12 miles east of Florence and 3 miles south of the Gila river. The group consists of fifteen claims showing carbonates, silicates, oxides, carrying gold and silver. A leaching process will be used to extract the values. McIntosh will build a ten-ton plant on the millsite at the river.

Superintendent W. B. Twitchell of the Big Lead M. Co. is increasing development work on the '05 mine at Kelvin. J. Champion Jr., superintendent of the Pinal Con. and Martinez mines, 18 miles northeast of Florence, says those mines are yielding high-grade ore which will be shipped as soon as he repairs the road from the mines to Butte at the smelter site. These properties are producers of lead and silver.

### Yavapai County.

The Arizona Gold Lode M. Co., owned mainly by Prescott men, with R. H. Burmister president, is operating in Cherry Creek district. On the Gold Lode, Leghorn and Red Cloud claims of the group there have been sunk three shafts of 60 feet each, all in ore, while on the Bugler there is a tunnel 260 feet long. On the Todd-King a shaft has been put down. They propose to build a 6-stamp mill. They are putting in a double-cylinder hoist and a boiler.

W. H. Ferguson has started work on the Aztec G. & C. Co. mines, 8 miles from Mayer.

Manager Heslet of the Yavapai Oil & Dev. Co. will start to bore for oil near Del Rio, near Prescott.

The power house of the Oriental M. Co. on its Postmaster mine last week was destroyed by fire. It contained a boiler, air compressor, engine to run a blower, receiving tanks and a blacksmith shop. It will be replaced. The mine is in Bigbug district, 1 mile below Poland.

## ARKANSAS.

### Boone County.

The Mammoth Spring M. & Dev. Co. of

Washington, D. C., has been incorporated, with J. M. Winder of Mammoth Spring as State agent, to operate near Harrison.

Superintendent G. W. Chase, of the Morning Star mine, reports Rush creek mines are active again—the Silver Hollow is shipping ore and the McIntosh is leased.

## CALIFORNIA.

### Butte County.

The Viloro Syndicate, Ltd., of London, England, which took over the McGee ranch of 400 acres, 2½ miles south of Oroville, expects to have its dredger start working this week. From sixty-three holes drilled the average depth to bedrock was found to be 3½ feet. T. H. Leggett is manager and W. H. James of Oroville superintendent of dredger operations.

The Fogg and the McLaughlin tracts, across the river north of Oroville, have been bonded to E. W. Fogg and C. Holman for gold dredging. The tracts aggregate 240 acres and are covered by orange orchards; five drilling machines are prospecting the ground.

### Calaveras County.

The mill for the Chris Anderson gravel mine at San Andreas is set up to handle the cemented gravels. Fifteen more men have been put on. The mill is expected to be in operation this week. Men have been running gangways below bedrock, through which the cars will travel and be loaded from raises into the deposits.

The West Lake M. Co. has started operations on the New Buffalo gravel mine, in Chile Junction district, near Mokelumne Hill. The hoist and other machinery from the Keystone mine at Railroad Flat are being set up. The Rooney and What Cheer mines, in same district, are producing values.

The Utica M. Co. at Angels last week again started up the electric plant, and as a result the Stickle mill and the Cross shaft hoist are being operated. A. D. Field of Waterbury, Conn., president of the Sultana company, says he will resume work.

### El Dorado County.

D. H. Jackson at Placerville says he will put in machinery and reduction works on the Landecker mine.

### Fresno County.

The pipe line of the Coalinga T. Co. has been given final test under water pressure and has started pumping of oil from Coalinga to tide water at Monterey. The pipe line is said to have cost \$750,000, which includes stations and terminals. The wharf at Monterey, while unfinished, is in condition for service.

### Inyo County.

In the Funeral range, near Ballarat, work is progressing on the Kean Wonder mine which J. R. De Lamar has bonded for \$160,000. Superintendent C. J. Lyser says final payment will be made about January 1st. Ore that runs \$200 per ton is being taken out and there is a ledge that assays \$30. The mine is 5 miles from eastern edge of Death Valley, and there is a wagon road to within a mile of the mine, where are the assay and general offices.

### Nevada County.

Final payment of \$15,000 has been made on the Central Con. group (formerly the Greenhorn and Central mines), near Grass Valley, by C. A. Bailey, O. Coffin, M. P. Stone et al. A mill will be built and is expected to be in operation next spring.

### Santa Clara County.

The Quicksilver M. Co., T. Derby manager, at New Almaden has issued its report for the year ended April 30, 1904, showing: Receipts from quicksilver sales, \$184,803; cost of materials and supplies, \$33,055; payrolls, \$146,455. Quicksilver produced, 4340 flasks (76.5 pounds each), average value \$40.495; sales, 4518 flasks. Average cost per flask of quicksilver produced was:

Payroll	\$33,745
Supplies	7,990
Miscellaneous and taxes	0,957
Total	\$42,692

From this is deducted \$2,605 for rents and miscellaneous and \$1,930 for increase ore at hacienda, leaving net average cost per flask at \$38.157. This compares with cost of \$41.59 per flask for previous year. The output was 405 flasks less than 1902-1903, as 6131 tons less of ore were hoisted, due to idleness of No. 2 furnace, and repairs to No. 9. The ore reduced gave average yield of 0.448% mercury against 0.415% in 1902-1903. Tons of rock mined, 40,398, of which 11,051 tons were from prospecting and deadwork, and 22,347 tons from vein and stopes. This gave 39,062 tons of ore, divided into 5082 tons, "granza" and 33,980 tons, "tierras."

### Shasta County.

(Special Correspondence).—The Great Western G. Co., owner of the Afterthought group of mines (see illustrations front page and page 311), is plac-

ing the group on a producing basis. The company controls 1400 acres at Ingot. W. G. Scott is manager. On the 250-foot level a body of ore is showing up, carrying 10% copper, not heretofore known to exist. The main working tunnel is in 1500 feet, and at that point is being built a chute down which ore will be sent from all the upper workings, a distance of nearly 500 feet. Development to greater depth will be resumed. At the smelter camp the furnace is built and the smoke-stack will be run up the mountain side at rear of the smelter. A three-story sampling mill, machine shop, covered ore bins of 1000 tons capacity, stock house, coke bins, laboratory, general office and other buildings have been put up. There is a 30-inch gauge railroad from the mine to the smelter. The main office of the Great Western G. Co. is at St. Louis, Mo. T. S. Henderson is president, W. G. Scott superintendent of mines and general manager, H. Haas superintendent of reduction works, J. Wolf general foreman. Ingot, Nov. 2.

Keswick reports say the sixth Fielding level in the Iron Mountain copper mine, at Iron Mountain, has been opened up; its development will give work to seventy-five more men.

At French Gulch the Fairview company has its wire cables across the Trinity river, and will lay the 2-foot pipe line over the river to the mine through the ditch to the millsite.

At the Gambrinus mine, near Whiskeytown, near Redding, the bonders having failed to pay the miners, the employees took the property and are working out their wages, operating the mine as lessees, says the Searchlight. The property is owned by Barner & Riebe of Redding. C. Woods, in charge of the mill at the Gambrinus, last week sent out three gold bars valued at \$4000, representing a 20-day run of the 2-stamp mill.

In the Whiskeytown section the Tarantula mine, on Whiskey creek, owned by E. Kiessling, F. P. Primm and H. S. Wilson, reports progress. Five of the ten stamps of the mill will be put in operation.

### Tuolumne County.

The New Albany mine near Carters has been bonded to J. A. Bunting & Co. of San Francisco for \$50,000 and twenty men have been put to work. B. Richards is superintendent. Machinery will be put in and the workings unwatered.

At the Ranch and Clark gravel mines, near Columbia, J. Shaw says he will increase machinery equipment and operate on large scale.

The Garfield-Virginia M. Co. has bought the Garfield extension mine, 2 miles east of the Buchanan mine, near Carters.

On Jackass hill, at Tuttle town, Flink & Erickson have unwatered the Allen shaft and are prospecting in the same. They also have an option on the Atlas mine.

W. P. Huston has bought a third interest in the Toledo (formerly the Labatour) quartz mine, 2 miles west of Tuttle town.—The Star mine, above Columbia, has closed down for lack of water. Grading is in progress for an air compressor.

—The Bell mine, near Tuttle town, of the El Rico M. Co. is closed down, but it is expected to start up again this month.

### Yuba County.

The Dunning farm, in Linda township, 3 miles east of Marysville, has been bonded to Stockton men, who will prospect it by drills for gold deposits. H. C. Meyers, G. H. Harris and F. J. Viebrock are of the company. The land bonded consists of 596 acres, 400 acres of which are bottom land.

W. P. Hammon, of the Yuba River T. Co., states his company intends to establish machine shops in Marysville, to repair and reconstruct the company's gold dredgers operating around Marysville.

## COLORADO.

### Boulder County.

The American Gold Queen M. Co. reports making a strike in its American Star mine, on Lefthand creek, near Boulder, says Superintendent L. R. Johnston. The pay streak is 10 inches to 2 feet in width and has been proved for 100 feet at the bottom of the shaft. The ore runs \$40 and shipments are being made.

The Northwestern M. Co., at Caribou, has bought two properties there and F. Smith of Caribou is in charge of operations. They are erecting shaft buildings and will put in machinery on both shafts.

Woods & Co. of Denver, who are interested in the Graham lease at Nederland, are shipping tungsten ores to Denver from Rollinsville over the Moffat road.

The owners of the Boulder County mine will build an addition to their 10-stamp mill at their tunnel property, and in the addition they will put machinery for handling tungsten ores.—The Wolf-tongue M. Co. has put up shaft building on its tungsten mine, 2 miles north of Nederland, and have set up a steam hoist-

ing engine and boiler. They are shipping tungsten ores to Nederland where they are milled and the concentrates hauled to Boulder for re-shipment to Pittsburgh for treatment. W. Roach of Nederland is in charge.

Boulder reports say the Savannah oil well No. 9, came into oil last week, and is producing at a rate of twenty-five barrels. In connection with the discovery of this well is reported found fullers earth, as a stratum below the oil.

Last week the new line of the Colorado & Northwestern Railroad from Sunset, 13 miles west of Boulder, to Eldora, 20 miles southwest, was opened for freight shipments to Sugar Loaf station. Grading on the line is completed and track laying will be completed by Jan. 1st. The Sugar Loaf mining district has the Logan, Livingston, Golden Age, Great Western Exp. Co. and other producing mines. These mines have been teaming their ore to Boulder. The following rates per ton have been made to Denver and Argo, in connection with the Colorado & Southern Railway: From Salina, Wall Street, value \$14, \$1.25; value \$20, \$1.50; value \$30, \$1.75; value \$50, \$1.75; value \$100, \$2; value over \$100, \$2.50. From Copper Rock, Sunset, Sugar Loaf, value \$14, \$1.50; value \$20, \$1.50; value \$30, \$2; value \$50, \$2.50; value \$100, \$3; value over \$100, \$3.25. From Francis, Ward, value \$14, \$1.50; value \$20, \$1.50; value \$30, \$2.25; value \$50, \$3; value \$100, \$3.50; value over \$100, \$4. The line from Sunset to Eldora will serve Nederland, where tungsten ore is being produced; also Caribou and Cardinal.

### Chaffee County.

Salida reports say the Liberty Bell M. & Dev. Co. of Salida, operating at Maysville, in the Monarch district, has added seven more claims to its holdings, at a cost of \$25,000. D. J. Kramer of Salida is president. They have shipped ore which netted \$40 per ton in gold, silver and lead. The mines are 1½ miles west of Maysville, on the Monarch branch of the Denver & Rio Grande railroad, and are so situated that ore taken from the tunnel is dumped directly into the railroad cars. The main tunnel carries veins running north and south. Plans are being made to build a concentrator on the south branch of Arkansas river and 50 feet from the railroad tracks. Surrounding the properties are timber. A branch of the Arkansas river flows near the mouth of the tunnel.

### Clear Creek County.

Manager F. A. Babcock of the Southern M., M. & D. Co., near Silver Plume, driving the Robert E. Lee tunnel, reports progress. The buildings have been repaired and other preparations for winter made. A cross lode has been cut by the tunnel which carries lead ore and is thought to be an extension of the Stevens vein. The Durango lode will be cut. The company will put in an air compressor operated by electricity.

Machinery at the Stevens mill has been overhauled and additions made, in another set of rolls, screens, elevators, etc., that will increase the capacity to 100 tons per day. It is expected the mill cannot be operated during the winter months on account of lack of water, but it can be run several weeks yet. An air compressor will be put in at the mine, which will also be driven by electricity, and fifty men will be kept at work.

Work is under way on construction of the concentrating mill for the Dives-Pelican & Seven-Thirty M. Co., near Silver Plume, and men are grading for the building, which will be west of portal of Burleigh tunnel. It is expected to have it ready for operation next spring. Foundations are made for the air compressor at entrance of tunnel, and further development work will be carried on, which will include driving the Burleigh tunnel to cut the Pelican and other lodes.

The Colorado D. & I. Co., of which H. A. Reidel of Colorado Springs is president, has a three-year lease and bond on the Kelley group of nine patented claims in Trail Run mining district, near Idaho Springs. The group adjoins the holdings of the company in Banner and Iowa districts, where they have 110 acres, and the Rockford tunnel. The tunnel is in 730 feet and is expected to cut the Coyote claim. By continuing the tunnel, it will reach claims in the Kelley group. The Kelley shaft, 300 feet in depth, will be sunk another 100 feet.—Sinking the shaft at the Ward mine has been stopped until the capacity of the mill has been enlarged. A belt conveyor has been put in under the crusher, which will carry the ore to the bins, from which it is fed automatically to the stamps and Elspass mill. The steel cyanide tanks are being placed, as the foundations of concrete have been completed. The mill is running on ore from the open cut. Electric power for mine and mill will be put in, replacing the steam plant.—The Little Mattie mine is producing low-grade ore for shipment under the new smelter schedule. The com-



pany is taking out twenty-five tons per day from the seventh level, and the water is being lowered in the shaft so that operations may be started on the eighth level. Lessees are also shipping steadily.—G. Taylor, operating the Edward mine in Spring gulch, in sinking the shaft, has opened a streak of ore at depth of 175 feet.

Manager Bonney of the Sun and Moon mine at Idaho Springs has been shipping an average of fifty tons per day. Development work has been increased, and by Dec. 1st production will be increased over 100 tons per day.—Four men, under Contractor W. W. Cannady, have driven the Burns-Moore tunnel 243 feet in three months. It includes the laying of track and the placing of air and ventilating pipe and the waterway.

Near Idaho Springs, the Signal M. & T. Co. has secured control of the Helen group of claims in Virginia canyon, adjoining the Crystal and New Year mines. The Helen is the western extension of the Seaton, Kangaroo and Metropolitan mines. The Helen is developed by a shaft and a tunnel, the mouth of which is level with the Virginia canyon wagon road. The mine has not been worked for twenty-three years. A chamber will be made in the tunnel where it cuts the shaft and a hoisting plant with a capacity of sinking 500 feet will be put in. The shaft will be sunk and additional levels driven, and at same time the tunnel will be driven to reach the Lucy claim.

#### Custer County.

Shipments of high-grade ore are being sent out by J. Gill and F. Gay from a lease near the tunnel of the Bassick mine in Custer district, near Rosita. The ore is a telluride and free gold has been found in the quartz. Milton, Bernard & Co., who have a lease on the 1300-foot level, will start outputting. Another lease has been granted on the 800-foot level to Harris & Duncan, where ore is being exposed.

#### Eagle County.

Red Cliff reports say in the past two months 100 locations have been made by Red Cliff, Minturn, Gilman & Fulford men. The camp is 12 miles from Minturn and has timber and water. The Spread Eagle, owned by New York men, the only producer at present, under Manager J. Pease of Glenwood Springs, last week shipped eight tons of ore, which netted \$3000, principally gold values. The mine also contains low-grade ore—a milling proposition—and a milling plant will be put in when method of treatment is determined.

#### Gilpin County.

The Copper Queen and Fairview claims, in Lump gulch, near Rollinsville, have been leased and bonded by J. Hansen & Co. of Central City, and sinking operations are being carried on at the Copper Queen lode. There is a 10-inch pay streak showing.

A. Skeels of the Orado G. M. Co. has taken up the bond amounting to \$10,000. He is starting operation of that property in Eureka district, near Central City.

#### Lake County.

F. G. Mitchell, president of the Lost Canon D. T., G. M. Co. at Twin Lakes, says development will be increased. Supplies, fuel, etc., are being stored. Erection of the 50-ton mill and concentrator has been postponed till spring. The tunnel is near another vein—the Tunnel View—from which \$23 in gold has been obtained on the surface.

#### Ouray County.

N. R. Bagley is getting in an electrical plant for driving the tunnel on the Frisco mine, near Ouray, which is in 100 feet, having been driven by hand thus far. This tunnel, when completed, will be several thousand feet into Houten mountain, near Animas Forks. It will crosscut the Red Cloud, Big Giant, Yankton, Dakota and other veins. The railroad is running into Animas, which facilitates getting in machinery and supplies.—The crosscut tunnel is in 600 feet on the Bankers' National, in Imogene basin, and a 30 H. P. compressor plant is being set up. Eight veins which show on the surface will be cut by the tunnel. Superintendent J. R. McNeill has charge.—Manager W. J. Hammond of the Treasury T. M. Co. is pushing work on his 20-stamp mill and will have it ready for operation next week. More men will be put into the mine.

#### San Miguel County.

The properties of the Alta M. Co., comprising the Alta group and the Bessie group, on Turkey creek, including the 20-stamp mill, have been leased to J. L. Brown of Telluride. The Alta mine has been developed to a depth of 900 feet. The Bessie group comprises twelve claims.—At the Suffolk-Globe or Silver mountain mines, north of Ophir, the main tunnel will be continued. It has been completed for 1400 feet. It is known as the Badger tunnel and is to cut the Suffolk vein at a depth of 2000 feet below the surface.

#### San Juan County.

The Champion mine, near Silverton, reports shipping three twenty-ton carloads of first-class ore per month. The ore is broken from the northwest drift. No stoping is being done.

The Colorado & Detroit M. Co. is increasing operations on Sultan mountain, near Silverton, since putting in water power system and electric drills. The plant includes a pipe line of 1000 feet, extending from above the Thunder tunnel to the base of the mountain at the river level. The 10 H. P. generated from a 4-foot Pelton wheel is transmitted to the Thunder tunnel and distributed to the electric drills that are operated on the Aletha vein. An air compressor is being set up at the Sunnyside mine.

The Hamlet M. Co., operating near Silverton, says Manager O. Matthews, will build a 50-ton mill near Silverton alongside the Silverton Northern Railroad. Ore has been blocked out in the mine. The last 450 feet on the lower 800-foot tunnel has been run on 3-foot vein of ore, and vertical depth at breast to old workings is 420 feet. G. Robin is superintendent.

The tramway on the Hamlet group of claims on Galena mountain, 5 miles above Silverton, is completed and will be running this week. The property contains bodies of low-grade milling ore. The smelting ore, of \$40 grade, will be shipped at rate of a car per day. The vein averages 8 feet in width. The group consists of seven claims and a millsite.

#### Summit County.

Manager J. S. Strickler, of the Monte Cristo mine, near Breckenridge, says his company will build an addition to the mill and put in machinery to increase the capacity to 100 tons per day. The new machinery will consist of tables, jigs and a crusher.

#### Teller County.

At Cripple Creek, a ton and a half of ore valued at \$85,000 was sorted, sacked and shipped last week from El Paso mine, says President S. S. Bernard. The ore was taken from the C. K. & N. vein between the 300 and 600-foot levels of the mine.

King & Co. have completed a cyanide mill on the Anaconda mine on Gold hill, at Anaconda. The mill has a capacity of 150 tons daily. The mill company has a lease on rock both in the dumps on Gold hill and on the Anaconda main vein. The latter is said to average \$8 per ton.

To provide additional stoping ground, the main shaft of the Trilby mine on west slope of Bull hill will be sunk by the lessees to the 700-foot point. Three cars of ore are being sent out weekly by the Trilby operators. The shoot is said to be an extension of one of the bodies developed in the Gold Sovereign, adjoining.

Plans have been drawn up for a mill and sampler to be built at portal of the Ophelia tunnel, 1 mile south of Cripple Creek, says A. J. Chapin, president of the Pueblo Railway Co., which is owner of the tunnel. The company is reorganized as a common carrier designed to transport the ores of different companies whose properties it traverses from the company's territory to sampler at mouth of tunnel. The proposed mill and railroad company will obviate necessity of companies sampling their ore at great expense and then hauling it down the hill to mill, as the company expects to build railroads to the properties and shafts along the route of the tunnel by means of smaller tunnels connecting with the main tunnel.

The tunnel has been driven 7500 feet from the portal and has a double track. The tunnel will cut the Bull hill section of the camp at a depth of 1600 feet and will also carry a drainage way. A few of the properties which the tunnel will pass closely is the Anaconda, Peggy, Doctor-Jack Pot, Mary McKinney, Logan, American Eagle, War Eagle, Last Dollar, Findley, Shurtloff, Deadwood, Pharmacist and Pueblo and Victor properties.

At Cripple Creek, Engineer Jacquith of the El Paso drainage tunnel, says that there is running through the tunnel 4300 gallons of water per minute, 2000 gallons less per minute than when the tunnel was completed. The flow of water is dropping at rate of sixty gallons per week. He says the same situation that confronted the mine owners on Raven and Beacon hills now confronts the mine owners who own territory on south slope of Bull hill. Mines in that section are having same trouble with water as those on Beacon and Raven hills had two years ago. The best and cheapest mode of draining that section is being discussed, as it will have to be lower than the other. As, for instance, the Vindicator, Golden Cycle and Independence Con. are down over 1200 feet, it has been shown by surveys that the water in all three of those shafts is at a common level and that all the water comes from the same source.

At Cripple Creek, Henley & Co., operating under lease the north end of the Ramona claim, are sending out on an

average five carloads of ore per month, which runs \$40 per ton. Ore is being broken from a 12-foot vein on the 300-foot level. Hines & Co., operating under lease the south end of the same property, are drifting on the 200-foot level for the ore shoot which they opened on the level above.

C. B. Burch, manager of the Little Giant Co., whose mine is west of Cripple Creek, in Pony gulch, has started work on a cyanide plant.

Lessee Peters and associates have a two years' lease on the X-10-U-8 claim of the Little Jane G. M. Co., on Squaw mountain, near Cripple Creek. Ore has been shipped.—The Invincible G. M. Co. has been incorporated by L. E. Kimball, A. T. Pierce and G. Holmes to operate in Teller county.

The Frank Gilpin Leasing Co., operating the Jerry Johnson mine on Ironclad hill, Cripple Creek, expects to double the tonnage being shipped from that mine. A plant of machinery, including a 6-drill air compressor, has been put in. They will ship five cars per week.—C. N. Crowder & Co., on the Banner Gold, have depth of 230 feet in sinking the shaft. They are going to 350 feet before crosscutting for extension of the Lonaconing ore shoot.—Machinery is being set up on the Black Jack of the Anchor Co., and development is progressing.

The gas problem has been overcome in the Conundrum workings of the Anchoria-Leland group on Gold hill, Cripple Creek, says President Howbert. W. Lindgren, of the U. S. Geological Survey, left a barometer there and readings have shown that when the barometer reads 20.4 inches a light burns fairly, but one cannot move around rapidly lest they stir the gas, which snuffs the candle. When the night shifts go off the night watchman keeps "tab" on the barometer, and if between then and 6 o'clock in the morning the indicator of the barometer falls to 20.4 inches, he sends steam down the shaft and through the workings. The result is that the gas is dissolved and absorbed. With the barometer standing above 20.4 inches the air throughout the mine is good, but below that point steam is necessary. So serious a problem is the gas that in one mine a level was tin-lined, but failed to exclude the gases.—The two-compartment shaft being sunk on the Free Coinage estate by J. O. A. Carper of Denver is down 50 feet. A plant of machinery is being put in.—The Vindicator Co. is handling 300 gallons of water per minute, and keeping the water below the level.

The Magnolia mine, which adjoins the Colorado King, on Gold hill, at Cripple Creek, will be started up by the Grandin M. Co. It is intended to sink a shaft and run laterals in several different directions. A vein was cut by former operators at the shaft, which is at the 300-foot point. The Magnolia is between the Anchoria Leland and Abe Lincoln mines.

The Winner G. M. Co. has been incorporated by H. J. Brubaker, A. M. Levy, W. McWhorter, S. A. Wilson and L. H. Rowell, with principal office in Denver. Operations will be carried on in Teller and adjoining counties.

## IDAHO.

#### Boise County.

V. Thorne, at Idaho City, says he has cut a vein 8 feet wide at depth of 225 feet which carries average value of \$12 per ton. It is the third vein since they started sinking, making seven in all, which has been cut. The shaft will go to 600 feet. When this is done it is intended to crosscut and do 2700 feet of work on the seven veins this winter. In the spring a 100-ton mill will be built.

#### Blaine County.

Another tunnel has been started at the Red Elephant group of mines, near Hailey, that will tap the vein at a vertical depth of 800 feet. The tunnel is at the 600-foot level and will afford backs of 800 feet in an undeveloped part of the group.—It is reported that a vein carrying 5 feet of galena has been struck on the 1200-foot level of the Minnie Moore mine.

#### Idaho County.

J. C. Northrop of Palouse City, working the Spokane mine, near Florence, reports the Spokane is held by the Florence Electric M. & M. Co., and has 600 feet of tunnel. They are in 160 feet on a 5-foot ledge with 30-inch paystreak that assays \$60. The company owns a 2-stamp mill, but it is intended to put in a 15-ton grinding mill in the spring. The Bear Track, in charge of H. Moore of Moscow, is running a 2-stamp mill. The Mikado, owned by Dayton, Idaho, men, which was idle for five years, is again active. A mill will be put in this winter. On the Gilt Edge mine too much water has caused a shutdown. The company intends to put in additional pumping machinery and hoists this winter, as well as a 30-ton mill.—On the Last Chance placers for three years

the owners have been developing the ground. They have an open cut 1000 feet long through bedrock to a depth of 15 and 20 feet. Twelve men are working, says D. Greenwalt, manager.

A. S. Johnson of Hump, in the Buffalo Hump district, says there are about 300 men working in the district. On the Buffalo Hump mine, he says, there has been 3000 feet of underground work done. On the Jumbo the 20-stamp mill is in steady operation, turning out from \$20,000 to \$30,000 in gold monthly, the ore averaging \$10 per ton. The Atlas Co. is putting up a 10-stamp mill.

L. Hanagan of Lucile, on Salmon river, interested in the McKinley M. Co., states development work will be continued during the winter. The company will build a stamp mill and it is expected to have a plant in operation next summer. A 5-stamp mill will go in, with concentrating tables. Since the first of the year the company has driven 300 feet of tunnel, 210 of which is on the lead. They are planning to drive a 1200-foot tunnel at a depth of 600 feet below the present workings. The Lucile Con. G. M. Co., composed of Clarkston men, has increased development work during the summer.

At Oro Grande, the Hogan mill is closed for the season and a series of successful runs reported. The closing of the mill is preparatory to putting in a cyanide plant, the ground for which is being surveyed. T. L. Kelly of Lewiston says the Union group will be worked this winter. Hoisting machinery is being put on the Oregon mine.

#### Kootenai County.

The River Queen mining group has been bonded to R. K. Green of Spokane, Wash., for \$10,000. The property is on Prince creek, on the St. Joe river, 20 miles above the head of navigation, near Coeur d'Alene. Work will be started next week. It is a copper proposition and has a 50-foot surface cropping.

#### Owyhee County.

It is reported work will resume on the Sinker tunnel on War Eagle mountain, near Silver City. Work was suspended on the tunnel two years ago.

The mill at the Cumberland mine, near Silver City, will start this week. The company has been putting on additional miners for a month past.

#### Shoshone County.

Wardner reports say low water in south fork of Coeur d'Alene and its tributaries is causing an increased demand for electric power. The Bunker Hill & Sullivan M. Co. is putting in three more motors. One of them, with a capacity of 100 H. P., will operate the compressor, while the other two, each of 50 H. P., will be used in the mill. Heretofore water power has been doing this work. The company has been taking on an average of 150 electrical H. P. This is utilized for furnishing lights for Wardner and Kellogg, and operating the company's electric railway from mill to mine, and its sawmill. At Sweeny, at the Last Chance concentrator, a 350 H. P. motor is being added. Electric power only is used at that mill.

H. L. Gray of Pierce City, near Greer, reports on his placer grounds, of 380 acres, taking in a part of French creek and its tributaries, he is putting in a bedrock flume 1000 feet long. It is half completed. Next summer he will run one stream. The ground has been worked on a small scale. The French Creek M. & Dev. Co., owning thirty-four claims adjoining, is running two stamp mills with satisfactory results. The shaft is down 100 feet on the main workings, with a drift of 140 feet. In addition there are 500 feet of work on the other claims owned by the company. A ledge 3 feet wide, giving average assays of \$11, has been opened.

The Olympia M. Co. has been incorporated, and owns a group of claims near the Mammoth mine at Wallace. The trustees are C. Cunningham of Wallace; E. K. Austin, A. Corbin, J. C. Cunningham, R. L. Ford, R. A. Freese and F. E. Lucas of Spokane, Wash.

Since the Federal M. & S. Co. took charge of the Standard and Mammoth mines at Mace it has been the intention to consolidate and operate them as one property, says the Wallace Press. To this end Mammoth No. 6 tunnel has been driven east and connects with the collar of the Standard shaft by a raise, which will be used as an underground ore bin, and skips have been put in the shaft, with skip pockets and air lifts, so that the ore will be automatically handled. Ore is trammed to No. 6 ore bin (which has been doubled in size and has capacity of 2000 tons of ore) by an electric locomotive, drawing a train, each car of which holds 45 cubic feet of ore. By this means all the ore will come out at No. 6, and eventually all the men and supplies will go into the collar of the shaft by the Campbell tunnel. This work is expected to be completed by Nov. 1st.

Wallace reports say the Golden Chest



M. Co., M. H. Hayman of New York president, has men at work improving and developing the group, ready for winter's work. The 20-stamp mill is overhauled, motive power being both steam and water, and is connected to the Idaho flume by a 1000-foot track, over which they are putting a snow shed. As soon as they have water to run the mill, they will drive the Idaho tunnel to connect with the Klondyke shaft. The United States Geological Survey party, which has been in the Cour d'Alene country for several weeks, consisting of F. L. Ramsome, in charge, F. C. Calkins, E. R. Zalkinski and assistants, has nearly completed its work of examining and marking all geological features, also taking surface and underground photographs.

The Samson M. & Dev. Co. of Wardner has let contracts for a tunnel. A pack trail 3 miles long has been completed, which connects with the main trail up Big creek. The claims are on Big creek, 3 miles above the Western Star mine, and have a silver-lead-bearing ledge, giving returns of 6% lead and eleven ounces of silver from the surface. A shaft is being sunk on a 2-foot vein of carbonate ore. The Paragon Co. is doing development, working two shifts, with J. Carter in charge. They are nearing the 36-foot ledge, for which they are crosscutting. The shaft is down 300 feet and the crosscut in 200 feet. The ledge is expected to be struck at a depth of 700 feet.

## ILLINOIS.

A strike of 800 hoisting engineers in 240 bituminous coal mines in Illinois went into effect Oct. 31. The engineers refuse to accept the  $\frac{3}{4}$ % reduction in wages which the miners agreed to. The strike affects about 50,000 workmen, but the operators expect many of the mines will be running within a few days.

## KANSAS.

### Cherokee County.

Near Galena the Merchants M. Co., of which S. Rhodes is superintendent, at Cave Springs, expects to have its mill in operation this week. They have put in a new pump in connection with the walking beam pump. They have opened up a lead prospect. The Palmetto mill No. 1 is running a double shift. Mooney & Co. have started up on the Page land, southwest of Galena, after a layoff of three weeks and are taking out pay dirt. G. W. Van Pelt has ground on the Bonanza tract, and will sink a shaft.

Shovelers' wages in Galena district have been raised fifty cents per day and operators are looking for men. Not only are experienced miners in demand, but laborers of any kind can get work.

At Baxter Springs E. T. McCarthy, of the Baxter M. Co., has bought the Goodwin interests in the Mission mine and mill, known as the Ford & Troupe mine. A 150-ton mill is on the ground and, as soon as ground is opened up so more men can be put to work, the mill will be run twenty-four hours per day. The Strong Bow M. Co. is sinking a shaft northwest of the Dark Horse mine. The Morea M. Co., which has a lease on ten acres of the Abrams land, west of the Dark Horse, has started a shaft. Ginder & Co. have made a rich strike of zinc ore on their lease of the Charters land.

## MISSOURI.

### Jasper County.

At Zincite, the Lucky Five mine is again in operation, also the Edgar County mine after repairs to machinery. The Big Rubin is operating three-hand jigs and hauling crush rock to mill. The Gibson M. Co., owned by Holmes, Cape & Rogers, is running four-hand jigs and has 30-foot face of ore. The Holiday M. Co. is building a mill on a new strike that shows a 14-foot face of ore. G. E. Ladd will work the pit south of the Catheline mill. He will also pump the Catheline lots, which will start several shafts. D. D. Duncan is superintendent and reports a strike on the point of Radish hollow. The Cold Day mine has started work. The Scranton M. Co. has prepared the jig beds and is producing again. The Harris mines report developing a good face of ore. The Daisy Bell mill is starting to run tailings and they will drain the ground for work.

A company composed of A. M. Wagner, J. Varner, S. Hillet al. of Webb City is drilling on land north of Carthage. The tract adjoins the Sloan-Aylor land where zinc has been struck.

The Three C. M. Co. of Joplin has been incorporated by W. Lockow of Milwaukee, Wis.; P. Hinkelmann, C. T. and J. Tasche, J. A. and O. Junck, J. Geren and F. Monika of Sheboygan, Wis.; E. Webb, C. A. Morsman and W. N. Andrews of Joplin.

The Reliance M. Co. has been incorporated by L. J. Stevenson and W. R. Robertson of Webb City, C. Moore, R. H.

and A. Corbin, R. G. Dodge, L. L. Rogers and L. E. Williams.

The Lula D. mine on the American Cornfield tract at Cartersville has been sold for \$30,000, and includes a lease on fourteen lots and the Lula D. mill. The new shaft has been completed and the mill put in operation. J. O. Craig of Webb City has charge.

O. S. Prince and J. R. Ridd of Carthage have leased six lots at Alba and have begun development work. They will sink a shaft. Webb City men are opening up ground at the mouth of Chitwood hollow. They have shaft down and showing ore. They are following a drill hole which shows ore from 50 feet to 92 feet. The company is composed of D. Craig, T. Hill, L. Mock, R. Morrison, J. Wigg, H. Irelan and J. N. Uttersen.

Stepp & Kaiser, operating on the Guinn land, near Webb City, are putting in additional steam capacity and will increase production. A. D. Hutton of Webb City and G. Wommack of Prosperity have bought the Cissna forty acres and will develop it for its mining values. It is in Joplin. The consideration is \$7000.

J. A. Graham & Co., in cleaning out an old shaft on the L. J. Stevenson lease north of the Gussie K., near Webb City, opened up a 25-foot face of lead-bearing ground.

## MONTANA.

### Jefferson County.

The Butte & Basin M. Co. is operating the King Cole group near Basin. The company is composed of Butte men and has shipped several cars of ore that has given satisfactory results. It is driving a tunnel on the King Cole, which is in 240 feet, and is also crosscutting the vein. The group consists of the King Cole, Tip Top, Time and Tide, Oxide and the Florence. P. J. McGowan, J. S. Davey and A. Thompson have a lease and bond on the Boulder mine, back of Basin, and are taking out ore. The lease also includes the stamp mill on Basin creek, which will be operated.

Work of cleaning out and retimbering the lower tunnel on the Minah mine, near Wickes, is progressing. The tunnel is 3000 feet in length. In addition to the main tunnel there are several hundred feet of crosscutting. The Minah is under bond and lease to J. C. Cory. The property is equipped with machinery, concentrating works, air compressor, etc.

### Lewis and Clarke County.

The Red Bird M. Co., which is developing its Copper Hill mines, near Austin, has completed sinking the shaft another 65 feet, and has crosscut to the vein, which carries iron, copper, gold and silver. The vein shows 17 feet wide. The company also owns the Red Bird mines, 2 miles from the Copper Hill, and the Reliance mine, in High Ore gulch, from which shipments have been made.

The Augusta G. M. Co. has been incorporated, with main office at Great Falls. The directors are H. Tegtmeyer, of Augusta, G. H. Stanton and C. Young of Great Falls. The company's mines are at Augusta.

### Missoula County.

T. C. Marshal of Missoula, of the Amador M. Co., says improvements are being made in the company's mines and equipment, and they have fifty men at work. More machinery will be put in. A railroad will be built from the mines to connect with the Northern Pacific.

### Park County.

At Cooke, C. R. Tuttle, secretary and managing director of the New World S. Co. of Seattle, Wash., and F. C. Byrne of Red Lodge, manager, have put men to work. A ditch will be dug to divert the waters of Clark's Fork from above the upper falls to a point on the New World placer where from the flume will be a fall of 50 feet. At that point the smelter will be built. The company will put in saw and lumbering mills on Lake View creek, near Clark's Fork river. G. L. Tanzer of Seattle, Wash., is president of the company. After June 1 next, the principal branch offices of the company will be in Livingston. The company will build a smelter this winter of 100 tons daily capacity and expects to add another smelter next summer. They have 5,000,000 feet of timber on their locations.

## NEVADA.

### Esmeralda County.

The Baltimore-Goldfield M. Co., which includes in its holdings the Fortune group, has been incorporated by President H. J. McGhan, C. D. Mercer, J. W. Skelton, E. N. Davis, M. Averill, A. L. Hudgens and E. R. Shields. The group consists of four claims in northern Goldfield, north of the Tonopah Club claim and west of the Goldfield-Tonopah M. Co.

### Humboldt County.

J. J. Burke of Salt Lake City, Utah, says he will build a 100-ton combination concentrating and cyanide plant at the

property of the Golden Eagle M. Co. at Golconda.

### Lincoln County.

The Old Roman M. Co., near Searchlight, reports a vein 50 feet in width. On the hanging wall a shaft has been sunk, showing average of \$15 in gold and 50 ounces in silver. On the foot wall there are 7 feet of ore which runs \$10 per ton, but no silver values. Between these two shoots there is low-grade ore, says Superintendent DePuy. He is driving a tunnel. The winze will follow the vein, and at a lower level a drift will be run to come out at the head of a canyon, which has been selected as the site for the mill.

The Caliente G. M. Co., near Caliente, is running a drift on a 4-foot ledge of decomposed free gold ore going \$30 per ton. They have run in 210 feet, crosscutting the ledge at 125 feet. They have run a drift 135 feet. They expect to put in a mill in the spring. C. H. Ross and M. T. Breck of Toronto, Ontario, have bought the Chessman group of gold-silver claims, fourteen in number. The claims are 42 miles northwest of Caliente, and have 1000 feet of work in shafts, tunnels and drifts completed. The ore averages \$32 in gold and 110 ounces in silver per ton. The ledge is 4 feet wide at the surface. G. Barton, half owner of the Princess group of silver claims, northwest of Caliente 52 miles, has bought out his partner. They have 300 tons of \$15 ore on the dump and 420 feet of work completed in two tunnels, both of which crosscut 6-foot ledges. The ore carries silver values.

## NEW MEXICO.

### Dona Ana County.

The concentrator at the Bennett & Stephens mine at Organ is reported in successful operation. Concentrates have been shipped running sixty-five ounces in lead and thirty-two ounces in silver per ton. Teams are hauling coal and supplies to the mines and concentrates to the railroad. Shipments will average three cars per week.

### Lincoln County.

The Vera Cruz M. Co. has its plant up, and has started operations on its mines, near Nogal. The plant has five Huntington mills for crushing the ore and also five concentrating tables. Ore averaging \$4 per ton is on the dump.

### Socorro County.

It is reported the Kelly group of mines of Magdalena district have been sold to J. B. Corliss et al. of Detroit, Mich. The mines are not producers of copper to any great extent, but copper ore is reported to exist, underlying the lead, zinc and sulphide ores which are being shipped.

## OREGON.

### Baker County.

Z. Houser of Sumpter is developing his Dixie group of six claims on Cougar ridge, near Quartzburg. The main working tunnel, a crosscut, is in 530 feet. At 150 feet it cut the vein on the Fraction claim, showing 3 feet, with pay streak 6 inches wide running \$30 per ton. A 5-stamp mill will be built. Other properties are being developed in the Quartzburg district, and the extension of the Sumpter Valley Railway, affording transportation facilities, will be built.

With fourteen men winter operations are started at the Citizens Con. G. M. Co. properties in Cracker Creek district, near Sumpter, and work will be resumed in the cross tunnel. The mine has been equipped with a six-drill compressor and the crosscut is in 220 feet. It cut vein No. 1, showing 3 feet of ore. The next vein expected to be cut is the Gold Coin No. 3, at 500 feet in and at depth of 375 feet. There are said to be four parallel veins in the group, the last two to be reached at 1000 feet. The group comprises thirteen claims and millsite (formerly the Gold Coin and Mountain Monarch groups which are consolidated), owned by Wheeling, W. Va., men, represented by J. R. Murrin. W. Priestly is superintendent.

Thirty stamps are in continuous operation at the North Pole mine, near Sumpter, and eighty men are working in the mine and mill. A larger compressor is being put in.

L. V. Swiggett, secretary and manager of the Orleans G. M. & M. Co., near Sumpter, says they cut the vein with a 100-foot crosscut on the lower level. A rush of water stopped operations until a pump can be placed in position. The Golden Chariot has been consolidated with the Orleans, and the name of the Golconda Extension G. M. Co. changed to the Orleans G. M. & M. Co.

Improvements started at the Columbia mine, near Sumpter, during the summer months are about completed. The Huntington mill is ready for operation in conjunction with the fifteen stamps. The shaft has been sunk 40 feet below the 700 level and a sump made. The pump will

be removed from the 500-foot to the 700-foot level, where a pump station is being out. Ore is stoped from the upper workings.

Excavations for the Maxwell mill, near Sumpter, are completed and the building is going up. The mill is on a site near the ore bins, preventing a repetition of damage by snowslides, which wrecked the mill last winter. For the present five stamps will be put in, but next season the capacity will be enlarged.

J. F. Lane of Sumpter has put men to work developing the Morning mine, in Greenhorn district, and will let a contract for driving the tunnel.

### Curry County.

Work is to be increased this winter by H. E. Matlock et al. of Portland on a copper mine in Curry county, 20 miles north of Crescent City, Cal. In the early days this mine is said to have shipped copper ore to Swansea, Wales, for reduction. Ore from one of the tunnels shows native copper.

### Douglas County.

Pending the erection of a concentrator and a leaching plant, Manager H. Banfield of the Rainbow M., M. & S. Co., near Bohemia, has suspended underground development. Banfield says the development completed on the Rainbow is 5000 feet. This work has been concentrated on one location. Six adit levels 100 feet apart have been established and drifts extended on the Rainbow main ore shoot, blocking out ore. The Rainbow has essentially a copper ore, gold values also being present. The group, consisting of nine claims, is on Drew creek, a tributary of the South Umpqua, both of which afford water power.

Superintendent W. B. Hartley, driving a tunnel on the mine of the Star Con. Co., near Bohemia, says a strike has been made. It is intended to put a 5-stamp mill to work next spring.

### Grant County.

First consignment of dredger machinery for the Crane Flat placers, near Granite, being operated by Burch & Burbridge of Spokane, Wash., has arrived. Excavating for the pond that will float the dredge is completed. Lumber for the hull is being delivered and the plant will be ready for operation in February next.

W. W. Gibbs of Portland, president of the Copperopolis C. M. Co. at Copperopolis, says he has increased tunnel work. Compressed air drills will be used.

### Josephine County.

At the Royal Group placer mines of the Royal Group M. Co., near Galice, they have driven a tunnel into the auriferous gravel deposits, and loaded 8000 pounds of powder, firing it last week. This broke and loosened up the side of the mountain. Hydraulic giants will wash the loosened material into the sluices.

Manager L. B. M. Simons of the Rand M. Co. of Bellingham, Wash., is putting in machinery at the company's mines at Galice. A boiler, engine and machinery equipment for a sawmill are included, and must be hauled over a 14-mile mountain road to the Yank mine. The company is developing the Yank quartz ledge, is operating a placer mine and is installing a sawmill to cut lumber for building and mining purposes. The Yank mine is across the river from the Alameda mine and said to be on same mammoth lode. There are five locations in quartz in the Yank properties and 500 acres of placer ground. The placers are equipped with hydraulic plant and 5 miles of ditches, taking water from Bailey creek. C. A. Chalmers has charge of the placers.

The Layman interests on Canyon creek, near Grant's Pass, including the Clark, Lewis, Iron Clad and Golden Age claims, have been sold to the Lewis & Clark M. Co., and J. L. Layman remains as manager. The ore is said to carry sylvanite.

The Carson & Miller placers, in Oscar Creek district, near Grant's Pass, have been bought by Foster & Gunnell of Grant's Pass for the New York & Western M. Co. for \$7500. This ground will be added to the Oscar creek hydraulic mines and is largely to give additional water rights and more dumping ground for the Oscar creek placers. Foster & Gunnell have also bonded the Jewell & Moore hydraulic mines, which adjoin the Carson & Miller.

The W. J. Palmer interests in the Kramer & Palmer group of quartz claims, comprising the Madrona, Golden Queen, Elwida, Little Granite, Riverside, Oakley and Golden Rule, have been sold to W. Kramer for \$30,000. The Kramer & Palmer mine is on Whisky creek, in Mount Reuben district, near Grant's Pass. The ledge is from 2 to 4 feet in width.

Preparations are made for increased work in the placers of north Josephine county, says J. Winton of the Wolf Creek D. Co., north of Grant's Pass. The company will start as soon as the rains bring



sufficient water to operate the four giants. A drift run into one of the company's claims shows payable gravel above bed-rock in deep ground.

## SOUTH DAKOTA.

### Lawrence County.

An addition to the tank room is being built at the Lundberg, Dorr & Wilson cyanide plant at Terry, in which additional vats will be set. The capacity of the plant will be increased to 100 tons per day, says J. Lundberg.

The Homestake M. Co. of Lead is completing its electric plant at Spearfish, replacing the one destroyed by the flood last June. The new plant is larger and better equipped than the old one, says the Review.

### Pennellington County.

The Black Hills M. Co., owning mineral lands 5 miles west of Rochford—about 1 mile west of Hornblende camp—is taking in from springs 2 miles west of its property a water supply. A trench is being dug and pipes laid. When this is completed they will proceed with sinking. The company has a shaft 800 feet deep sunk on a copper vein and is equipped with a steam plant. J. B. Taylor is manager of the company.—At Hornblende camp, the Black Eagle and Golden West companies are increasing work, the former in sinking its shaft to lower levels and the latter in completing its mill. The Golden West flume for water power from Castle creek is nearing completion, the mill building is completed and part of the machinery set up. An aerial tramway will be built from mine to the mill. It will be 1700 feet long. It is expected the mill will be ready for operation by the time the tram is completed, says President J. H. Fisher.

## UTAH.

### Beaver County.

W. M. White of Salt Lake City has a bond on the Hobson group of four claims adjoining the Majestic company's Harrington-Hickory mines on the west, near Milford. A ledge has been opened up through open cuts and inclined shafts, and shows values in silver, lead and gold. From these mines to the Majestic smelter is 5 miles. It is intended to run another tunnel.

### Jaab County.

Extraction of ore from the Victoria mine in Tintic, near Eureka, has started. Men have been working on the 800-foot level of the Grand Central mine on an ore body headed towards the Victoria. The boundary lines of the latter have been reached. At the dividing line the ore is reported to carry 100 ounces in silver per ton in addition to the other metallic contents. The Victoria mine will be operated through the Grand Central shaft.

The Bug Iron group of twenty-two claims, near Eureka, owned by H. Kruse, is being worked. They are running a tunnel which is in 200 feet, in the center of which are 6 inches of ore, with values in gold, copper, zinc and silver.

Manager H. Joseph of the Carisa mine in Tintic district, near Eureka, says he will begin shipping to the Bingham smelters during this week. Over 2000 tons of low-grade ore has been broken down, said to run from \$10 to \$15 a ton.—Damage resulting from the fire in the shaft of the Uncle Sam mine has been repaired and hoisting resumed.—The capacity of the ore bins in the Grand Central mine has been doubled. Sinking the shaft continues.

### Piute County.

The Gold Dev. Co., associated with the Log Cabin Co. in the Ohio mining district, near Marysville, has started work on eighty-six claims owned by that company. L. Neilson is in charge. The property is on either side of Bullion canyon and a tunnel will be driven. An air compressor plant and power drills will be put in.

### Salt Lake County.

The New England G. & C. Co. of Bingham owns the Nast group. Manager H. M. Adkinson says he has struck a 12-foot vein of lead-copper-gold ore on the tunnel level. During the present year he has placed in operation an experimental mill of fifty tons capacity. The plant will be enlarged. It is intended to put in an air compressor of four-drill capacity.

### Summit County.

At the Silver King Con. mine at Park City three shifts are grading for a hoist. Though the shaft is double compartment all the way down, only one cage is used, so a direct-connected double drum will be put in. Bailing skips will also be used.

Tracks and air pipes have been laid into the face of the Federal tunnel at Park City and three shifts of men working with machine drills are driving towards the Mazeppa ground.

The management of the Brown Eagle mines, in the Elkhorn district near Park City, will continue development work this

winter. A contract has been let for sinking the shaft. The officers of the company are F. D. Aubrey, president; O. F. Johnson, G. Wilson and J. H. Macdonald, manager. A hoisting plant will be put in. Tooele County.

Salt Lake reports say Minnesota and Utah men have bought 520 acres of land covering the extensions and being on the end lines of the Fiske, Ophir Queen, Buckhorn, Ophir Hill and Montana Con. properties, 45 miles southwest of Salt Lake City. J. A. Butchart of Duluth, Minn., is interested. The land has been bought from the Michigan Ore Co. Operations have been begun on the property by the Ophir Tunnel Co., formed last week. It is a tunnel proposition and 500 feet in. The mine is in Ophir gulch. The Clark interests have a road surveyed from St. Johns to within a mile of the mine, and it is expected track will be laid and the line in operation by spring. The company is piling its low-grade ore on the dump and will ship out all high-grade ore. The ore is silver, lead and copper, with gold.

Manager G. Dern of the Con. Mercur mine at Mercur says he will start construction of a sampling mill for that property.

Superintendent Raddatz says connections between the drain tunnel and the main Honerine shaft at Stockton will be made by Dec. 20. The tunnel is being driven at rate of 60 feet per week, and there are 400 feet farther to drive to get under the shaft.

## WASHINGTON.

### Ferry County.

At Republic, Superintendent N. Cochran has arranged with the smelters for the shipment of three carloads of ore a day, and has resumed work in the Mountain Lion mine.—It is said Manager E. L. Tate has contracts for shipping Quilp ore, with a combined transportation and treatment rate of \$4 a ton, and that work will be resumed in the mine this week.—The Pearl Con. M. Co. will resume sinking the shaft on the Lone Pine mine. It is stated that a compressor plant will be put in and driving and sinking in the mine will be done with power drills.

Work will be started at the Manila mine, near Keller, under the management of J. L. Harper. He will drive the lower tunnel ahead to the hanging wall. The vein has been cut for 100 feet on this level.

Work on the dam by the Keller & Indiana Con. S. Co., 1 mile above Keller, is progressing. Penstock and headgate for the flume have been built, and other flume work is being pushed. About 1,500,000 feet of logs have been cut and are being hauled to the mill.

Foreman Trahey has resumed work on the Park-Central mine at Davis camp, near Republic. The intention is to drive both ways on the vein cut in the tunnel.

### Okanogan County.

J. J. Bennett of Columbus, O., in charge of the Douglas Mountain M. Co.'s mines, near Loomis, has development under way. It is intended to run a tunnel in on the ledge.

### Stevens County.

R. K. Green of Spokane has bonded the Silver Queen group, 2 miles south of Kettle Falls, on the east side of the Columbia river, and will start work this week. A shoot on the surface, showing silver ore and gray copper running \$100 a ton, is said to be opened up. It will be developed by a shaft.

J. M. Fish, president of the Columbia River G. M. Co., whose mine is 2 miles east of Meyers Falls, says he will ship copper ore to the smelter.

Among the companies that have started quarrying marble near Northport is the Chewelah Marble Co., whose property consists of 400 acres, 5 miles east of Northport, on Deep creek, under management of A. J. Dunton of Rutland, Vt. Dunton says he has ten men stripping off several acres of timber, brush and soil. He has bought a millsite on Deep creek, where he can get 400 H. P., and will build an electric plant to generate power to run quarries, mills, etc. In case the Great Northern does not run a spur up Deep creek, Dunton says he has right of way for an electric road from the quarry to Northport. By March 1 he expects to have machinery in and open the property on a permanent basis. The Chewelah Marble Co. property is 1300 feet below the Last Chance mine.

### Snohomish County.

H. Bailey, secretary of the Smuggler M. Co., developing its properties in the Monte Cristo district, near Index, says work is progressing and the copper ore is of high value. The number of men have been increased.

At Index work has started on the Index M. Co., under direction of T. McIntyre. It is intended to continue the lower tunnel until the Crown Jewel ledge is

reached. It is expected a concentrator, machine drills and an aerial tramway to the railroad will be put in, says the Index Miner.

W. Cornwall has begun work on the Acme M. Co. (the "47") at Index. Development will be on the lower tunnel. A vein of chalcocite and bornite shows 30 feet in width. It is owned by Ohio parties. Machine drills and a concentrator will be put in next spring.

## WYOMING.

### Carbon County.

It is reported that E. A. Norton, C. E. Miese et al. of Cripple Creek, Colo., have bought the holdings of the North American C. Co., valued at \$5,000,000. The property of the company includes the Rudefeha mine, the Encampment copper smelter, the 16-mile aerial tramway connecting the smelter and the mine, and improvements in the town of Encampment.

Superintendent Putnam of the El Rey gold mine, in Purgatory gulch, near Encampment, for the Con. G., C. & C. Co., reports that the tunnel is in 150 feet and in ore. The average width of the vein is 2 feet. The company will sink a working shaft from the tunnel level. A wagon road will be built from El Rey to the Encampment smelter.

DeF. Richards says he will develop the Osceola and Osceola Jr. copper mines near the Ferris-Haggarty mines near Dillon.

### Fremont County.

At the South Pass mines, at South Pass City, men have been put to work by Manager Spry. Ore is being taken out. The Creaser mine is operating on a small scale. Work is being carried on in the 500-foot level and ore has been blocked out.

### Laramie County.

The Hecla M. Co. has let a contract for sinking 300 feet on its Louise mine, 25 miles west of Cheyenne. The present depth of the shaft is 175 feet and hoisting equipment has capacity of 400 feet. Two and one-half feet of high-grade copper is said to be showing in bottom of shaft. The company proposes to build a smelter at Cheyenne to handle its ores.

## FOREIGN.

### BRITISH COLUMBIA.

#### Boundary District.

At the sixth furnace of the Granby smelter at Grand Forks they are adding an electric charge car. By the conveying of the ore by this method several laborers are dispensed with.

By November 15 they will be shipping 600 tons of ore per day from the Rawhide mine at Phoenix, says Superintendent G. H. Collins of the Montreal & Boston Con. properties. Work is on the quarrying system. The Canadian Pacific Railroad spur to the Rawhide is being built and ore bunkers for the Rawhide will also be erected. On the Brooklyn Collins expects to be raising 300 tons daily from the mine itself. About seventy men are at work there. A skip is being put in.

Grand Forks reports say the Canadian Pacific Railway has closed a deal for the Cascade Power Co.'s holdings at Cascade, 13 miles from Grand Forks, and that the railway company proposes to build a smelter at Cascade.

#### Cariboo District.

The Cariboo Con., owning hydraulic properties near Cariboo, has amalgamated with the Gold Lands Corporation as the Cariboo Con., Ltd.

#### Cassiar District.

W. J. Robinson, head of the British-American Dredging Co. at Atlin, says the results of the season's work have been satisfactory. In the early part of the year, owing to hardpan being struck, the dredge was delayed in reaching bedrock. They are working the dredge on Gold Run in 32 feet of earth, averaging from surface to bedrock \$3 per yard, says Robinson. Timber and part of machinery is on the ground for a second dredger. Construction will be started in the spring. The new dredge has twice the capacity of No. 1. The properties on Spruce creek have been acquired at cost of \$88,000, and those on Tar Flats bought for \$55,000.

#### Nelson District.

P. Paulson of Seattle, Wash., has started work on the Flying Dutchman group of six claims at Hall creek, near Nelson. W. Hutchinson of Northport, Wash., is part owner.

#### Slocan District.

It is reported B. N. White, principal owner of the Slocan Star mine at Sandon, proposes building a zinc concentrator at Nelson.

The Two Friends group on Lemon creek, in the Slocan, reports progress. The property is owned by the Pioneer M. Co., Ltd., which is operating the Two Friends and Black Prince groups, both of

which are on second fork of Lemon creek, 9 miles from Slocan City, says Manager J. W. Moffat. On the Two Friends a showing of high-grade galena has been uncovered, which has been tapped at depth. To reduce cost of transportation and do away with hand-sorting the ore, a road has been built 3 miles.

### Vancouver Island.

The Nahmint mines, near Alberni, having been sold to a Portland, Or., company, Superintendent Cabel has started development work.

At the Britannia mine, at Howe Sound, machinery is being put in for treatment of ore on the ground. The concentrates will be shipped to the Crofton smelter. The intention is to put the works in shape to ship 500 tons of concentrates a day, says Manager Robinson.

## CANADA.

### Ontario.

J. Nash, at Rat Portage, reports discoveries of tin ore in the eastern end of the province. The claims taken up consist of five lots of fifty-two acres each, on which there are veins of tin-bearing quartz 50 feet in width. The property is within 4 miles of the main line of the Canadian Pacific Railway at Hawk lake.

W. E. H. Carter, provincial inspector of mines, says that in the Dryden and Eagle Lake gold belts, near Wabigoon, since opening up the Eagle Lake area, there are four properties working and these are owned by the Northern Light M. Co. and the Grace M. Co. The mines are at the west end of Eagle lake. The Baden Powell mine of the Northern Light Co. will put in operation a 5 stamp mill; El Dorado of the same company has a 2-stamp mill. The Pioneer Island mine is being opened up by the same company, while the Grace is owned by the Grace M. Co. From the latter a mill run has produced \$80 gold per ton.

### Yukon Territory.

The Yukon World of Dawson City gives returns of the gold yield in the Klondike for the current year to the close of September:

January.....	\$ 85,895 55
February.....	107,417 10
March.....	138,740 40
April.....	60 00
May.....	836,606 10
June.....	2,687,508 70
July.....	1,300,250 55
August.....	1,539,518 30
September.....	1,887,616 80
Total.....	\$8,593,733 90

From this it is estimated that the total product of the district for the year 1904 will reach \$10,000,000. During the same period, with the exception of the month of September, export was paid on gold at Forty Mile to the value of \$5385, and at White Horse on \$21,541.30.

## KOREA.

Korea possesses gold mines whose output increased from \$1,158,000 in 1898 to \$2,509,000 in 1903. It has also mines of iron, silver, copper, coal, etc. Most of the gold is exported to Japan. Iron, although present in large quantities, can hardly be said to be exploited. Iron used in Japanese foundries is obtained from China. Coal of medium quality is equally abundant, but little exploited. Copper is extracted in several districts. During the last two years 564,433 pounds of copper, valued at \$51,044, were mined. It is stated in the Seoul Morning Journal that the southern portion of Korea belongs to the Crown, and that it is necessary to have a special authorization to develop it. A request for such a concession should be presented through the diplomatic representative of the country of which the petitioner is a resident. As a rule these requests are denied, owing to the Korean's dislike of foreigners. The principal producing gold mines are in northern Korea, in Wunsan province, where the Oriental Con. M. Co. has a total of 200 stamps operating.

## MEXICO.

### Chihuahua.

The Compania Minera de Zola, S. A., has been incorporated in Parral to exploit the Zola mining claims in district of Naica, 16 miles west of Conchos station, on the Mexican Central Railroad. The officers of the company are: W. T. Swoyer, president; J. M. Guevara, E. Van Dreveldt, J. Perez and D. Garza. The property consists of 40 pertenencias 700 meters north from the San Pedro mine of Compania Minera de Naica. The ores of the Zola and the mines of the Naica district are lead-silver, which, owing to the excess of iron and lime, are said to be desired by the smelters. The company has completed a narrow gauge railroad from Conchos station and is shipping seventy-five tons of ore per day. The mine is said to be netting \$20,000 per month.

C. O'Calahan of Chihuahua City has bought the Nueva Chihuahua mine in Santa Eulalia camp. The property consists of 40 pertenencias and is near the



Santa Rita, El Carmen and Negrita mines. Compania Minera del Saltillo is putting in aerial trams from its Nazarena and other mines in San Pedro Ocampo district to a point where they will connect with a mule tramway to the station of Jazmal, on the Coahuila & Pacific Railway. The Saltillo Co. is owned by men of Saltillo, Coah., and J. M. Rodriguez is manager.

**Jalisco.**  
The smelter of Guadalajara, of which J. S. Diaz is principal owner, is completed and it will be blown in this month. The furnace is designed for lead ores with 100 tons daily capacity.

**Mexico.**  
The company owning the Esperanza mine, in El Oro camp, is putting in electric motors and accessories for 2700 H. P. at a cost of \$60,000. It is the plan to operate the plant with electricity from the plant at Nexaca.

During the fiscal year 1903-04 silver exported by Mexico amounted to \$78,987,891.12 as declared at the custom houses, as follows:

	Value.
In bar silver	\$45,748,106 94
In Mexican coin	18,635,595 00
In other forms	14,594,189 18

Total. \$78,987,891 12  
The total amount of silver coined in the three mints and put into home circulation during the fiscal year was \$22,025,450 in addition to the coinage exported, bringing Mexico's silver production for the year to \$101,013,341.

**Michoacan.**  
(Special Correspondence).—In Arrio district the Carrizal G. M. Co., E. B. Sanderson manager, is adding to its ore reserves in the Bella Vista shaft. Work is progressing in three levels, with stoping on the second. Sufficient ore is blocked out to run the present mill for eighteen months. In the third level pyritic ore is appearing. A steam hoist will replace the 4-horse whim which lately superseded the antigua method of carrying ore to the surface with "zirconas." Owing to the limited mill facilities, work has been suspended on the Fortuna shaft and other surface workings. A grinding mill of fifteen tons capacity will be installed. A cyanide plant is building. The solution, tailings and receiving vats are of rock with cement casing. The four tailings vats have a capacity of fifty tons each. G. H. Green is mine foreman.

Gold-silver-copper ore has been struck on the Filo de las Cortaduras, between the Rancho Concepcion and the Rio de Chuta.—J. Luna is working a few men on his exploration concession in the Barranca Blanca.—South of Los Posos nuggets are being taken out ranging as high as an ounce in weight.  
Gold is found in the black sand on the beach between the deltas of the Rio Balsas and the mouth of the Rio de Chuta, on what is known as the Playa Prieta, but it is not sufficiently concentrated in one place to warrant beach placering.  
Near the iron deposits of the Ferreria natives manufacture their own implements from iron smelted in stone furnaces. The charge consists of a certain amount of iron between three times its bulk each of pine and oak charcoal.  
Carrizal, Oct. 21.

**NEW ZEALAND.**  
Gold returns of New Zealand for month of September are reported at 42,259 ounces, valued at £161,767, compared with 58,542 ounces in September, 1903.

**SIAM.**  
British Consul Beckett at Bangkok reports mineral exports for Siam for 1903 at:

	Value.
Tin	\$6,462
Rubies	9,908
Salt	4,239
Lead	473
Sapphires	366

**Trade Treatises.**  
Catalogue No. 35 from the S. H. Supply Co., Denver, Colo., 8½x11 in., has in its hundred pages considerable of interest in the way of illustrated information concerning all departments of mine equipment, with prices and freight rates thereon.

Mine surveyors will find much of practical interest in the eighth edition of a "Manual of Modern Surveying Instruments," issued by A. Lietz Co., 422 Sacramento street, San Francisco, Cal. In addition to a description of their establishment, methods of manufacture and adjustment, and an illustrated price list of engineering instruments, it also contains a number of professional papers, notably one on "Stadia Surveying," by Otto von Geldern. It is sold for 50 cents.

**Personal.**  
H. C. CALLAHAN has returned from Australia to California.  
P. L. YOUNG has returned from Chile and goes to Mazatlan, Mexico.  
W. C. RALSTON has returned to California from Tonopah, Nevada.  
J. BROOKS is superintendent of the California mill at Park City, Utah.  
H. H. CLARK of Tonopah, Nev., is manager of the Bull Frog M. Co.  
A. I. GOODELL has resigned as manager of the smelter at Takilma, Or.  
A. C. CABEL is superintendent of the Nahmint mines, near Alberni, B. C.  
J. E. BARNES is foreman of the Goldfield Bonanza mine at Goldfield, Nev.  
J. L. HARPER is manager of the Manila mine, near Keller, Ferry county, Wash.  
R. L. POSTLETHWAITE of San Francisco is visiting the St. Louis Exposition.  
JESSE SCOBAY has returned to Hermosillo, Sonora, Mexico, from Denver, Colo.  
C. M. FUELLER of Denver, Colo., has returned there from a professional trip to Utah.  
L. S. JUDD is manager of the Copper Glance M. Co. mines, near Encampment, Wyo.  
H. A. BENNER is manager of the Judith Basin M. Co., near Lewistown, Mont.  
C. B. HORWOOD is assistant engineer with F. Hatch at Johannesburg, South Africa.  
J. D. YOUNG is manager of the Silver Cliff G. & C. M. Co., operating near Wallace, Idaho.  
WILLIS LAWRENCE has been appointed superintendent of the Red Lion group at Goldfield, Nev.  
A. M. YONGE is superintendent of the Tres Amigos gold mines at Abangarez, Costa Rica, C. A.  
GEO. A. TWEEDY of Los Angeles, Cal., is making an examination of Arizona mining properties.  
F. SMITH is superintendent of the mines of the Northwestern M. Co. at Caribou, Boulder county, Colo.  
E. W. WALTER is manager of the Takilma smelter at Takilma, Or., vice A. I. Goodell, resigned.  
A. A. KOCH, Ph. D., is instructor in chemistry at the Michigan College of Mines, Houghton, Mich.  
G. R. HANCOCK of Salt Lake City, Utah, is superintendent of the Curtis mines at Park City, Utah.  
L. NEILSON of Richfield, Utah, is superintendent of the Gold Dev. Co., operating near Marysvale, Utah.  
O. STEIN has resigned as manager of the Oro M. Co., in the Bradshaw mountains, near Crown King, Ariz.  
B. HELLER, president of the Oro M. Co., near Crown King, Ariz., will act as manager, vice O. Stein, resigned.  
C. H. HOYT, C. E., is instructor in civil and mining engineering at the Michigan College of Mines, Houghton, Mich.  
D. COPELAND, B. S., is instructor in metallurgy and ore dressing in the Michigan College of Mines, Houghton, Mich.  
C. F. BOWEN, M. S., and E. T. HANCOCK, B. S., are instructors in geology and mineralogy at the Michigan College of Mines, Houghton, Mich.  
W. J. RULE has resigned as superintendent of the Bell mine of El Rico M. Co. at Tuttle town, Cal., to accept a similar position at Goldfield, Nev.  
F. G. ADAMSON, of the Stephens-Adamson Manufacturing Co., manufacturer of belt conveying machinery at Aurora, Ill., sailed last week for Europe, on business.  
E. HODGE, formerly at the Negaunee, Mich., mines, has returned there from Bisbee, Ariz., where he has been underground superintendent of the Houghton D. Co. for two years.  
A. L. DORENUS, secretary of the Crocker-Wheeler Co., Ampere, N. J., is in Denver, Colo., making arrangements for a local manager at that point, vice L. P. Hammond resigned.  
M. M. GREEN has resigned as professor of mechanical engineering of the University of Colorado, at Boulder, Colo., to take charge of construction work for the

Acheson Graphite Co., Niagara Falls, N. Y.  
STATE ENGINEER WAYNE DARLINGTON at Boise, Idaho, has resigned, to take effect November 15th. Darlington goes to California to take management of the Bagdad Chase M. Co. of Stagg, Cal.

**Obituary.**  
J. McDERMOTT, a pioneer miner and mine owner of Bannack, Alder Gulch and Deer Lodge, Mont., died at Butte, Mont., October 19, aged 74 years.  
B. H. EATON, a pioneer mine owner of Colorado, and Governor of the State in 1885-86, died at Denver, Colo., on October 29th. Deceased was born in Ohio, December, 1833.  
A. J. MALLOY, manager of the Bingham-New Haven M. Co., died at Bingham, Utah, October 25. Deceased was formerly manager of the Dixie mines of the Utah & Eastern C. Co. in Washington county, Utah, and was at one time connected with Stratton's Independence mine of Cripple Creek, Colo.

F. SANDS, for the past seven years engaged in metallurgical and chemical investigations for the Boston & Montana C. Co. at Great Falls, Mont., died at Great Falls October 27. Deceased was born in New York City in 1858, and after studying at the Columbia University was with the New Jersey Z. & I. Co., New Jersey. For several years following 1888 he was assayer and chemist for the Butte Reduction Works and the Original mine at Butte, Mont.

**Commercial Paragraphs.**  
THE Witherill Separating Co., 52 Broadway, New York, was awarded a gold medal at the St. Louis Exposition.  
COLORADO IRON WORKS Co. of Denver, Colo., have an order for five of their improved 1904 model impact screens from the Montana Zinc Co. in Montana.  
A GOLD MEDAL was awarded to Wm. Ainsworth & Sons, Denver, Colo., for their exhibit of assay and analytical balances at the Louisiana Purchase Exposition in St. Louis, Mo.  
THE Broderick & Bascom Rope Co., 805 N. Main street, St. Louis, Mo., write regarding their exposition exhibit "We have captured the grand prize, which is the highest prize made to any one in that line."

THE Stoddard Metal Co. of Chicago, Ill., has been organized by E. B. Stoddard, A. E. Woodbull and others to manufacture babbitt metals, electrolytic metals and all the white alloys. The company's offices are located at 1164 Monadnock Block, Chicago, and its plant, which is entirely new, at 150 So. Homan Ave., Chicago.  
THE Denver Engineering Works, Denver, Colo., have orders for the following: One 150 H. P. double conical drum electric hoist to Montana; one 50 H. P. double drum electric hoist to Sonora, Mexico; one 50 H. P. single drum electric hoist for Oregon; one 30 H. P. double drum electric hoist for Chihuahua, Mexico; one 150 H. P. steam turbine motor for Denver, Colo. This company sold and started the first steam turbine at the Gold King mine, Gladstone, Colo., ever started in Colorado—a 250 H. P. direct-connected turbine dynamo.

MR. ERNST WIENER of the firm of Arthur Koppel, 66-68 Broad St., New York City, has returned from a three months' trip to Europe. He reports that general business conditions in Germany are very good. While abroad he made arrangements which will enable him in future to furnish any of the standard styles of railway materials made by his firm from a stock kept in this country. He also perfected a system whereby orders which call for special manufacture can be shipped promptly. In this way, he states, such difficulties as his firm has had in the past from delays in filling orders will be entirely obviated.

THE Jas. Leffel & Co., Springfield, Ohio, some months ago built a turbine for the Kosaka copper mine, Kosakamura, Rikuchu, Japan, owned by the Fujiti Gumi, F. Kuhara and K. Taketa managers. This was a 38-inch double-discharge, horizontal Samson turbine, to operate under a head of 104 feet and develop 850 H. P., at a speed of 360 r. p. m.; direct coupled to a General Electric Co. 500 K. W. generator. This outfit was shipped

on the steamer Calchas, which was captured by the Russians and taken to Vladivostok. The Jas. Leffel Co. then received a cable order from the Fujiti Gumi to duplicate the turbine, and this week made shipment of the duplicate wheel.

THE Westinghouse Companies, exhibiting at the Louisiana Purchase Exposition, advise us that they have been given awards by the International Jury as follows: Special award in the Department of Machinery for the best, most complete and most attractive installation; twelve grand prizes for alternating current generators and motors, alternating current turbo-generator installation, static transformers and rotary converters, direct-current generators and motors, electric railway motors, alternating current and direct current and control systems for single and multiple unit operation and for mining and industrial locomotives; horizontal gas engines and steam turbines; air brakes and friction draft gears; brakes for electric cars; driver brakes; air and steam couplers; air brakes and accessories; signal system; the development of the mercury vapor arc lamp. In addition, they were awarded eight gold medals for complete switchboards and controlling apparatus and the application of electric motors for mechanical purposes; alternating current, direct current and Bremer arc lamps and arc-lighting systems; electric measuring instruments; Nernst lamps; vapor lamps for photo-engraving; water and gas meters; industrial betterment work; the housing of the working classes. Four silver medals for switches, fuses and wiring appliances; incandescent lamps; electric light fittings; gasoline automobiles. And one bronze medal for electric switches.

**Books Received.**

Under the head of "Mineral Resources of the United States for 1903" the United States Geological Survey has issued "Production of Cement," with "Notes on Portland Cement in Michigan in 1903."

**New Patents.**

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:  
FOR THE WEEK ENDING OCTOBER 25, 1904.  
773,450.—MAKING ALLOYS—R. S. Anderson, Seattle, Wash.  
773,118.—SAW—W. W. Carter, Ballard, Wash.  
773,581.—DOOR OPENER—J. F. Connell, Los Angeles, Cal.  
773,379.—CATTLE GUARD—W. D. Dobler, Sumner, Wash.  
773,315.—PENCIL SHARPENER—R. J. Ellis, S. F.  
773,488.—OIL BURNER—C. B. Elmirt, S. F.  
773,281.—CONTAINER—W. E. Everette, Tacoma, Wash.  
773,203.—BLOWPIPE—E. H. Fosdick, Los Angeles, Cal.  
773,391.—FRUIT GATHERER—F. D. Hendrickson, Ambony, Wash.  
773,283.—FRUIT PICKER—J. B. Marshall, Fresno, Cal.  
773,337.—DREDGER—R. A. Perry, Oakland, Cal.  
773,221.—SLIMES WASHER—L. E. Porter, Camp Rochester, Cal.  
773,232.—SLIMES WASHER—L. E. Porter, Camp Rochester, Cal.  
773,954.—MEAT TENDERER—G. R. Sackett, Fennelon, Nev.  
773,526.—ADVERTISING DEVICE—L. L. M. Salsbury, Fruitvale, Cal.  
773,429.—BRIDLE BIT—H. A. Sievert, Walla Walla, Wash.  
773,976.—CAMERA—A. L. Swartz, Junction City, Or.  
773,497.—LOG TURNER—E. E. Thomas, Tacoma, Wash.

**Notices of Recent Patents.**

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:  
PENCIL SHARPENER.—No. 773,315. Oct. 25, 1904. R. J. Ellis, San Francisco, Cal. This invention consists in the combination with suitable supporting means, of a rotatable pencil support, a gear on said pencil support, a reciprocating knife carriage, and a rotatable part on said carriage provided with gear teeth, engaging said pencil support gear irrespective of the reciprocations of the carriage.  
DREDGER.—No. 773,337. Oct. 25, 1904. R. A. Perry, Oakland, Cal. This invention consists in the combination with vessel, of a frame or ladder extending from one side of the vessel's bow in a line diagonal to the vessel's length and terminating substantially on a prolongation of said central line, a shaft journaled upon the frame, an excavator fixed to the outer end of the shaft, a motor and connections between it and the inner end of the excavator shaft, a suction pipe and a suction pump upon the vessel with which said pipe is connected.

**Dividends.**  
Bunker Hill & Sullivan M. & C. Co., Idaho, dividend No. 85, \$75,000, payable November 4. Total since January 1, 1901, \$663,000, total to date, \$2,196,000.

THE WITHERILL SEPARATING CO., 52 BROADWAY, NEW YORK, WAS AWARDED A GOLD MEDAL AT THE ST. LOUIS EXPOSITION.

**Commercial Paragraphs.**

THE DENVER ENGINEERING WORKS, DENVER, COLO., HAVE ORDERS FOR THE FOLLOWING: ONE 150 H. P. DOUBLE CONICAL DRUM ELECTRIC HOIST TO MONTANA; ONE 50 H. P. DOUBLE DRUM ELECTRIC HOIST TO SONORA, MEXICO; ONE 50 H. P. SINGLE DRUM ELECTRIC HOIST FOR OREGON; ONE 30 H. P. DOUBLE DRUM ELECTRIC HOIST FOR CHIHUAHUA, MEXICO; ONE 150 H. P. STEAM TURBINE MOTOR FOR DENVER, COLO. THIS COMPANY SOLD AND STARTED THE FIRST STEAM TURBINE AT THE GOLD KING MINE, GLADSTONE, COLO., EVER STARTED IN COLORADO—A 250 H. P. DIRECT-CONNECTED TURBINE DYNAMO.

MR. ERNST WIENER OF THE FIRM OF ARTHUR KOPPEL, 66-68 BROAD ST., NEW YORK CITY, HAS RETURNED FROM A THREE MONTHS' TRIP TO EUROPE. HE REPORTS THAT GENERAL BUSINESS CONDITIONS IN GERMANY ARE VERY GOOD. WHILE ABROAD HE MADE ARRANGEMENTS WHICH WILL ENABLE HIM IN FUTURE TO FURNISH ANY OF THE STANDARD STYLES OF RAILWAY MATERIALS MADE BY HIS FIRM FROM A STOCK KEPT IN THIS COUNTRY. HE ALSO PERFECTED A SYSTEM WHEREBY ORDERS WHICH CALL FOR SPECIAL MANUFACTURE CAN BE SHIPPED PROMPTLY. IN THIS WAY, HE STATES, SUCH DIFFICULTIES AS HIS FIRM HAS HAD IN THE PAST FROM DELAYS IN FILLING ORDERS WILL BE ENTIRELY OBTIATED.

THE JAS. LEFFEL & CO., SPRINGFIELD, OHIO, SOME MONTHS AGO BUILT A TURBINE FOR THE KOSAKA COPPER MINE, KOSAKAMURA, RIKUCHU, JAPAN, OWNED BY THE FUJITI GUMI, F. KUHARA AND K. TAKETA MANAGERS. THIS WAS A 38-INCH DOUBLE-DISCHARGE, HORIZONTAL SAMSON TURBINE, TO OPERATE UNDER A HEAD OF 104 FEET AND DEVELOP 850 H. P., AT A SPEED OF 360 R. P. M.; DIRECT COUPLED TO A GENERAL ELECTRIC CO. 500 K. W. GENERATOR. THIS OUTFIT WAS SHIPPED

ON THE STEAMER CALCHAS, WHICH WAS CAPTURED BY THE RUSSIANS AND TAKEN TO VLADIVOSTOK. THE JAS. LEFFEL CO. THEN RECEIVED A CABLE ORDER FROM THE FUJITI GUMI TO DUPLICATE THE TURBINE, AND THIS WEEK MADE SHIPMENT OF THE DUPLICATE WHEEL.



### Latest Market Reports.

SAN FRANCISCO, November 4, 1904.

#### METALS.

**SILVER.**—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c, refined (1000 fine); San Francisco, 58½c; Mexican dollars, 47c San Francisco, 48½c New York.

**COPPER.**—New York: Standard, \$13.25; Lake, 1 to 3 casks, \$13.62½@14.00; Electrolytic, 1 to 3 casks, \$13.62½; Casting, 1 to 3 casks, \$13.57½; San Francisco: \$15.00. Mill copper plates, \$17.00; bars, 18@24c. London: £63 10s spot per ton.

Copper shows a further advance over last week's quotations, having advanced as predicted. Lake is now quoted at \$13.62½@14.00, which is a generally satisfactory price, though it may go somewhat higher. It is not the part of wisdom for those who control the copper market to advance the price to a figure which will bring the metal into too active competition with aluminum, though there are many uses for copper in which aluminum cannot be substituted. The largest use of copper is in the electrical field, and here the white metal is an active competitor, and in some instances is preferred, but the choice is usually determined by the relative price of copper and aluminum.

**LEAD.**—New York, \$4.45; Salt Lake City, \$3.50; St. Louis, \$4.12½ San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £12 12s 6d long ton.

**SPELTER.**—New York, \$5.40; St. Louis, \$5.00; London, £23 15s 3d ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

**TIN.**—New York, pig, \$28.87½@29.17½; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, \$32, 32½@35c. London, £131 15s 9d spot.

**PLATINUM.**—San Francisco, crude, \$18.50 ½ oz.; New York, ingot, \$19.00 ½ Troy oz. Platinum ware, 75 @ 82c per gram.

**QUICKSILVER.**—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 ½ flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

**BABBITT METAL.**—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100 lb. lots, 16c.

**ZINC.**—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

**NICKEL.**—New York, 40@47c ½ lb.; ton lots, 40@47c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

#### STRUCTURAL MATERIALS.

**IRON.**—Pittsburg, Bessemer pig, \$12.85 @13.10; gray forge, \$12.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$19.50; open hearth billets, \$19.50; San Francisco, bar, 7c to 12c ½ lb.

#### CHICAGO CURRENT QUOTATIONS.

Bessemer .....	\$15 00@15 50
Charcoal .....	15 50@16 00
Foundry Northern 1 .....	14 50@15 00
Northern 2 .....	14 00@14 50
Northern 3 .....	13 50@14 00
Southern 1 .....	14 65@15 65
Southern 2 .....	14 15@15 15
Southern 3 .....	13 65@15 65
Forge .....	15 35@16 35
Billets, Bessemer .....	@22 50
Bars, iron .....	1 35@1 40
Bars, steel .....	@ 1 47
Rails, standard .....	28 00@28 00
Rails, light .....	21 00@23 00
Plates, boiler .....	1 72@
Tank .....	1 57@
Sheets, 27 store .....	2 17@ 2 22
Angles .....	1 57@
Beams .....	1 57@
Tees .....	1 57@
Zees .....	1 57@
Channels .....	1 57@
No. 1 railroad wrought .....	12 50@12 75
No. 1 cast, net ton .....	11 50@12 00
Iron rails .....	17 00@17 50
Car wheels .....	12 00@12 50
Cast borings .....	5 00@ 5 50
Turnings .....	7 25@ 7 50

**WHITE LEAD.**—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ¾c ½ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ¾c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

**LUMBER.**—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

**NAILS.**—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45;

Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

**LIME.**—Santa Cruz, \$1.25 country, \$1.25 city ½ bbl.

**CEMENT.**—Imported, \$2.15@2.65 ½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 ½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

#### GENERAL SUPPLIES.

**ANTIMONY.**—New York, Cookson's, 7c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

**CAPS.**—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

**FUSE.**—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 11½c ½ set; 14 oz., 40s., 10c.

**COAL.**—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

**CHEMICALS.**—Cyanide of potassium, 98%-99%, jobbing, 23@24c ½ lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 ½ 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ½ lb.; Cal. s. soda, bbls., \$1.20@1.40 ½ 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c ½ lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1¼@2c ½ lb.; nitric acid, carboys, 8c ½ lb.

**OILS.**—Linseed, boiled, bbl., 53c; cs., 58c; raw, bbl., 51c; cs., 56c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Ecocene, 25c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

**ALUMINUM.**—No. 1, 99%, small lots, 37c ½ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c; Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

**BORAX.**—Concentrated, 6@7c ½ lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

**BONE ASH.**—Extra No. 1, 5@6c ½ lb., No. 1, 4@5c.

**RED LEAD.**—500 lbs. and over at one purchase, ½ lb., 7c; less than 500 lbs., 7½c.

**LITHARGE.**—Pure, in 25-lb. bags, 8@9c ½ lb.

**MOLYBDENUM.**—Best, \$2.75 ½ lb.

**CHROMIUM.**—90% and over, ½ lb., 80c.

**PHOSPHORUS.**—American, ½ lb., 70c.

**SILVER.**—Chloride, ½ oz., 90c@1.00; nitrate, 55c.

**MERCURY.**—Bichloride, ½ lb., 77c.

**MAGNESIUM.**—Pure, N. Y., 60c.

**MANGANESE.**—½ lb., \$2.75.

**SODIUM.**—Metal, ½ lb., 50c.

**BISMUTH.**—Subnitrate, ½ lb., \$2.10.

**URANIUM.**—Oxide, ½ lb., \$3.50.

**FIRE BRICK.**—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

**FIRE CLAY.**—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

**THE CALIFORNIA DEBRIS COMMISSION** having received applications to mine by hydraulic process from J. McGrath, in Red Rock Mine, at Howland Flat, Sierra County, Cal., draining into Slate Creek which reaches Yuba River, and from Douglas S. Cone and Charles L. Reynolds, in Smiths Blue Gravel Mine, near Ono, Shasta County, Cal., draining into Jerusalem Creek which reaches Sacramento River, gives notice that a meeting to receive any protests will be held at Room 96 Flood Building, San Francisco, Cal., Nov. 21, 1904, at 1:30 P. M.

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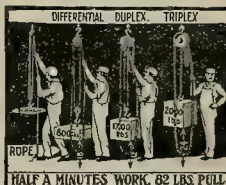
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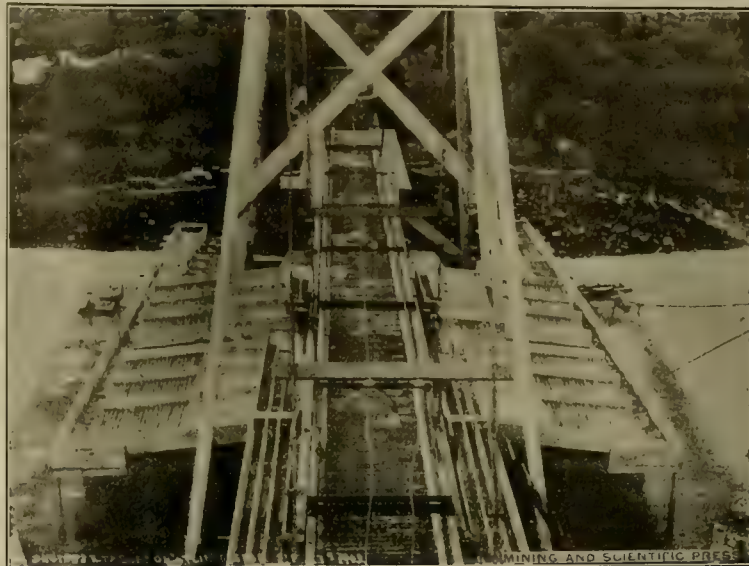
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## Some Object Lessons.

The recent cutting of the Kearsarge ledge at a depth of over 1000 feet in the workings of the Allouez company in the Lake Superior region is an important event in the history of copper mining in that district. The Allouez mine is about 3 miles north of the Calumet and Hecla and Tamarack group. The ledge was cut by a diamond drill operated from the bottom of the new 1000-foot shaft, the object being to locate the lode exactly in order that the proper curves might be arranged in continuing the shaft (which has been sunk at an angle of  $80^{\circ}$ ) to an intersection with the conglomerate bed which has a dip of about  $40^{\circ}$  at this depth. The shaft will be continued downward on the conglomerate. The Kearsarge lode is not always rich in copper, but at the Allouez it carries pay rock where cut by the diamond drill holes. This lode does not outcrop on the Allouez mine, but is seen on the surface both north and south of the property, which comprises 640 acres on the lode. In the history of mining by the Allouez company they have been much less fortunate than some of their neighbors, having had an unprofitable career. The original mine was opened on the Allouez conglomerate. The copper content of this large lode—30 feet in width—was low,



Dredger at Atlin, B. C., Showing Sluices and Riffles. (See Page 324).



Gold Dredger, Atlin District, B. C. (See Page 324).



R. E. A. & A. Co.'s Cyanide Mill, Bull Hill, Cripple Creek, Colo (See Page 331).

running usually under 1%, and the ore was difficult to treat. After an active period of eight years under corporate management the mine was closed down. It was then operated by leasers, who made it pay, demonstrating the value of practical management divested of unnecessary corporate expenses. Three years later the company resumed operations, which were continued for about five years, but without favorable result. Again the leasers took the property, again making it profitable, thus further accentuating the advantage of the leasing system on a low-grade mine. Following them for the third time the company again operated the property at a loss. In 1898 and later a large amount of money was expended on the Osceola lode in the Allouez ground, but the outcome of this operation was so unpromising as to cause a suspension of work again. Notwithstanding the continued losses of this company they started the Kearsarge shaft in 1903, which is now 1000 feet deep. The outlook for the Allouez mine is now said to be good, and the new development on the Kearsarge lode is expected to recoup all their losses of the past. The career of this mine is an unusually interesting one, for in its operation a very large amount of money has been expended, two different lodes have been extensively developed without financial success, and a third is now to be tried with a more promising prospect than before of success. The fact that on three separate occasions several years apart, leasers took the property immediately following failure on the part of the company, paid a royalty and made a good profit for themselves is worthy of careful consideration. The continued faith of the company in the property, and the determination to investigate its every resource, is also one of the phases of mining that is often lost sight of. It is not the first instance of success crowning persistent effort after repeated failure in the development of a great mine.

THE annual report of the Quicksilver Mining Company of California, recently issued, shows some interesting facts; the most notable of which is that the average grade of ore treated during the year ending April 30, 1904, contained only 0.448%; though in 1902-03 the grade of ore was even lower than this. The report also shows that if it were not for rents, and incomes derived from other extraneous sources, the company would have been only able to meet its expenses. The most important fact, however, is that the low grade of ore treated, less than one-half per cent, is just about sufficient to meet the expense of production when the mine and reduction works are operated on a liberal scale.



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IN British Columbia the coal miners' strike of a few months ago has had a reactionary effect, as during that period of non-production users of power installed electric or oil burning plants, and the demand for coal was largely diminished in consequence. When miners contemplate a strike it is always well to weigh seriously not only the probable immediate result, but the possible far-reaching consequences of their action.

THE usual amount of sickness prevalent in new mining camps is reported from Goldfield, Nev. The character of the illness indicates clearly the cause—neglect to care for oneself. Exposure, privation and physical inability to endure the hardships of a pioneer mining camp in a desert country, where water, provisions and fuel are high and nothing is cheap. The same conditions prevailed in Tonopah, and in every other large mining camp in Nevada, and in every other State throughout the West in its early history; but the stamper gives little heed to such matters as these, and words of warning and advice are usually wasted.

SOME of the great mines of Mexico now being worked by American or British capital have had an interesting history. Discovered in the seventeenth century, they have been worked vigorously for a period followed by years of idleness, succeeding which activity again prevailed with usually abundantly satisfactory results. The most noted of these mines have produced a series of bonanza ore bodies, each of which in its turn was discovered and worked out, following which the mine was abandoned for long periods. Usually the Mexican removes his ore as fast as he uncovers it, and there is seldom a large ore reserve in sight under the old regime. Systematic mining and development has to a great extent replaced the old-time methods.

## New Mining Districts of Nevada.

The rich discoveries made in southern Nevada since the first strike at Tonopah, about five years ago, are only what may have been expected, and there is no reason at this time to believe that all the claims worth having have been located. Within the past year in southern Nevada there have sprung into existence several new mining districts and camps—among them Goldfield, Crater, Gold Mountain, Bull Frog, Ray, Lone Mountain and Hannapah. The coming year will no doubt see a number of others—equally good, perhaps—added to the list. In the Great Basin almost every hill and mountain range that rises out of the desert plains contains mineral veins and deposits. This fact was learned many years ago, and as far back as the '60s, the districts of Hiko, Logan, Reveille, Silver Peak, Candelaria and numerous others were known to the mining world. These later discoveries were not made at that time, for the reason that the sections in which they occur are even more forbidding, if possible, than those above mentioned. It required a rich discovery like that made at Tonopah to stimulate the search for new deposits and veins, and they have been quickly found. It is reasonable to expect other important discoveries will be made along a northwest-southeast zone extending through these new mining districts. Each new important find aids in the discovery of others, for the reason that a new base of supplies is promptly established at the latest discovery, and from this point the prospectors branch out in every direction.

Good advice to those who contemplate going into southern Nevada is to go to Goldfield, or one of the other newly established camps, and there outfit, and prospect in a new region in which no discoveries have yet been made; for in the vicinity of the now well-known camps, like Tonopah, Goldfield and Crater, the country has been solidly staked for miles, and it is almost useless to hope to find a vacant piece of ground where there is the slightest prospect of value being discovered. It is in the extension of these fields to the northwest and southeast—and for that matter in any direction—that the opportunity for the prospector now lies. This mineral belt extends southeasterly through the Good Springs, Searchlight, Quartette and El Dorado canyon districts, and, crossing the Colorado river into Arizona, continues through Gold Roads, White Hills and the Cerbat districts, which undoubtedly belong to the same mineral zone. Within this zone the veins may individually have a dip and strike in any direction, but the general trend is as indicated, in a northwest-southeast direction. Beyond Cerbat mountains to the southward the zone of mineralization continues beneath the great lava fields of western Arizona, in the midst of which are the old McCracken mine, the Burro, the Hillside and many others, and beyond this through the mines of central and southeastern Arizona and into Mexico.

At Goldfield at present a peculiar condition obtains. The most important mines have developed very rich ore. It is well known that a great deal of this rich ore is being stolen; numerous cases have been proven. The miners are well organized and the greater part of the work is being done by leasers. With the leasers time is an important factor. Any attempt to search men in change houses is resisted, and, if insisted upon, would precipitate a strike. This means loss of time, and the lessees cannot afford to lose time; as a result, the work goes on rapidly and the leasers are making money—so are the claim owners and all others directly connected with the industry.

THE proposed covering of the walls of a shaft in Tuolumne county, Cal., with cement, to keep out water is an ingenious idea, but it must certainly be viewed in the light of an experiment until its efficacy is proved. The mechanical difficulties and expense may be easily surmounted, no doubt, in the hard granite country of that section, but ordinarily the exposures in shaft work are only relatively a very small portion of those made in mining, and that the application of a coat of cement to the shaft walls will have an important effect on the amount of water coming into the workings is extremely doubtful. Similar attempts have been made previously, but have never proved suc-

cessful. If it were merely the lining of a single opening like a shaft or a tunnel, where when this was completed no further work was contemplated, it might have some effect on the water, but where mining is in progress its benefit is doubtful.

THERE is a growing disposition to substitute, as far as possible, mechanical devices for manual labor in mines. The pick and gad have been replaced by the mechanical coal cutters in the coal mines. Electric or compressed air locomotives, or mechanical haulage, have replaced the old-time trammer, or the horse, in many large mines. Automatic skips have taken the place of cages to a great extent. Aerial tramways have supplanted other methods of transportation on the surface. Drill sharpening machines do the work of a corps of blacksmiths—and now mechanical loaders are successfully performing the work of the muckers. In stopes of low inclination the ore is passed to the cars on the level below by means of shaking chutes or by buckets traveling on a wire in a manner similar to the aerial tramway. In the mills and smelters ores, fluxes and all materials are handled by machinery, and manual labor is being displaced on every side. All of this innovation tends to reduce working costs, and the result is that the mine too low grade to work a few years ago has become the profitable proposition of to-day, giving employment to more men than before. A certain mine in Arizona a few years ago was equipped with a hoist and small smelter. Fifty men were employed and the mine paid handsomely—often \$100 per ton. There were large ore bodies in the property but these were too low grade to pay. Only the smaller rich portions could be successfully worked. To-day this mine has a capacity of 1500 tons daily. Its great stacks are fully equipped with every modern device, electric haulage, etc., and the profit is ten times as great as formerly, and it is the low-grade ore that is doing it all, and over 1000 men now find profitable employment at this mine.

THE zinc industry of the United States has been wonderfully stimulated by the large and constantly increasing demands for that metal for use in the cyanide process and in other industries. In the face of a constantly increasing production the price of zinc has advanced, and this has still further stimulated its output. Throughout the Rocky Mountain region and the Pacific Coast zinc ores occur in greater or less amount in many places, but the larger portion of zinc ores exists as sulphide, and is combined with the sulphides of iron, copper and lead. These ores, where the several sulphides occur in finely disseminated crystals, intimately intermixed, were, up to a short time ago, undesirable, as the zinc was not wanted by the lead smelter, and the lead and iron were not wanted by the zinc smelter. The electromagnetic separator, however, has made a clean separation of these several sulphides possible, and as a result the waste dumps of several districts suddenly became valuable for their zinc, lead and copper contents, besides at once rendering profitable a large volume of ore in place in the mines. Under the new conditions and the stimulus given the output of zinc by the demand for it, that metal has become an important factor in the mineral output of several western mining sections. Colorado and Utah have greatly increased their zinc output, and in British Columbia zinc has become a noted feature of its mineral production. In nearly all cases the zinc ores are shipped hundreds of miles to smelters for treatment, indicating that this class of ores will bear a long-distance transportation charge and a comparatively high reduction charge and still afford a profit.

THE profitable reworking of the old slag dumps and the ground about the site of the old Anaconda smelter at Butte City, Mont., is practical evidence of the improvement in metallurgical methods of the present over the past. The slag dumps of to-day may possibly become a source of profitable revenue to some careful worker in the future, but it seems hardly probable that such will ever be the case. Changes in metallurgical methods at Butte have been frequent in the past and are still being made, the object being to derive every possible value from the ores of the district in a series of continuous operations that nothing may be left for the future.



## CONCENTRATES.

PURE PYRITES—that is, pyrites comparatively free from arsenic—would be necessary in the manufacture of sulphuric acid.

THE dissolution of gold in the application of cyanide solutions is greatly accelerated by heating of the solution. Barium peroxide also has the effect of hastening the dissolution of the gold.

POWER may be taken from any part of a line or countershaft, provided the power desired is available. In order not to disturb existing pulleys and boxing, a split pulley may be employed.

WHEREVER in the West petroleum has been employed as fuel it has been found less expensive than any other fuel, excepting at coal mines and in a few isolated mountain districts, where wood is cheaper.

GOLD was known to exist in the Black Hills of Dakota several years before the discovery which precipitated the stampede in 1875-76. Hayden, Warren and other explorers referred to the occurrence of gold in that region as early as 1859-60.

THERE are few accidents in drifting through rock if the timber is kept sufficiently close to the face, but in order to save expense the face is sometimes allowed to advance too far before timber is put in, and the back falls with disastrous results.

THERE is practically no depreciation in copper wire due to the elements. Cutting and splicing will eventually render it useless. Copper wire as junk will about half replace itself. The life of an iron wire is from three to five years in a smoky district; in the open country from thirteen to fifteen years.

THE term "flux" depends upon what kind of a smelting operation is being carried on. What is a flux in one operation would not be in another operation. A flux is a material added which combines with the impurities and forms a fusible mass, a mass that will fuse at the temperature maintained in the smelting operation.

EUCALYPTUS is used in some portions of Australia for mine timbers and is said to answer the purpose admirably. The blue gums, a variety of eucalyptus grown in California, do not usually endure well when set as posts in the ground, but as far as known to "Concentrates" no attempt has been made to utilize them for mine timbers.

A "BLOWOUT" in miners' phraseology means an outcrop of quartz or ore of large size. It originated in the conception that veins were of eruptive origin. Usually an outcrop of this description is much larger than the normal vein, due to the mineral being of superior hardness, and as it disintegrates spreads over the slopes of the hillsides.

ONE foot of a 1-inch hole can hold five ounces of powder. In the anthracite coal mines a 25-pound keg is consumed for every forty tons mined; the bituminous coal miner can break 300 tons with the same amount. Long wall mining uses up very little powder; for pillar and stall work the powder costs about 18% of the gross cost of mining.

IT is not easy to give a definition of the word "apex" from the standpoint of the extralateral right in United States mining law that would be universally accepted. Probably as likely as any to meet with the minimum of dissent would be that an "apex is the point from the foot wall to the hanging wall at the top of the lode nearest the surface."

THE altitude of Death valley, California, at its lowest part, near Bennetts vells, is stated by the State Mining Bureau of California to be 427 feet below the level of the sea. The water in the wells in the valley contains much mineral in solution. There are a few small springs in the canyons bordering the valley, but none of these springs are perennial.

THE rhyolite sheet, covering the Homestake vein at Lead, South Dakota, and also some of the gold-bearing conglomerate of that district, is not an "overflow" from a crater, but a flat sheet injected between the strata from a dike or neck, and forms a portion of a laccolith. The same may be said of the porphyry overlying the ore-bearing limestones of Leadville, Colo.

THE rare metals, such as scandium, yttrium, lanthanum, erbium, ytterbium, etc., are difficult for the prospector to recognize when present, and, while these metals are valuable for experimental and other purposes, the demand for them is limited to a relatively small amount, and the discovery of a large quantity of any such metals would be of no great value to the discoverer.

In ordinary wire rope, if the wires in the strands are laid from right to left the strands are laid into rope from left to right. But in the "lang way" the wires are laid

into strands and the strands into rope in the same direction. The latter is more flexible than ordinary rope of the same diameter and same number of wires. The endurance of the rope is also increased because longer surfaces of the wire are exposed to wear.

NITRO POWDERS cannot be safely thawed before an open fire or by the direct application of heat from a fire. The practice of warming powder by placing it on top of a hot steam boiler is extremely dangerous and has resulted disastrously on more than one occasion. Powder may be thawed with safety in a can or other covered vessel surrounded by warm water, the heat being applied at moderate temperature and for a considerable period.

WHERE the main line shaft of a stamp mill is placed back of the battery, it is advisable to carry it on a line of timbers or concrete piers at least 30 inches above the floor. This makes the shafting always easy of access, and not difficult to repair. The shaft boxes should be solidly held in place by bolts well anchored, to resist the upward pull of the belts. Light is an important thing in a mill, and provision should be made for ample light in every portion of the building.

MINING CLAIMS located at any time during 1903 should have the assessment work required by law completed by January 1, 1905. There still remain forty-nine days in which to finish all assessment work. In those cases where the work cannot be completed by midnight on December 31, 1904, but is already in progress at the end of the year, the work should be continued daily until completed. In this way a claim which is "behind on assessment work" may be legally held.

THE collar of any shaft should be so built as to insure permanency. Whenever there is any earth at the surface the best plan is to dig a pit to bedrock sufficiently large to admit of building within it a substantial concrete wall, the inside dimensions of which shall be such that the timbers may be placed within the wall and connected with those forming the sets below. It is also an excellent idea to place a perforated pipe around the collar of the shaft through which a spray of water may fall upon the timbers, thus keeping them constantly wet, and greatly prolonging their life. This is applicable to vertical shafts only.

THERE is no essential difference between a fault fissure and a fault plane. Many rich mines occupy the "plane" of a "fault fissure," but all fissures do not contain veins. A vein may occupy a fissure which is not the plane of a fault, but simply a fracture in the earth's surface. A fissure may conform to the strike and dip of the formation in which it occurs, or may cross either or both, or it may be cut across a single stratum being limited in its extent by the mass of the strata lying on either side of the one in which the fissure occurs. Thus, a fissure may cut vertically through a bed of quartzite and be limited above by a stratum of limestone and below by shale.

A FOREIGN CORPORATION can not acquire mining property in Colorado without registering under Colorado State law. Without such registration it can not sue or defend in any Colorado State court; but it can so sue and defend in the Federal courts, for no State legislation can abridge the right given by the Constitution and laws of the United States to all persons to resort to the Federal courts. The Federal Constitution also provides that citizens of any State shall in every other State be entitled to the privileges and immunities of citizens of that State. Hence the Idaho corporation could find suitable recourse to the Federal law in its Colorado relations.

IN turning a vertical shaft to an incline having a departure from the horizontal of about 48°, it has been found that a curve built on a radius of about 80 feet from the bottom wall plate, or the rail, permits of rapid running, with practically no lessening of speed at the curve. In some instances this curve is modified by a transition curve of somewhat longer radius on approaching the tangents at either end. The latter provision is calculated to lessen the shock materially and is advisable. Where running is comparatively slow—under 800 feet per minute—the transition curve may be omitted, and at slower speeds curves of shorter radius are permissible.

THE operation of a pyritic copper blast furnace is unlike that of an iron blast furnace, and the conditions present in one furnace may be entirely absent in the other. For this reason the gases which may be advantageously used at the iron furnace cannot be employed at the copper stack, for the reason that they do not exist in the best practice. A good manager of a copper furnace will not allow the gases to escape from the charge at a higher temperature than the gases of a lead stack when running properly, and therefore the gases cannot be economically employed in heating the blast as in iron smelting. The gases from iron blast furnaces are inflammable. Those from a copper furnace are not.

THERE are three towns on the Homestake belt in the Black Hills of South Dakota. Lead is at the southern end of that portion of the lode exposed at the surface, the outcrop practically ending at the creek known as Gold Run. A mile northwesterly from Lead is Terra-

ville, where are located the Deadwood-Terra and Caledonia mines, and north of this is Central City, the upper end of which is known as Golden Gate, where is located the Father de Smet mine, the most northerly of the Homestake group. The several towns of the Cripple Creek district are Cripple Creek, Victor, Independence, Altman, Goldfield, Midway, Anaconda, Cameron, Elkton and Gillett. There is a postoffice at each of the places enumerated.

WHEN contemplating the treatment of tailings, or an ore, by the cyanide process, laboratory experiments on small amounts should first be made, and if fairly good results are obtained, a small plant which will treat 100 pounds or more of the material should be put in, and exhaustive tests made, before designing a large plant. Although much knowledge has been gained of the cyanide process and its various modifications during the past 12 years, it is evident that there still remains much to be learned. Experienced experimenters are constantly making innovations, and adding new and valuable information to that already gained. Some ores, at present considered to be unsuited to the process, like some others in the past, will be found adaptable to some modification of the process.

A BLAST FURNACE for the reduction of silver-lead ore could well be of the following proportions: Area at tuyeres, 48x144 inches; at feed floor, 7x13 feet; height of jackets, 41 inches to 48 inches; height of shaft from top of jackets to feed floor, 13 feet; height of charge (tuyeres to feed floor), 16 feet to 17 feet; bosh of jackets, 10 inches; volume of crucible, 77 cubic feet; volume enclosed by jackets, 180 cubic feet; volume of shaft from top of jackets to feed floor, 1243 cubic feet; total internal volume of furnace (up to the feed floor), 1500 cubic feet. With a blast of three to four pounds and tuyere openings of 3.5 inches the smelting capacity per twenty-four hours would be 140 to 150 tons ore, exclusive of fuel, limestone and slag, but inclusive of iron flux. The above dimensions give a hearth area (at the tuyeres) of 48 square feet, and an area of 105 to 112 square feet at the top.

THE Kendall system of electrolytic precipitation of gold passes a dilute cyanide solution through a mass of carbon fragments packed around a porous cup and connected as cathode of an electric current passing to an anode inside the porous cup, a voltage of 15 being employed. A carbon plate immersed in caustic soda solution is the anode. When considerable gold is thus precipitated, the compartments are emptied of their solution and a strong solution of cyanide introduced, while the carbon is now used as anode and a silvered plate as cathode inside the porous cell. The gold is dissolved off the fragments and deposited in regular form on the cathode. Professor Christy, Dean of the Mining College of the University of California, had previously pointed out the advantage of this general principle of working, collecting the gold on a small fraction of the surface upon which it is originally deposited.

IN order to do the assessment work for a group of claims upon one of them (patented or unpatented) the claims must be contiguous, so that each claim concerned may be in some manner benefited. The amount expended on this one claim must be at least equivalent to the amount which would be required if each claim were "represented" separately. The work performed or improvements made must manifestly be for the benefit of all the claims included in the group, and the burden of proof is upon the miner to show that the work done or the improvement made does, as a matter of fact, benefit each of the claims of the group. As large properties are usually developed systematically for the purpose of more economical working, the running of levels from a shaft which will eventually extend into adjoining claims may properly be considered as assessment work performed on all the claims, or for the benefit of all. The work may even be performed outside of the boundaries of the claims, or the work may be done on a patented claim for the benefit of adjoining unpatented claims.

THE mine pump should receive the same care and good treatment as is given any other engine if good work and endurance are expected of it. Some pumps will handle more grit than others. It is better to send small rocks up in the bucket than to attempt to raise them out through the pump. Every suction hose should be provided with a screen of strong wire outside the perforated iron to prevent coarse grit going up into the pump. It is this material that causes the valves to wear out so rapidly. Whenever possible suspend the suction from the timbers above the bottom of the shaft, and secure it in such a manner that the vibration of the hose, when the pump is in operation, will not cause the suction hose to come in contact with either rock or timbers, or a hole will be worn through the rubber in a short time. It is a good scheme to wrap the suction hose, or the lower two-thirds of it, with a ½-inch or ¾-inch manilla rope. This keeps the suction from being readily injured in the shaft. When it is desired to blast, the suction should be detached from the pump and hauled up above the shaft by single block and rope placed several sets above the pump for that purpose. The bulkhead is then made tight below the pump, which it may also have been necessary to raise by chain blocks. If these precautions are taken the damage to pump and suction will be greatly diminished from flying rocks.



## Quicksilver in Pan Amalgamation.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by W. J. ADAMS.

The tendency of the lead carbonate to combine with the amalgam may in a great measure be provided against as follows: Do all the grinding in the pan before the chemicals are charged, and after lifting the muller add chemicals, incorporate them, and then add the quicksilver, thus using the pan only as a mixer.

The deleterious influences of manganese compounds are counteracted by the judicious use of chemicals only; while on roasted ore it is generally impossible to prevent the addition of some of the lead and copper to the bullion.

So much for the character of the ores in general, though special remedies are known for particular cases, of only one of which I will speak. That is an ore in which the principal value consists of metallic silver. Here the muller must be kept down with constant grinding during the entire time the charge is in the pan. At Batopilas, Mexico, in 1881, the writer assisted in starting all the machinery of the newly constructed stamp mills, pans and concentrators, and the first charge put through the pans, after twenty-four hours' steady run with the muller raised, after the quicksilver was added, did not amalgamate 5% of the metal. This was done against the writer's advice, and it was only when nothing was accomplished that the metallurgist in charge, and as a last resort, finally agreed to allow this to be done. As a result, every particle of silver was amalgamated within fifteen minutes, and all subsequent charges only required two hours for each batch, instead of the twenty-four hours without the grinding.

We now come to the method of operation and we find that there are two distinct methods in vogue: That employing individual pans charged periodically by hand; and the continuous process, where the crushed ore and proper amount of water steadily pass through a series of pans, and afterwards through a series of settlers, from the last of which the tailings pass to the tailings pond. Though both of these use grinding, chemicals and quicksilver, there is a wide divergence in their operations; so that, though skilled only in the use of one, the operator requires special instruction to manipulate the other successfully. This variation is shown very greatly in the employment of the quicksilver, but to see the cause a short description of each method must be given.

**INDIVIDUAL PANS.**—In this method the ore is crushed and settled in tanks, the overflow of slimes going to a separate tank. When a pan is filled this slime is pumped into the pan, and sufficient of the sand shoveled in to make up the charge. Then either live steam is turned into the pulp, or the pans are heated by steam passing through a false bottom. The consistency of the pulp is made thick and the action of the heat still further thickens the pulp, till it becomes a paste that will hold up a large quantity of quicksilver in the form of globules. When the proper time arrives to charge the quicksilver it is poor policy to scrimp the amount used, and here is where the gold man makes his error. From repeated experiments made by the writer it was definitely determined that the minimum quantity of quicksilver should never be less than 300 pounds for a charge of 1½ tons, and 400 pounds is by no means too much. With a properly thickened pulp, the more quicksilver that is carried the more it will conduce to bring the greater number of metallic particles in contact with it, thereby not only increasing the extraction, but diminishing the time required for each charge. It will also admit of a smaller quantity of chemicals being employed, and in that way increasing the fineness of the resulting bullion. There are generally two pans to each settler, and the time in which the charge can be thinned and settled is dependent on the number of hours it requires to grind and amalgamate in the pan. When the charge is withdrawn a plug is extracted from a spout at the side of the pan, which discharges directly into the settler, and the pan is washed out with clear water and the pulp thinned in the settler. The greater part of the quick and amalgam settles at once and is drawn off through a well in the side of the settler, and falls from there, or is ladled into the straining sacks. The slow moving arms of the settler keep the coarser sand in suspension, but with as little agitation as possible, and the constant addition of water increasingly thins the pulp. The overflow passes through one spout below another to five in number, as time allows or the pulp becomes sufficiently thinned. If the chemicals are rightly added and the quicksilver kept clean and free from grease, the only loss will occur from chemically combined quick, in the form of corrosive sublimate or calomel, and the microscopic globules called "floured" quicksilver.

**THE CONTINUOUS PROCESS.**—In this the pulp, and sufficient water to carry it along, are fed into a pan and ground, and from this through the requisite series of pans and settlers, all of which are set on the same level and connected one with the other by horizontal pipes, the pulp slowly passing to its outlet from the last settler. Sometimes the fine grinding is done by pulverizers, occasionally two pans in the series

are used; but the grinding is completed first. In the succeeding pan the requisite amount of chemicals is constantly and automatically fed to the pulp, and in some instances this is carried on with two pans. Then, into the next succeeding pan or two, the quicksilver is periodically fed, and these pans all have the quicksilver wells on the sides similar to those attached to the settlers in both methods. All the pans are also steam heated to assist the chemical action; but the pulp is kept thinner than in the individual pan process, as otherwise it would not flow from one to the other. This results in a great difference in the quantity of quick to be used. Instead of 300 to 400 pounds to a charge, it is found absolutely necessary never to exceed 125 pounds, and the best results are obtained with 115 pounds. The method of application is to pour in 115 pounds, most of which will immediately escape through the well, and then take 15 pounds of this and pour it back into the pan. If the quicksilver was continuously fed in the quantity required, the danger of flouting and consequent loss would be increased an hundred-fold over the periodic dumping in of a smaller quantity from time to time, a large part of which is incorporated with the pulp and carried even to the tail flume of the last settler. To show the activity, and what might be called the mulish inquisitiveness of quicksilver in apparently opposing every physical law, it is only necessary to state that appreciable quantities of quicksilver will be found to have traveled against the prevailing direction of the current, and lodged in the pans which precede the one into which alone the quicksilver is poured.

The surface of the pulp is kept at a lower level in the settlers and clear water for thinning is continually added.

No account need be taken of the amalgamation of rebellious ores requiring roasting; as, in these later years it has been found better, both commercially and metallurgically, to use other processes. Commercially, on account of the wide distribution of smelters and the network of railroads, giving lower transportation and working charges, as well as quicker returns, and metallurgically because all the values, even of the associated metals, are saved, and to a much higher percentage than was ever attained by amalgamation. With this long, but necessary preamble, we now turn to the handling and condition of the quicksilver.

(TO BE CONTINUED.)

## Costs in Mining.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

The most important consideration in mining operations is the net profit that may be made, and the next most important matter is the cost of conducting practical operations, whether the enterprise be profitable or otherwise. The aim of every engineer and manager is to accomplish whatever may be required to be done at as low a cost as possible while doing the work thoroughly, properly and in a manner which will make it enduring. As a matter of course, it can scarcely be expected that the details of operation at any particular mine will be exactly duplicated in any other mine, owing to the many important differences that may and, in fact, always do exist. Nothing exemplifies this more strikingly than the difference in cost in performing practically the same work on different levels of the same mine.

On one level the ground may be comparatively easy, still requiring no timbering worthy of mention; on another the ground may be hard and short and progress accordingly slower and more expensive; on still another level the ground may be much softer and wet. Numerous cross fissures may be met, accompanied by heavy ground, and, though cutting is rapid, timbering must be done with often increased expense. On some levels work must be done not found necessary on other levels, and so from place to place in a mine conditions are found to vary.

The figures below are given with the object of showing the approximate cost of working under the varying conditions in a mine in Amador county, California. The conditions existing on the 400-foot level were unlike those found on the 700 level, and these two instances have been selected to indicate the differences in cost under the varying conditions. When the shaft (an incline) was sunk, prior to my management, it had been carried to the 740-foot point, with stations and levels opened at 200, 300 and 500 feet, but none at either 400, 600 or 700 feet. The 500 level was opened and considerable work was in progress there, also on the 300 level above. It was determined to open a station and level at 400 feet, and to do so, if possible, without interference with the regular working of the mine. Accordingly, experienced men were set to work with hand drills to cut out a station and ore pocket at the 400 level. The ground was of average hardness at first, and stood fairly well, so that the men soon made working room. The shoot openings were located in the shaft and the iron doors placed in position as quickly as expedient. The hanging wall side of the shaft was heavily lagged to reduce as far as possible any damage to the shaft from blasting. All rock broken in the station and in the ore pocket beneath was drawn into the skips after removal of the first few tons by shoveling. The dimensions of the station were:

Length, 40 feet; height, 11 feet at the shaft, 8 feet at the back end. The ore pocket was 35 feet long on the level, 12 feet wide and 20 feet (four sets) deep at the shaft. It was divided into two compartments—one for ore and one for waste. Although the back stood well at first, it soon required heavy timbering. The cost of this station, including the ore pocket (all of which was cut by hand, no machines being at the time available), was \$635.86, which included labor, powder, fuse, caps, candles, all lumber and timbers, supplies of every kind and the iron chute doors with wheels, pinions and racks.

The next 111 feet of the crosscut, immediately back of the station, was also driven by hand. This cutting was 5 to 5½ feet wide and 7 to 8 feet high. It required no timbering. The cost of this work was as follows:

Powder.....	\$ 51 18
Caps.....	4 20
Fuse.....	7 70
Candles.....	12 80
Labor (including track laying).....	1,013 00
Lagging (shoveling floors).....	84
Superintendence (apportioned).....	50 40
Total cost.....	\$1,140 12

The cost per foot (hand work) of 111 feet of crosscut was \$10.27. Upon the completion of this work machine drills were put in the crosscut and the next 262 feet was accomplished at a cost of \$1402.14, or \$5.35 per foot. No. 2 Hercules powder was used (¾-inch for hand holes and 1½-inch for machine holes.) The proportional cost of water power for compressing air to drive drills in cutting the 262 feet by machine was \$120, or 46 cents per foot.

The 700 level was driven from the shaft, being started in much the same manner as that on the 400 level. All holes in the station and ore pocket were drilled by hand. The dimensions of the excavation were practically the same as those on the 400 level. The cost of this station and chute was \$667.52, including timbers, lumber, supplies, chute doors (\$78.56) and other sundries. The cost of putting in the chute doors on the 400 level was about the same as at the 700 station. The next 52 feet were also driven by hand at a cost as follows:

Powder.....	\$ 54 00
Caps.....	3 20
Fuse.....	5 40
Candles.....	7 08
Labor.....	509 50
Superintendence.....	25 00
Total cost.....	\$604 18

The cost per foot was \$11.61, which is \$1.34 more per foot than on the 400 level, due to greater hardness of the ground, which was a "short," dry, hard and tough greenstone schist. In this crosscut 419 feet were driven by machines and cost as follows:

Labor.....	\$2,002 40
Powder.....	306 00
Caps.....	8 50
Fuse.....	17 50
Candles.....	19 00
Superintendence (apportioned).....	12 00
Total cost.....	\$2,425 40

The cost per foot by machines of 419 feet was \$5.79, being 44 cents per foot higher than the same kind of work on the 400 level. The cost of power to drive compressors was estimated at \$190, as there are four or five machines running in other parts of the mine. As the amount of hoisting from the two levels here referred to (400 and 700) only constituted a small part of the total amount of ore and waste and water hoisted from other parts of the mine, this item was omitted from both cost sheets, but it may be estimated at about 8% of the total cost of hoisting of ore, waste and water. This total expense for engineers, fuel, lubricant, etc., skip tenders, trammers and other expense amounted to about \$23 per day, or 7.3 cents per ton of materials hoisted—equal to an average of 22 cents per foot of crosscut on the levels here referred to.

## Production of Precious Stones in 1903.

G. F. Kunz is authority for the statement that interest in the production of precious stones increases in the United States from year to year. In a report recently made to the United States Geological Survey he gives the value of the precious stones produced in the United States in 1903 as \$321,400. This production was a little less valuable than that of 1902, which was rated at \$328,450, but was worth considerably more than that of 1901, which was valued at \$289,050.

The total value of the imports of precious stones in 1903 was \$26,522,523, as against \$24,753,586 in 1902, \$22,815,352 in 1901, and \$13,561,588 in 1900.

Mr. Kunz's report on precious stones is more attractive than usual this year, for it contains a great amount of miscellaneous data about the precious stones of other countries as well as those of the United States. The increased interest in this country in the production of precious stones has resulted in bringing together a splendid exhibit of these beautiful products of nature at the Louisiana Purchase Exposition at St. Louis, where thousands of visitors have seen and studied them.

This valuable report is an extract from the Survey's volume entitled "Mineral Resources of the United States, 1903," but it is also published separately, in pamphlet form, and may be obtained on application to the Director of the United States Geological Survey, Washington, D. C.



## Cinnabar in San Luis Obispo County, Cal.

The several quicksilver mines of San Luis Obispo county, Cal., all occur in the Santa Lucia mountains, in the northwestern part of the county. The ore deposits occur in zones having a certain parallelism,

near the New Almaden mines; but in neither this instance nor in the Santa Lucia mountains do these rhyolite dikes come in contact with the ore deposits. The sandstones are all the result of the consolidation of the detritus of granite (arkose), but by infiltration of silica they present many phases, from loosely coherent sandrock, to dense, highly siliceous rock

tact of sandstone and serpentine, the latter rock forming the footwall. The ore is siliceous and contains iron sulphide, as well as cinnabar. The hanging wall sandrock of this vein forms the foot wall of the second vein, which also carries iron sulphide, cinnabar and also native sulphur, due to decomposition of sulphide minerals. The mine is developed by inclines sunk on the veins from an adit tunnel. One of the accompanying engravings shows the massive outcrop and some of the surface improvements at the mine. An 8-tile fine-ore furnace is built near the mine. It is equipped with fourteen brick condensers. In this district is La Libertad mine, which also occurs at contact of sandstone and serpentine, and in this connection it is an interesting fact that every great quicksilver mine in the world occurs under similar conditions, though many occurrences of cinnabar are known in small quantities under similar as well as under different conditions; but no great quicksilver mines are known that are not directly associated with sandstone and serpentine.

The distribution of ore bodies in La Libertad mine is somewhat erratic. The cinnabar occurs principally in the seams of the rock, though disseminated veins also occur in the quartzitic rock forming the lode. In one portion of the property a zone is found 10 feet wide, in which occurs a vein 6 to 8 inches wide of rich ore, consisting chiefly of cinnabar and the more rare meta-cinnabarite. One of the accompanying engravings is that of La Libertad mine, showing the outcrop and the tunnel entrance. Both of the accompanying engravings are here produced by courtesy of the Sunset Magazine. On one portion of La Libertad mine mercury occurs, which can be obtained by panning the crushed ore. This mine is equipped with a 10-pipe retort for reduction of the richer ores.



Karl Mine, San Luis Obispo County, Cal.



La Libertad Quicksilver Mine, San Luis Obispo County, Cal.

though generally separated by considerable distance. The cinnabar deposits occur almost wholly at contact of sandstones and serpentine, and in the sandstone near the contact with the serpentine.

In the vicinity of the mines are intrusive dikes and masses of rhyolite. A rhyolite dike is also known

(quartzite). Among the later developments in this county is the Karl mine in Adelaide district. In this property are two veins running approximately parallel, but dipping in such a manner as to suggest the probability of the two veins uniting and forming one vein in depth. The most westerly lode lies at con-

## The Production of Magnesite in 1903.

Figures given in a report entitled "The Production of Magnesite in 1903," recently published by the United States Geological Survey, show that the United States furnishes only a small part of the total quantity of magnesite consumed in this country. Most of it, especially of fine quality, comes from the island of Euboea, Greece, although some is furnished by Austria. This mineral is a native carbonate of magnesia. In the crude state, the Grecian magnesite sometimes analyzes as high as 98% magnesium carbonate, but more often it averages between 94% and 96% magnesium carbonate, 0.08% ferric oxide, 0.52% silica and 0.54% water. Calcined at a high temperature for refractory purposes, the mineral analyzes from 82.46% to 96.25% magnesite; 0.85% to 10.92% lime; 0.56% to 3.54% ferric oxide and alumina; 0.73% to 7.98% silica.

In the United States the entire product of magnesite comes from California. During 1903 the quantity reported was 3744 short tons crude, valued at \$10,595, equivalent to 1361 tons calcined, worth \$20,515.

The production of crude magnesite is practically in the hands of one firm at present. The crude product is sent to the manufacturers of carbonic acid gas for calcination, and the calcined product is used by the paper mills. The demand for both crude and calcined magnesite is limited on the Pacific coast. Owing to a freight rate of \$13 to \$15 a ton on shipments to Eastern points, it is not shipped out of California except to the paper mills in Oregon. The production of California could be quadrupled if the demands of consumption warranted the increase.

The principal producing point in California is in the vicinity of Porterville, Tulare county, though small quantities still come from Chiles valley and Pope valley, Napa county. The most extensive deposit in California is in Placer county, but it is in an almost inaccessible mountain region where a very costly road would be necessary to get the product out, and the deposit has therefore not been utilized. Near Sanger, Fresno county, is another deposit which is now being opened. A deposit has been discovered also near Walkers Pass, Kern county, but it has never been developed. There are also unutilized deposits near Morgan Hill, Santa Clara county. The extensive deposits of magnesite on Red mountain, at a point where Stanislaus, Alameda and Santa Clara counties join, are now being opened by the American Magnesite Co. of Chicago, which has obtained control of numerous claims heretofore owned by individuals. Subsidiary companies include the Rose Brick Co., which is to manufacture magnesite brick at Oakland, Cal.; the American Carbonic Acid Gas Co., and the Plastic Construction Co.

In the crude state magnesite is used for the manufacture of carbon dioxide gas; calcined, it is used in the manufacture of paper from wood pulp, and as a refractory material in brick or concrete form for lining furnaces, covering steam pipes, as artificial lumber, as composite stone for lithographing, etc. Magnesium chloride is an excellent bleaching agent.

Calcined magnesite, generally in form of brick, is now universally recognized as the best material for lining open-hearth furnaces, cement kilns, etc. It may be employed to advantage wherever high temperatures and chemical reactions are detrimental to chromite and silica brick. The distinctive characteristics of a magnesite lining are durability, freedom



from moisture and silicic acid, and resistance to corrosion when exposed to the action of basic slags and metallic oxides. These qualities make the lining cheaper than most others in the long run.

The report was prepared by C. G. Yale, and is published in pamphlet form as an extract from the forthcoming volume, "Mineral Resources of the United States, 1903," which the Survey has in press. The pamphlet may be obtained on application to the director of the United States Geological Survey, Washington, D. C.

### Character in Mine Reports.

Among the interesting features of mine investment and promotion are the reports submitted by engineers and pseudo-engineers on mining properties. These are of many kinds. Some of them are elaborate in design, replete with statistics, and indicate a rare combination of engineering education and draughtsman's skill. Handsome photographs form an interesting accompaniment, and nothing, apparently, is omitted to make the report a complete exposition of the subject, and all that appertains to it. Other reports are brief, directly to the point, and conclusive. They are shorn of all unnecessary description and contain only that which the investor or his engineer would probably care to know. Little reference is made to other mines—the engineer making the report evidently having long since realized that in any event each mine must stand on its own merit, and can borrow nothing, at most, but glory from the great records of other mines.

Then there are reports that are crude and unlettered, plainly the attempt of the novice with a small fund of large terms. He usually quickly gets into deep water and flounders about in a sea of technical phrases, from which he escapes with difficulty.

Some reports are picturesque, viewed from almost any standpoint—scientific, statistical, historical, or otherwise. These usually deal in magnificent terms, tremendous veins and great values. A few millions, more or less, is a matter of little moment in reports of this stamp; but of all the reports that come to the notice of the investor the most interesting, perhaps, are those written by men who enjoy the implicit confidence of their friends at home, but whose knowledge of geology and mining is of the home-made type and based on a limited personal experience, though the writer of the report tries assiduously to impress his readers with the profundity of his knowledge of the subject.

Following is a report of this latter type, made by an eminent foreign engineer, whose painstaking observation is evidenced in his unusual phraseology and bungling of technical terms, though withal it contains some good, sound advice:

My DEAR SIR:—Before I start to write a report concerning the mines that belong to your company, I must relate to you events that occurred on my first visit to that country.

When I arrived at your mine at a glance I noticed that the formation was what the miners up there call black slate. The serpentine is further to the west. My first observation was to see if the incline was following the foot wall down—which is the only way to be done—for if a miner were to sink on an incline, leaving part of the vein matter between the track and foot wall, it would be dangerous to life and property, for some of the ledge matter might cave in at any time. So, satisfied that everything was all right—that to my mind that it was the foot wall, we went down the incline shaft, noticing the veins very narrow; no gouge; no clay. I was astonished. We alighted at the first level, which is 100 feet from the surface. Here, looking at the roof of the drift, I began to see the vein here and there. At a point 84 feet from shaft I found the vein almost perfect, showing about 5 feet of good milling ore between walls. Right here I made up my mind the mine was from 5 to 6 feet wide, looking like an ore body or shoot, as the miners call it here, but again I was disappointed—its inclination was to the north. There is no precedent in the Pacific Coast States for such a thing, for in all the mines I saw in the northern hemisphere all the ore bodies pitch to the south; and on the other hand, strange to say, in the southern hemisphere the ore bodies pitch to the north. It seems to me the great attractive power of the sun may have something to do with it, but, be as it may, I have no precedent in this country for such a case. I went down another hundred feet to the lower north drift. They were following the vein with some quartz here and there, and they were going in the right direction to strike the ore shoot. Here again I looked to the foot wall to see if I could find some indications of some gouge of clay—none; but I saw some quartz sticking to the foot wall. That put me out. That propensity appertains to serpentine formation, not to this formation. I said to myself, "look for the cause." I examined everything. I saw there had never been any disturbance in that hill. I looked again to the formation, it was the black slate, very eminent formation—it is primary, very uniform, always making nice walls, with clay gouges. Where is it? I was very much disappointed having no other, and seeing there the propensities of the serpentine, which formation is some distance to the west, and knowing that there is some connection between these two formations, I blamed the daughter for the sins of the mother. When I arrived from my trip I was the most disappointed miner in the country. Now to explain how things look now.

REPORT OF THE X—MINE.—With my companion we took the stage at H— for P—, where the mother

lode passes. They told me the distance was 20 miles; if that is the case, we crossed 20 miles of serpentine formation. Here, about 2 miles from the great lode, you can see very plain the work of that great agent, the metamorphic law, that serpentine, oval in its form, changing to tabular—the form of slate. Now you see the formation standing upright with a pitch toward the east, its trend northwest-southeast, being the direction of the mother lode. Now as we approach it, it already looks like slate, only with the difference that the tabular stratification is too thick yet. Now, if you alight from the stage and break a piece of that slate, you will see that it looks green inside and of fine grain. This tells us that it still retains the propensities of its origin. As we approach the west branch of the mother lode it is pure slate. I call it metamorphic slate, and it is of the primary formation and it has no similarity to the black or blue slate that we have here in several places in this State—for this order is a secondary formation, and sometimes we find there nice little gold mines of the second order. But as all the miners call it black slate, we will do the same hereafter in this report. This black slate follows the mother lode on the west side for an indefinite distance. I saw the same formation in Mariposa county. We are at the mine now.

The X— mine is a location of 1500 feet long and 300 feet on each side of the vein, but, for a distance of 1000 feet, commencing at the north boundary on the east side contains only 100, this will not affect your title in any shape or form, for your mine has the right to trespass in its inclinations your side lines, carrying with it the virtue of the 100 feet, and being the prior location, if it came to be connected with another mine of your neighbor everything belongs to you. You have the prior location, but you are going to need some of that ground for working purposes. The trend of the lode is northwest-southeast. Its inclination or pitch is about 65° to the east. The mineral formation is black slate, very uniform. It is a primary formation. We may call it one of the west branches of the mother lode.

THE PROBLEMS ARE SOLVED.—This time they took me to see the old shaft, and I see where north and a little higher up from our ore shoot they had a nice body of rich ore which gave splendid results in the mill. They took from there over \$25,000. That body of ore was connected with our shoot. That established the fact

work the mine calls for now, for I consider your superintendent as capable as I am, if not better, but anyway, I will give you my opinion:

1. Go ahead with that upper raise, to make connection as soon as possible.
2. To push the two crosscuts ahead, one to the east and the other to the west, to strike the walls.
3. Then after that you may get ready to go down another level.

About putting up a mill, the mine does not call for it yet—not until you have your mine better opened.

And all the ore that comes from the dead work pile it up in the dump and have plenty of reserve in the mine before you start the mill.

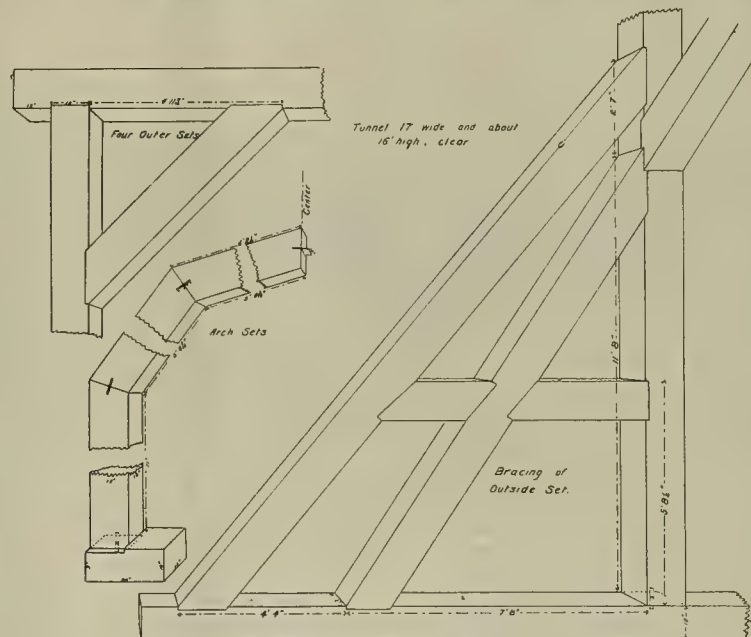
The ore that was worked in the mill, I am told, went from \$10 to \$20 per ton in free gold, outside of the sulphurets. The ore will be very good grade.

South of the X— mine comes the C— mine, 1500 feet following the lode to the south, with 300 feet on each side, then comes the L—, a full claim. These two claims are in the same lode as the X—, with the same formation. When developed, they may be as good as the X—.

In conclusion, let me tell you, that when advancing those two crosscuts, strike the walls of the lode, with the clay that I like so much to see there, then you can proclaim to the world that in the X— you have one of the best mines on the mother lode.

### Timber Frame for Tunnel Support.

The construction of most tunnels requires that the roof and sides be supported by either timber frames, or arches of brick, masonry or concrete. In Europe and the Eastern United States masonry and concrete are most commonly employed, but in the West timber is abundant, and therefore much cheaper than either of the other means of support mentioned. In mine work timbers in tunnel sets are usually framed with spreading legs and a single cap reaching from post to post, with lagging resting on the caps. The sides may or may not require lagging also. In some larger tunnels the methods usually adopted in mine tunnels



Details of a Tunnel Set.

that its inclination is to the south. How many headaches it would have saved me if I had seen that place on my first visit, but that was impossible, for it was full of water at that time.

In the first northwest drift all the work consisted of, from shaft to ore shoot, 84 feet, and from ore shoot to connect with the old shaft, 45 feet.

Now let us go down to the second level (the 200 northwest drift) and I will show you where a grand idea of your superintendent, Mr. J—, solved the other problem, by crosscutting the lode to the east and to the west, which established the fact that your mine now is 60 feet wide, and no walls yet on either side; so, you see, I am likely to have my clay yet.

The developments on your north drift, 200-foot level, consists: Length, 234 feet. Ten feet northwest from shaft they ran a crosscut due west of 27 feet. Another crosscut west 30 feet, and about 40 feet further ahead; another 24 feet crosscut to the east—towards the hanging wall—and about 35 feet in the upper raise. In this place they have quite a body of quartz, and I believe it will continue, all the distance they have until connections are made being 65 feet, that will make a nice reserve ready to stop when connection is made. In all the crosscuts and southeast drift native gold can be seen, but in small feeders. Some places quartz stringers or feeders are a foot wide. There is a network of them, coming from everywhere. In the southeast drift they are 24 feet from the shaft.

Now you ask me how wide the mine will be. I don't know. It may be 75 or 100 feet wide—the crosscut will decide that question. Again, you may ask me, "When are you going to strike that compact and large ore shoot?" I will say, "You may strike it in the level," for there is plenty of room now, or you may have to go down another level, but for that there is no time yet, for there is a great deal of work to be done in the present level.

There is no necessity for me to tell you what kind of

are often unsuited to the existing conditions, and the sets are framed in the form of a semi-arch as illustrated in the accompanying sketch, which shows the method adopted at a road tunnel between the counties of Alameda and Contra Costa, California. The sets generally are framed as shown in the lower left-hand figure, the sets at the portal being arranged as shown in the upper left-hand figure. To resist the possible thrust of the overhead weight on the interior sets the portal sets are reinforced by timber angle braces which act as buttresses, as indicated in the right-hand figure. This latter idea may be copied with advantage in the starting of some mine tunnels, particularly where the ground at the entrance to the tunnel is soft and likely to give trouble when wet. The design here shown is simple of construction, and if properly set up is likely to fully meet the requirements for which it is intended.

### Dredging for Gold in British Columbia.\*

In the Atlin mining division of British Columbia dredging for gold has become an important industry, though a large number of men still find employment in drifting, sluicing, etc., on their individual claims. On the larger holdings suited to dredger operations considerable "bore hole" prospecting has been done as preliminary to the installation of dredgers.

A dredger was last season placed on a group of claims on Gold Run creek, and an electric power plant installed on Pine creek near the falls. This plant has

\* See engraving front page.



a capacity of 500 horse power. In addition to this the company owning the dredger, the British-American Dredging Co., constructed a mile and a half of ditch, laid 1800 feet of 30-inch steel pipe, built 400 feet of flume and set up six miles of pole line, and put in other equipment and made improvements at their dredge camp. One of the engravings on the front page shows this company's dredger near Atlin. The other engraving shows the arrangement of the gold-saving tables provided with the various types of riffles. In addition to this enterprise, which it is intended to extend by the building of additional dredgers, there are numerous hydraulic properties at work on Pine creek and on Gold Run. Some companies operate both quartz and placer mines. On Spruce creek the mining is mostly of the smaller kind, and is done by individuals or small associations, who work their gravels in the usual way by sluicing. During the winter months a great many men get out the gravel from the bench claims by drifting, washing the gravel when the spring thaws and rains afford abundance of water for this purpose. On Birch and Boulder creeks in this district are also a number of mines, mostly of the smaller kind. Some of the larger companies have sustained heavy losses by the washing out of their flumes, dams and ditches. In several instances their entire season was lost by the destruction of improvements made the previous summer. Between the damage by spring freshets and falling off of water in the early fall the operating period of many of the large mines working by hydraulic method is reduced to 120 to 130 days. Some of the claims are rich, however, and pay well during the short season when they can be worked.

### The McLaughlin Tractor.

The illustration herewith is a good example of the work performed by a McLaughlin traction engine, the latest addition to the ranks of powerful engines of this class for which California has become famous. Rigid simplicity, perfect proportions, with proper distribution of weight to obtain maximum efficiency at the drawbar, are claimed by the manufacturer. The engine, as illustrated, is pulling a gang of forty plows, cutting 33 feet wide at a speed of 3 miles per hour, at times on a 15% grade, and at a stated cost of 25 cents per acre. The boiler is of the well-known vertical submerged tube type, as specified by the United States Government for boilers of this class, and is tested at 220 pounds hydrostatic pressure, the submerging of the tubes being designed to obviate possibility of leaking from overheating. The engines are duplex; cylinders 8 inches diameter by 11 inches stroke, fitted with balanced piston valves and guides of the Corliss type. The reversing mechanism is designed to afford durability and positive action. The transmission gears are of cast steel throughout, few in number transmitting the power direct from the engine shaft to driving wheels through the medium of only one countershaft. The whole transmission contains only five journal boxes which are provided with self-oilers. Owing to the work to which such machines are subjected, it is necessary to devote similar special attention to the construction of the wheels. The tires consist of two or more rings of Channel steel with the flanges extending inwardly, the abutting flanges riveted together and integral with the rim, maintaining rigidity. The spokes consist of flat steel bars riveted in sockets in the hub, and meeting in trussed form between the hub and rim, bracing the wheel with minimum tensile strain on the spokes. Oil, wood or coal may be used as



The McLaughlin Tractor.

fuel, and the saving in cost for work performed by them as against animals is obvious.

The tractor engine illustrated is built and furnished by the McLaughlin Manufacturing Co., 24-26 First street, San Francisco, Cal.

### Geology of the Treadwell Ore Deposits, Douglas Island, Alaska.\*

NUMBER VI.

Written by ARTHUR C. SPENCER.

**METALLIC MINERALS.**—As shown by the mill records, the metallic minerals, or sulphides, constitute about 2% of the Treadwell ores. They consist mainly of iron pyrites, and a considerable amount of magnetite is also present.

Pyrite occurs both in the rock and in the veinlets, but the position of the sulphides has no apparent influence on the gold content. In the rock it invariably has the form of minute cubes, from a size scarcely visible to the unaided eye up to about 1 millimeter, rarely larger. It is distributed sparsely through the diorite accompanying the secondary minerals, especially the albite and calcite, though where these are not present it is associated with epidote and uraltic hornblende. In the reticulating veinlets the pyrite occurs either as separate cubes, often several millimeters across, or in bunched aggregates, forming "turkey-egg rock" which usually contains more than average values.

Magnetite occurs only in the form of minute grains outside the veinlets. Part of it appears to have been an original constituent of the diorite, but much of it was deposited secondarily along with the pyrite, perfect cubes of which it sometimes surrounds.

Stibnite occurs in minute needles, and though seldom visible to the naked eye the microscope shows that it is widely distributed in various parts of the mines. As a rule, it occurs imbedded in calcite, but it is sometimes in the secondary albite. Pyrrhotite often accompanies or takes the place of the pyrite and may be readily isolated from the concentrates by means of a magnet. Chalcopyrite, galena and sphalerite occur sporadically, and native arsenic, realgar and orpiment have been noted in small quantities. Assays are said to indicate the arsenical nature of much of the pyrite, though the presence of true arsenopyrite has not been recognized. Molybdenite is frequently noted, though it is irregularly distributed.

**OCCURRENCE OF GOLD.**—Visible gold has been observed in veins of coarsely crystalline calcite enclosed in the ore bodies. This occurrence is, however, rare, and in general even the microscope does not reveal the form in which the precious metal exists. I have not been able to distinguish gold in the thin sections studied under the microscope, but Professor F. D. Adams, who examined the material collected by Dawson in 1887, observed gold mechanically enclosed in crystals of pyrite. It is evident that a considerable amount of gold must be in the metallic condition, because a large proportion is saved by amalgamation, the amount sometimes being as high as 75% of the total assay value.

The gold is perhaps mainly associated with pyrite, but rather coarse crushing is the present mill practice where slot screens equivalent to 18 and 20-mesh wire screens are used, and so much of the pyrite passes the screens in comparatively large grains or unbroken crystals, that it seems open to doubt whether from 60% to 75% of the gold could be free milling if it were all associated with the iron sulphide. The non-amalgamating portion undoubtedly does occur with the pyrites, because the concentrates contain only pyrite and magnetite, with a small amount of pyrrhotite, all the stibnite and molybdenite going into the tailings. The portion which amalgamates readily may occur with the stibnite or with the gangue. Molybdenite can hardly be

values. The values vary with the amount of interstitial vein matter, but the position of the pyrite in the rock or in the quartz and calcite seem to have no influence upon the amount of gold. In some places, where the ore is of average grade, all the metallic minerals seem to be in the rock, and careful search is necessary for the discovery of any sulphide in the quartz or calcite. Elsewhere the sulphides may be almost entirely confined to the veinlets. A limited amount of material is mined which contains practically no stringers of quartz or calcite, the sulphide being disseminated through the mass of the rock, for instance, in the crosscut on the 440-foot level and in stope No. 1 of the 330-foot level in the Treadwell mine. In other places material of similar appearance, containing an equal amount of pyrite, yields only a very small amount of gold.

**METASOMATIC ALTERATION.**—As already stated, the Treadwell ore bodies are dikes of albite-diorite filled with reticulating veinlets of quartz and calcite, and permeated with metallic sulphides carrying small amounts of gold.

From the structure of the deposits, it is evident that the dikes were subjected to pressure which caused fracturing, whereby they became porous, affording channels of easy circulation for underground waters. The minerals in the ores and their mutual relations suggest that carbonated and mineral-bearing solutions found the broken dikes and continued to move through them for a very long period. In transit these waters attacked the minerals of the albite-diorite, decomposing them, and in some cases effecting more or less complete metasomatic replacement. As a rule, the hornblende and mica of the original rock have entirely disappeared, their place being taken by aggregates of secondary minerals, sometimes including metallic sulphides. A few specimens of relatively unaltered material indicate that the original rock characteristically contained two sorts of feldspar—albite-oligoclase and microperthite. The first occurs in phenocrysts of fairly definite form, often showing concentric structure, and always clouded by decomposition products, excepting for clear rims, which are usually narrow. The microperthite, which has the mottled appearance of this minute intercrystallization of albite and orthoclase, is entirely interstitial as regards the albite-oligoclase. It is usually nearly free from decomposition inclusions, and is ordinarily accompanied by some clear albite. When pyrite occurs in such slightly altered material, it lies in or next to decomposed hornblende crystals. Most of the rock has suffered considerably more alteration, and pyrite occurs throughout the interstitial ground mass. Its introduction has apparently been accompanied by breaking down of the microperthite, for this mineral, so abundant in the comparatively fresh rock, is usually entirely absent when the sulphide occurs outside of the decomposed hornblende—that is to say, in the interstitial feldspar. In the most altered rock the place of the microperthite is taken by an aggregate of small albite crystals, and this mineral is regarded as a secondary replacement of the original feldspar. In some cases the replacement has gone so far that the crystals of albite-oligoclase have been attacked. This feature is relied on in part to prove the secondary nature of the albite, for intermediate stages, in which the microperthite is only partially replaced, were not noted during the preliminary study of the thin sections. Still more conclusive evidences that the albite is of secondary origin are its occurrence in veinlets cutting the old feldspar, the fact that it is found intercrystallized with calcite, both in veinlets and throughout the rock itself, and the fact that where albite forms the interstitial material instead of microperthite, pyrite and often stibnite are present, embedded either in the feldspar or in the evidently contemporaneous calcite.

The alteration of the Treadwell diorite is regarded as a phenomenon which accompanied the formation of the veinlets which intersect the rock, and the metasomatic action is attributed to the same solutions as those which deposited the quartz and calcite. The minerals last named appear to have been for the most part introduced, but the albite is believed to have been formed entirely, or nearly so, from the previous minerals of the diorite, because it is not found in the larger vein fillings. It is commonly observed that where both calcite and quartz are present in the fractures, the former usually occurs next to the walls, and it always permeates the rock to a greater or less extent. According to Lindgren, alteration of the sort here described has not been previously recorded, for though albite occurs as a vein mineral in California, it has not been detected among the metasomatic minerals in the wall rocks of veins.

In this connection, however, reference should be made to pseudomorphs of albite after adularia from St. Gotthard. These are described by Bischoff, who gives an extended discussion of the probable chemical reactions involved, and suggests the competence of waters containing sodium chloride to effect the observed replacement of potash feldspar by soda feldspar.

The occurrence of values in the wall rock to such an extent as is observed in the Treadwell ores is also somewhat unusual, though not unique. So far as it was possible to ascertain, the position of the sulphides

\* Abstract Am. Inst. Min. Engs.



in the rock or in the veinlets has no influence upon the gold tenor.

**THE ROLE OF THE BASALT DIKES.**—In his discussion of the genesis of the Treadwell-Mexican ores, Dr. Becker leaves some doubt as to the importance which he desired to assign to the basalt dikes as mineralizers. He says that the genesis of the ores is probably connected with the dikes, but afterwards suggests the relative unimportance of their influence.

In the Treadwell and Seven Hundred Foot mines two narrow dikes of the basalt are observed in a zone of sheeting, which is undoubtedly later than most of the veinlets in the ore mass. A small amount of calcite is found along their selvages, but they contain little or no pyrite. Upon the west or hanging wall side the ore is somewhat richer than it is between and beneath them, but it seems that this variation in gold tenor can not be attributed to the dikes as mineralizers, because the rock between them is not enriched, as might be expected had they been an actual source of gold. It seems likely that a rearrangement of values by relatively recent circulation has been going on, and the course of the currents may well have been controlled by the zone of sheeting in which the dikes occur; but secondary migration of this sort must be distinguished from the original mineralization, the extensive results of which in the neighborhood are entirely beyond comparison with the effects directly or indirectly attributable to a pair of narrow dikes of this sort. It is now believed that they have no connection with the formation of the ore.

Other basaltic dikes occurring in Gold creek are regarded as practically of the same age as those on Douglas island, and these are also unmistakably younger than the gold-bearing quartz veins of that neighborhood.

**ORIGIN OF THE FRACTURES.**—Upon the fracturing of the Treadwell dikes their impregnation with gold-bearing sulphides is evidently dependent. The systematic arrangement of the reticulating veinlets in two main sets standing at right angles to each other and dipping in opposite directions led Becker to the conclusion that the fractures had been produced through compressive shearing stresses. He suggested that these stresses were caused by nearly tangential forces acting in a direction normal to the common strike of the two sets of fractures, which is also approximately the strike of the country rocks. The fact that the fractures are due to compressive thrust need not be questioned, since the theory of the subject has been so ably developed and so fully corroborated by experiment. Some doubt arises, however, as to the direction in which the forces may have been applied, because the geological history of the general region since the diorite intrusions seems to indicate that no widespread lateral compression has taken place. If tangential shortening has been going on, evidences of the fact, independent of the fracturing, has not yet appeared. On the other hand, a study of the wide physiographic features of this portion of North America has shown that a succession of continental uplifts has taken place since the period of the diorite invasion, and it seems necessary to suppose that such radial movements would tend rather toward areal dilation than toward contraction, as in the opposite case of tangential compression.

It is suggested that the general fissuring throughout the Juneau district may have been caused by gravitative adjustment in the rock masses, tending to restore internal equilibrium disturbed during the uplifts which are known to have taken place. The rocks of the district consist of alternating beds of greatly varying physical character, and they possess an eminent cleavage structure parallel with the stratification. Under stress such rocks would yield more readily along the pre-existing structure planes than in other directions. That this old structure has, in fact, taken up most of the internal movement during the later deformation of the rocks is evident from the occurrence of so large a majority of the veins in parallel position with it, and it may be supposed that this control has prevented the formation of a large number of fissures in various directions, which would have resulted in the case of homogeneous or massive rocks deformed under their own weight.

Having been subjected to the same pressures as those which fractured the other rocks of the region, it is only natural that the Treadwell dikes should be broken along lines parallel with the general fissuring, and one of the two sets of veinlets occurring in the ore-bodies practically coincides with the structure of the enclosing slates. The other set, which stands at right angles to the first, is not nearly so well developed in the country slates, probably because these yielded by bending, since they are very flexible when compared with the brittle rock of the dikes.

**SOURCE OF THE VEIN-FORMING WATERS.**—The formation of the Treadwell ores is assigned to the same general cause as the other veins of the region. Both are attributed to circulating waters moving through channels opened by a general fracturing of the rocks.

Ascending waters may be assumed from the nature of the metasomatic changes which they have effected and also from the large amounts of carbon dioxide which they evidently contained. That the waters were hot may also be safely predicated, because the erosional history as well as the present topography

of the region both indicate that the veins now exposed must have been deposited at great depths, certainly from 6000 to 10,000 feet below the former surface, and possibly very much deeper. The occurrence of tourmaline in some of the veins of Gold creek and the occasional presence of fluorite elsewhere suggests a connection with igneous emanations, for these minerals are characteristic of pneumatolytic action as exhibited in the case of tin deposits and in various instances of contact metamorphism.

(TO BE CONTINUED.)

## The Mother Lode in Tuolumne County, California.

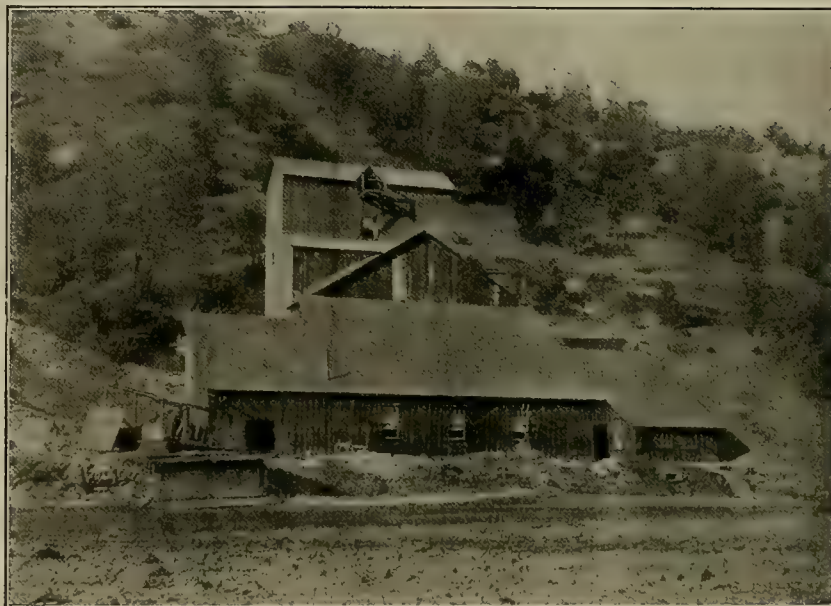
NUMBER VII.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

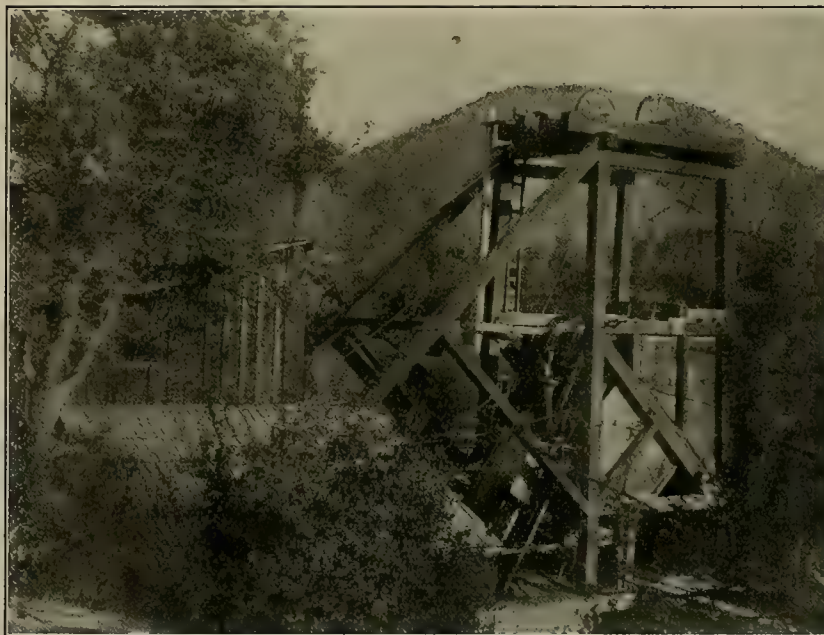
Southward from the Eagle-Shawmut mines described in the last paper the Mother Lode continues uninterruptedly nearly to the junction of Moccasin creek with the Tuolumne river, a distance of about three miles. The next important property to the southward is that of the Republican Mining Company. The property comprises a number of claims, the most

level is now being opened. Levels are established at 200, 300, 400 and 500 feet from the surface, and these have developed a pay shoot 15 feet wide, extending from the 500 level to the surface. This vein occurs in amphibolite schist, and little quartz appears on the surface, though the course of the lode is indicated throughout the property by the heavy gouge. The Orcutt claim, above referred to, is also singularly destitute of heavy quartz croppings, though producing considerable coarse gold in pockets. This absence of quartz is in strong contrast to the massive white outcrops on the Eagle-Shawmut, a short distance to the northward. The Republican company claims that that property has paid from the surface down, and has been placed on a paying basis by the original company without having ever shut down. It is equipped with free water power, a 20-stamp mill, hoisting equipment run by water power, with steam auxiliary and electrical auxiliary power at the mill. The ore is worked by amalgamation, the sulphurets concentrated and shipped.

Southward from the Republican property are a number of mines along the course of the lode to the crossing of the Tuolumne river. The most important of these is the Clio, where a vein 4 to 5 feet wide at the surface was developed by a crosscut tunnel and a mill built in 1900. The hanging wall of the Clio vein is slate, the foot wall altered greenstone tuff. It is



Republican Mill, Tuolumne County, Cal.



Republican Hoist, Tuolumne County, Cal.

extensively developed of which are the Republican, Ben Harrison, Live Oak, Democrat, Orcutt and Mammoth. These claims extend along the lode for a distance of a mile. There is a large amount of development work done on the Republican and Mammoth, and considerable on the others of the group. In the early history of these mines the work was mostly confined to superficial cuts and tunnels, and a large amount of gold in the form of pockets was recovered from the workings. The Orcutt, particularly, was worked as a pocket mine for many years.

The center of active operations on this company's property at present is on the Republican mine, in which the main shaft is down 700 feet and the 650-foot

seamed with irregular veins of quartz and calcite, and some of this prospects in gold. The surface mineralization here is several hundred feet wide, and a number of zones of mineralization occur, but none of them have proven to be important.

Southward from the Clio mine to the vein the numerous claims which cover a zone of mineral formation half a mile or more in width have been developed by shallow crosscuts, shafts and open workings, and some machinery of ancient type is still seen about some of the mines, notably at the Willietta, where gold was found in a granitic rock which occurs from place to place along this portion of the lode, becoming more prominent geologically southward. The serpentine in



the Willieta ground is also mineralized in places, and it is reported that a pocket of gold valued at several thousand dollars was found in this serpentine. The occurrence of gold in pockets in serpentine and at contact of serpentine with other rocks is known at several places along the lode, but it cannot be said to be characteristic of it.

Along Moccasin creek for a distance of 3 miles the lode is rather indistinct, though there are several outcrops in this distance. Very little quartz occurs along this portion of the lode, the principal rock formations found here being serpentine, diabase, slate and a dike of acid granitic rock previously referred to. Heavy gouges are of frequent occurrence, but no paying mines have as yet been developed in the section of the lode between the Tuolumne river and Grizzly gulch, at the foot of what is known as Priest's hill. The most interesting development in this section is on the north side of Grizzly gulch, on what is known as the Grant mine, where a broad dike of granitic rock carrying several per cent of iron sulphide, said to be auriferous, has been opened by shaft.

(TO BE CONTINUED.)

### Ore Sampling Plant.

Herewith is illustrated the new works of the Denver Ore Testing & Sampling Co., Bryant street and West Sixteenth avenue, Denver, Colo., a fireproof plant 75x75 feet, and an assay office 25x34 feet, designed for making tests on any quantity of ore, from a few pounds to carload shipments. They have a battery of 800-pound stamps, silver-plated amalgamating tables, and if required can crush the ore in a cyanide solution, having facilities for handling the gold solutions afterwards. The roller mill for wet

and Wild tables are used, as well as the Wilfley, Sperry and Wild slimmers. Officers of the company are: N. C. Bonnevie, president; E. A. Lee, secretary and treasurer; C. A. Hoyt, chemist and metallurgist. Their uptown office is 527 Seventeenth street.

PLACER miners, like others in other branches of mining, have their troubles. Often the gold distributed in the gravel is insufficient to make mining profitable; or if containing a fair amount of gold, the ground may be frozen as in Alaska, or the water may



### Gas and Oil Engine Exhibit.

The exhibit of the Mietz & Weiss gas and oil engines, manufactured by August Mietz, 128-138 Mott street and 67-69 Elizabeth street, New York, N. Y., in block 41, Machinery Hall, World's Fair, St. Louis, Mo., is one of the most complete working exhibits at the Exposition. It shows the various units from 1 to 30 H. P., connected up and in operation. These units are of the standard horizontal stationary type and the single and multi-cylinder vertical type for marine purposes.

In this exhibit are also shown a number of units direct connected to generators for electric lighting purposes, centrifugal pumps for irrigating and dredging purposes, triplex and simplex pumps for farm and residence use, also engines direct-gearred to air compressors for operating water storage systems, and direct-gearred hoists for mining and elevator service, of which this firm makes a specialty.

They are showing in operation a 1 H. P. universal pumping engine, a 2 H. P. standard stationary engine, a 2 H. P. engine and direct-connected triplex pump, a 2 H. P. engine direct connected to a 1½ K. W. generator, a 4 H. P. engine and direct-gearred air compressor, a 4 H. P. engine and direct-gearred hoist, a 6 H. P. engine and direct-connected centrifugal pump, a 6 H. P. engine direct connected to a 3 K. W. generator, the electric current from which they use to operate their signs and arc lamps, also to operate a 2 H. P. electric motor driving a centrifugal pump, a 30 H. P. stationary engine and a 3½, 5 and 15 H. P. marine engine.

These engines are of the two-cycle type and have no valves, cams, gears or electric sparking devices, the charge of oil being fired automatically from the compression. These engines are made in sizes from 1 to 80 H. P. and are operated with common kerosene oil, fuel oil, distillate and crude oil as low as 28 gravity.

There is also shown a two-cycle gas engine of 7 H. P., which this firm makes in sizes from 1 to 20 H. P.

These engines have been awarded the gold medal and a special diploma by the examining jury of the Louisiana Purchase Exposition Co.

The exhibit is in charge of Jas. H. Fischer, direct from the factory.

### Relative Economies.

A prominent engineer of the Power & Mining Machinery Co. makes the following statement concerning the relative economies of gas generating plants and steam plants:

The yearly records of 11 electric power stations, each serving a population of 5000 or less, and of 45 stations, each serving 5000 or more, show:

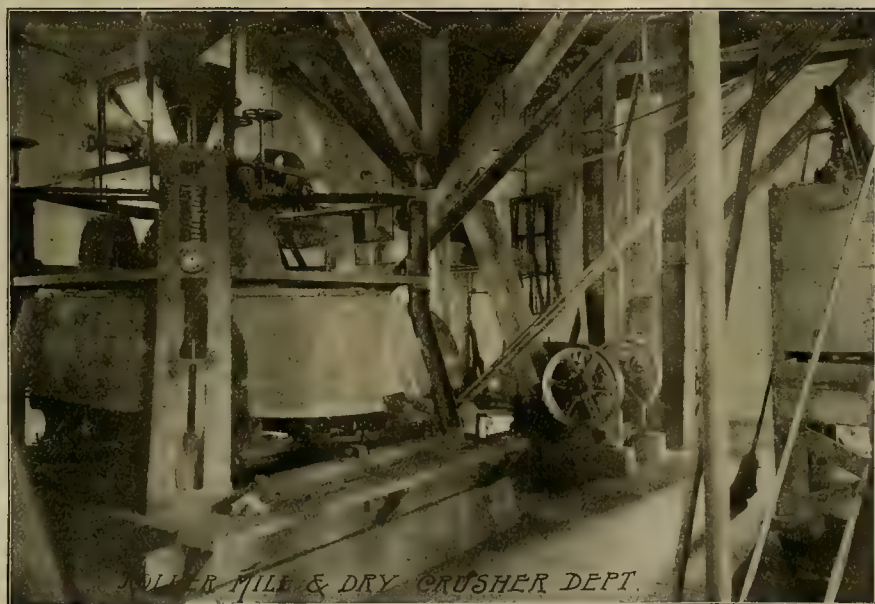
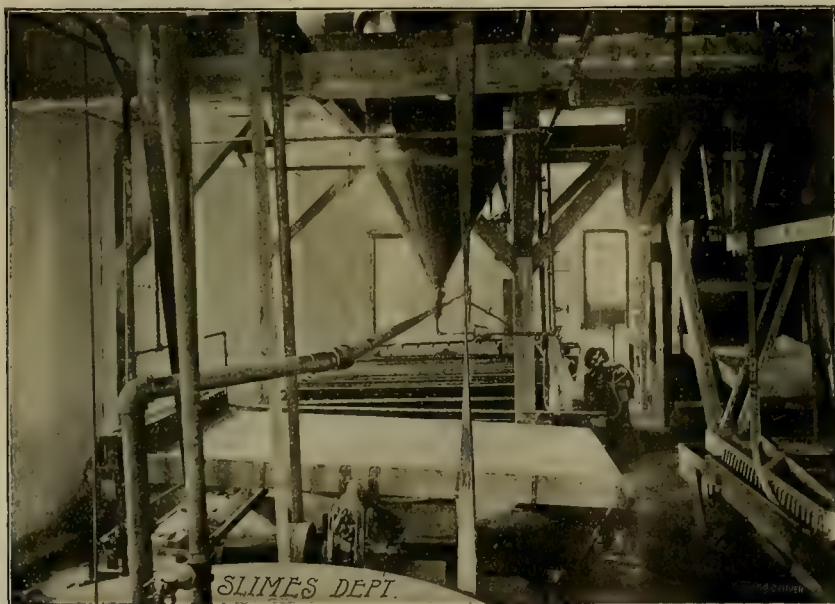
The average B. H. P. developed .....	1235
The average coal consumption per B. H. P. hour (lbs.) ..	5.5
The average cost of coal per ton .....	\$4.30

Cost of fuel in steam plant (operating ten hours per day):	
33.96 tons coal at \$4.30 .....	\$146.02

Cost of fuel with gas engines and producers:	
7.72 tons coal at \$4.30 .....	33.19

Saving per day .....	\$112.83
Annual saving (365 days at \$112.83) .....	\$41,182.95

THE striking hoisting engineers of the Union of Illinois wisely concluded to submit the question to its members. The committees having had the matter in charge called the strike, but the referendum vote showed that the rank and file of the organization did not favor a contest in which there was apparently every reason to anticipate ultimate defeat. In many instances if the proposition to strike were left to the mass of the members, instead of to a few composing a committee or executive board, the vote would be overwhelmingly against a strike, as it was in this case.



grinding prior to amalgamation or concentration has a capacity of fifty tons per twenty-four hours. The ore after leaving the stamp battery or roller mill will be classified, if desired, before reaching the concentrating tables, and the middlings from same can be reground in a 3½-foot Huntington mill and re-treated. In the concentrating mill the Wilfley, Card

be in such volume as to be beyond control with the limited means at hand. In many instances some other heavy substance renders the work of separating the gold from the alluvial difficult. At Leadville, Colo., it was carbonate of lead; at Virginia City, Nev., it was black sulphide of silver, and in some parts of the Black Hills of South Dakota it was tin stone.

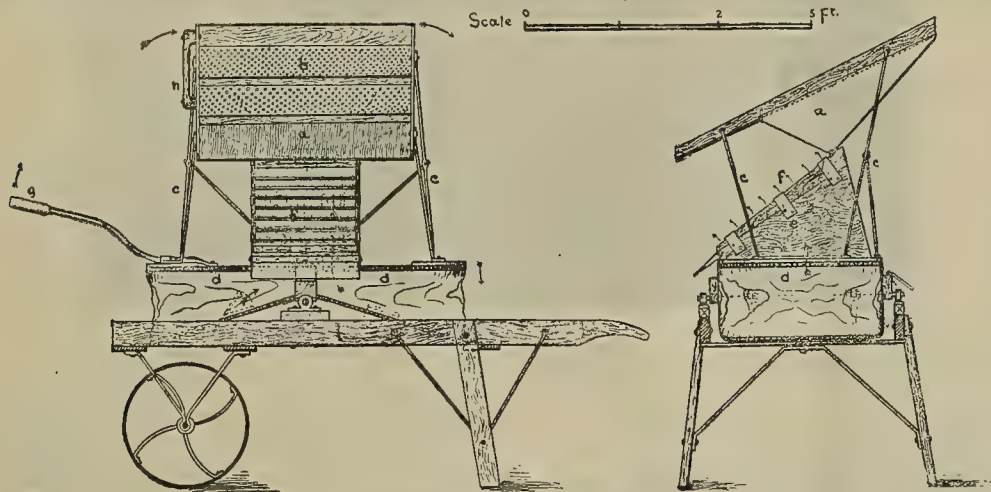


### Dry Blowing Gold-Bearing Gravel.

In the desert regions of America and Australia there are many places where gold-bearing gravel is found, but no water is at hand to treat the gravel by sluicing, rocking or even panning. In such cases dry washing is resorted to where the gold-bearing mate-

causes it either to be blown out or to descend over the riffles.

The residue in the riffle box is thrown into a prospecting dish, then wind-blown by tossing or by pouring from one dish to another. The heavy particles—too heavy to be thus removed—are taken out by a quick motion of the hand after settling the gold at the bottom of the dish, and the gold is finally cleaned



A Dry Blower Mounted on a Barrow.

rial is of a character which will admit of its being treated in this manner. The essentials to this method of treatment are a loose material readily sifted and screened, and containing sufficient gold to make the work profitable. Often these desert gravels are found cemented by clay, calcium carbonate or iron, forming a compact material. This cannot be successfully treated by the dry process without crushing. All free material, however, may be handled with little difficulty, the chief factor being the quantity that may be treated daily, and the ratio of expense per ton for treatment to the gold content that may be saved. In California, Nevada and Arizona dry washing machines of many kinds and sizes have been successfully employed in treating gold gravels in districts where water was unobtainable. In Australia these machines have been used extensively. The accompanying illustration is of a dry washer used in Australia, and is described by the Queensland Mining Journal as follows:

The hopper and hopper screen on top of the machine, and the wind chest, zinc perforated screen and riffle box below are all fixed to the long board forming the top of the double bellows, and as the handle attached to the bellows is raised or lowered to make

by blowing with the mouth. The task of separating the gold by dry washing seems to require considerable skill, but the miners get accustomed to it, and to them it becomes a simple, rapid and mechanical operation. With fine gold there is not much loss through want of skill or from carelessness, but generally from the gold adhering to the particles of stone or clay.

The capacity of the machine is about four or five yards a day, under normal conditions.

### A Large Weighing Scale.

It has been decided to establish a national mint at Peking, to take the place of the old mint at Tien-Tsien. The contract for the balances to be used in the Peking mint was given to H. Troemner of Philadelphia, Pa. It involved the manufacture of nineteen special balances, one of which, the largest, is shown in the accompanying illustration, being 10 feet in height, 9 feet in length, 3 feet in width; the entire machine weighs more than a ton.

The capacity of this weighing machine is 10,000 troy ounces. The beam is made of a special alloy



American Scales for Weighing Gold.

the blast, so the hopper, riffle box and wind chest are rocked from side to side with a seesaw motion, the fulcrum being the block of wood separating the two bellows. The hopper screen and its riffles are not removable, and only require to be looked at occasionally for coarse gold, but the riffle box, to which is attached the zinc screen, has to be taken out frequently. The riffle box has two sides tapering towards the front, so that it may be firmly wedged into a number of metal fastenings and set perfectly airtight on the top of the wind chest.

In operating the machine the coarse material comes over the front of the hopper, the finer portion being delivered onto the top of the riffle box, where the seesaw motion and the pulsating blast together

of aluminum. It is 6 feet long, weighs 68 pounds, and has withstood a test of 42,000 pounds pressure. It is protected by a glass case, supported by the column and beam rests. The column is of iron, planed and finished, square in shape, and into its four sides are fitted glass sashes. It is utilized as a case in which the spear, or indicator, attached to the beam, works. The ivory index across which the point of the indicator travels from right to left, is also fitted in the column.

The platform, or base, is of iron, is planed to a perfect level, and polished. The plates and arches are of hammered brass, the pan is made of fine tempered steel, by hand, out of one piece.

"The great feature of these immense balances,"

says the manufacturer, "is their sensibility. So delicately are they adjusted that if bullion to the amount of 10,000 troy ounces be placed in one scale, and balanced exactly by an equal weight in the other, either scale can be made to descend by adding a piece of aluminum whose calculated weight is the one hundredth part of an ounce."

### How the Grand Prize Looks.

The accompanying half-tone gives a good repre-



sentation of the grand prize given at the St. Louis Exposition. This particular one was awarded to the Broderick & Bascom Rope Co., St. Louis, Mo., for the beauty of their wire rope display.

### THE PROSPECTOR.

The rock specimens from Bodie, Cal., are determined as follows: No. 1 is a dike rock with a small fragment of vein quartz attached; no mineral can be seen in either the quartz or dike rock; a few small plagioclase feldspars can be seen in the specimen. No. 2 is from a vein and shows foliated vein material, with veinlets of quartz; a little iron sulphide can be seen in the specimen; it is probable that this rock is gold bearing. No. 3 is opal, and may be opalized wood, although it shows none of the woody structure commonly observed in specimens of that material. No. 4 is aplite, a variety of dike granite. No. 5 is a specimen of carbonized and mineralized wood; numerous specimens of this material have been observed in the mine workings of Bodie district and also in the andesite at Virginia City, Nev., where it is supposed to represent the carbonized and mineralized remains of portions of trees which grew on the surface of older andesite flows; as these carbonized specimens are usually found at the contact of different flows of the volcanic rock, it is presumed that a sufficient interval elapsed between each flow for large trees and other vegetation to grow on the lava surface.

The rock specimens from Kelvin, Ariz., are rhyolite. The rock has been subjected to metamorphism and has been silicified somewhat. The black color is due to manganese and iron. Rhyolite is an acid rock and occurs either as dikes, necks or intruded sheets. It is distinguished from quartz-porphyry by the frequent occurrence of sanidine, a variety of feldspar. The older acid eruptives of fine texture have been called quartz-porphyry and the later rhyolite. The latter, however, is really a quartz-bearing trachyte. The difference between rhyolite and quartz-porphyry is often indistinguishable without the aid of the microscope.



Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 1, 1904.

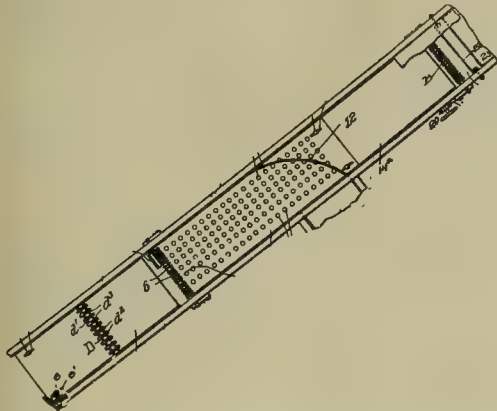
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

EARTH AND ROCK AUGER.—No. 773,562; E. Gerry, Whatcom, Wash.



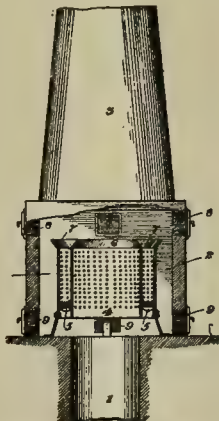
In apparatus of class described, combination of drill tube, drill head secured to drill tube and having shoulder spaced from lower end of same and forming with lower end of drill tube a ball race, a series of antifriction balls arranged in ball race and projecting horizontally beyond drill tube and drill head and adapted to engage well casing, and drill carried by drill head.

SEPARATOR.—No. 713,928; C. W. Colvin, Scranton, Pa.



In coal separator, upper or receiving slide, device arranged transversely of slide at short horizontal distance from its lower end, thus providing vertical gap or opening between device and slide, device being arranged to obstruct flight of coal passing from slide and cause coal to drop downward through gap, and slate separating slide or partition arranged in plane below its receiving slide and having its upper end extending beneath device and into position to divide stream of material passing through gap.

MINE VENTILATOR.—No. 773,936; G. Himrod, Lockport, Ill.



In mine ventilator, combination of ventilator shaft, chamber surrounding mouth of shaft, heater within

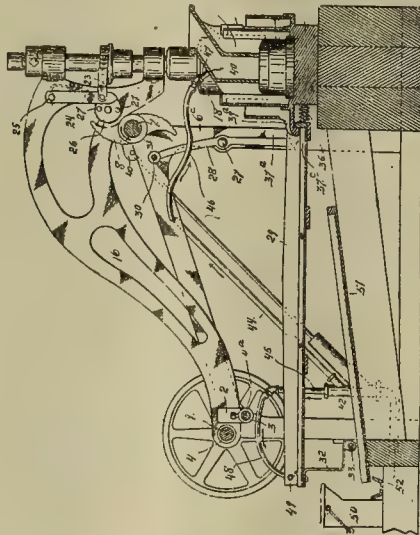
chamber comprising annular wall forming air passage registering with shaft, second wall surrounding first named wall and forming therewith firepot, each wall provided with multiplicity of perforations, and draft chimney communicating with chamber and having bore registering with annular space.

DRILL AND UNDERREAMER.—No. 773,962; E. McCray and F. A. Wiser, Los Angeles, Cal.



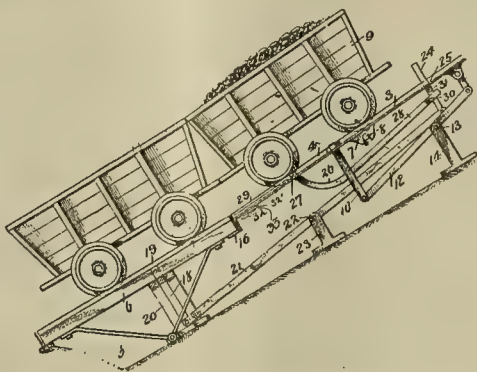
Flattened drill body having drill bit at end in line with working axis, extension along one side of body provided at lower end with underreamer bit, above but in proximity to drill bit, reamer bit, above but in proximity to drill bit, drill bit having edge in direction of width of drill body, and drill body having incline on end of drill bit opposite underreamer, and drill body being channeled on each side.

STAMP MILL.—No. 773,732; A. P. Granger, Denver, Colo.



Combination with stamp, of counter shaft, cam shaft intermediate counter shaft and stamp, arm mounted to swing on counter shaft, and provided with collar through which stamp stem passes, stem having stop engaged by collar of arm, cam mounted on cam shaft, roller tappet mounted on arm and lying in path of cam, and pawl supported by swinging arm and actuated by tappet to rotate the stamp, stem of latter being provided with ratchet which pawl engages.

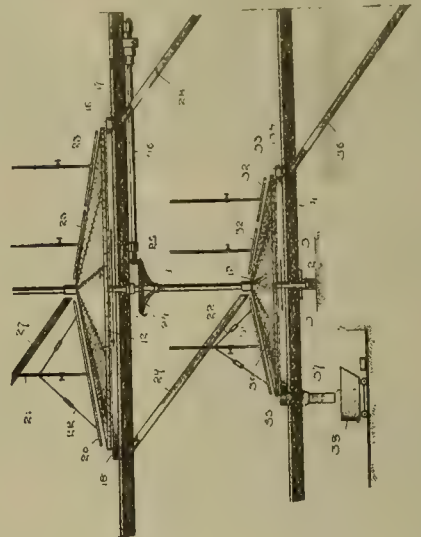
AUTOMATIC CAGE LOADER.—No. 774,047; W. H. Davis and J. M. Wood, Cambridge, Ohio.



In apparatus for loading mine cages or elevators, combination of trackway, cage, tilting platform be-

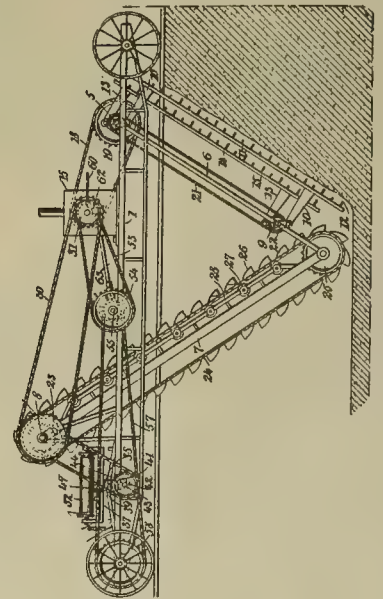
tween one portion of trackway and base of shaft in which cage descends, platform having portion adapted to be engaged by cage and effect tilting thereof, stop devices to engage cars of cage and platform to hold same from movement, means for automatically retracting stop device of platform when latter is tilted, lever connected to stop device of cage, third stop device, and lever having trip member adapted to be operated by car to retract stop device of cage and adapted to be manually adjusted to protect third stop device to prevent movement of car on tilted platform when first named stop device thereof is retracted.

BUDDLE.—No. 774,048; C. W. Denison, Denver, Colo.



In buddle, combination with vertical shaft, and means for rotating same; of similar tables of different sizes secured to and revoluble with shaft, each table comprising hub, circular rim, spokes connecting rim and hub, V-shaped strips of canvas secured upon spokes, grain of canvas forming pockets for reception of flour gold, stationary circular trough under edge of each table and having oppositely disposed outlets, partitions within troughs at opposite sides of one of outlets, bottom of trough being inclined downward from partitions to outlet farthest removed therefrom, means for supplying material to center of upper table, chute extending from one of outlets of each trough to waste receiver, chute extending from other outlet of upper trough to center of lower table, outlet spout depending from other outlet of lower trough, independently adjustable spray pipes suspended above tables for cleaning same, and adjustable spray pipe above each table and alining with trough outlet located adjacent partitions within trough, pipe being adapted to direct flour gold from tables and between partitions.

EXCAVATOR.—No. 774,102; C. L. Payne, Salem, Ind.



Excavator comprising wheel mounted main frame, plurality of frames carried by main frame and reciprocating independently of each other, ground breaking devices carried by reciprocating frames, one set of breaking devices operating to break ground during downward movement, while another set is moving upward free from ground, and means for causing movements of reciprocating frames.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

The United States Geological Survey reports the value of the mineral production of the United States for the calendar year 1903, compared with 1902, divided as follows:

	1902.	1903.
Metallic.....	\$ 642,258,584	\$ 624,318,008
Non metallic.....	617,251,154	793,435,579
Unspecified.....	1,000,000	1,000,000
Totals.....	\$1,260,509,738	\$1,418,753,587

## ALASKA.

J. E. Burton, president of the United States Alaskan T. M. Co. of Milwaukee, Wis., after an inspection of the company's tin holdings near Cape Prince of Wales, reports a shaft has been sunk to 65 feet and a vein 6 feet wide found carrying tin ore. Another tunnel will be run 800 feet farther down the mountain side. The ore will run average of 10% tin. Next season development will be increased.

C. E. Nason of Chicago, Ill., manager of the Alaska Marble Co., says at the marble quarry at Marble creek, near Shakan, near Wrangell, he has put on more men, and taken in supplies, and will increase development.

## ARIZONA.

### Cochise County.

T. F. Cole and D. E. Woodbridge of Duluth, Minn., and J. Hoatson of Calumet, Mich., of the Calumet & Arizona mine and associated enterprises in Bisbee district, report the company's mines are developing satisfactorily. Among these are the Lake Superior & Pittsburg, the Pittsburg & Duluth, and the Calumet & Pittsburg companies. The Junction is being operated by the same men. They have cut ore with a drift. There are deep shafts on these properties, and in the Pittsburg & Duluth ore carrying native copper has been found at depth of 1500 feet. On the Lake Superior & Pittsburg they are opening up ore bodies from depth of 900 to 1100 feet. The Calumet & Pittsburg is a pumping proposition. It is down 1000 feet and 4,000,000 gallons of water is raised daily. The Calumet & Pittsburg has five compartments in its shaft.

H. E. Armitage of Prescott, part owner of the Old Terrible mine in Cochise county, says the mine is improving. He has a shaft down 150 feet and cut a blind ledge 4 feet thick that with the adjacent strata carries gold values.

### Maricopa County.

(Special Correspondence).—The Gila Gold Lode Co. will resume work on its mines in the White Tank mountains this month.—G. Hamlin reports the Relief mine looking well. The mill has made a trial run.—The Mormon Girl mill at Cave Creek is in operation.—J. E. Mad-dox reports his property in the White Tank mountains improving.

Phoenix, Nov. 6.

### Mohave County.

The Kingman Volcanic Tufa Co. has been organized in Los Angeles, Cal., with office in Kingman, to utilize the material from the Metcalfe quarry west of Kingman for building and other purposes. It is said it has been found adaptable, when ground and mixed with oil, for waterproof paint for cement work and masonry.

J. Boyle has started up work on the Vanderbilt mine at Cerbat. Machinery is being set up and sinking a shaft will be started.

It is reported work is showing up ore bodies in the Azalia mine at Weaver.—J. H. Johnson has opened up a body of ore on the Bryan mine at Stockton Hill. The ore carries values in gold, silver and copper.—Lead ore is being taken from the Star Spangled Banner mine at Stockton Hill. The work at depth is showing values in gold and silver.

S. C. Bagg, manager of the New Comstock M. Co., operating at Pyramid, near Kingman, reports H. C. Howard et al. of San Francisco, Cal., have a bond on the New Comstock properties and will begin operations this week. A shaft will be sunk to 300 feet. Pending sinking the shaft drifts will be run off from the 200-foot level and the ore milled to test its value.

Heavy machinery and 4-inch water pipes are being hauled to the Gold Road mill, near Acme. The increased output of the mine has made necessary additions to the reduction plant.—The Infalible and Star Spangled Banner mines, near Kingman, being worked by the Fletcher M. Co., are shipping twenty-five tons of high-grade lead ore daily. In the lower drift of the Banner ore that runs \$30 in gold and silver and 40% lead is being ex-

tracted. Last month 1000 tons of ore were shipped from these mines to the company's smelter at Needles, Cal.

The Eldorado mine in Gold basin, near Kingman, is showing up a body of high-grade gold ore on the 300-foot level.—Miners have been put to work on the Golden Gem mine, says Manager Hall.

G. W. Jonas of the Standard G. M. Co., operating mines at Mohave Wash, near Kingman, says it is intended to put in machinery on the mines and sink several hundred feet.

C. Schader, manager of the German-American M. Co., says he will sink the shaft 100 feet more on Pioneer mine of the German-American group. The shaft is down 110 feet. It is intended to put in a mill and begin reduction of ores from the other mines. The mines are in San Francisco district, near Acme.

Compressor plant for the Samoan mine at Chloride is being set up, says L. Hoffman, superintendent. It is proposed to begin deep work preparing for a large output as soon as the railroad is again in operation. The machinery consists of a 30 H. P. gas engine and compressor, with three hammer air drills.

### Pinal County.

(Special Correspondence).—The Silver Belle mine, under Manager Champion, is again a producer. The road from mine to Cochran station, on the Phoenix & Eastern R. R., is repaired and teams are hauling ore for shipment.—The McCormack and Eyrich mines, on the north side of Gila river from Cochran, under recent development work, show bodies of iron with gold values.—At the Aboriginal group, on south side of the river, development shows large bodies of low-grade copper ore with gold and silver values.—The Copper Butte Co. will start operations this week.

Florence, Nov. 6.

### Santa Cruz County.

The Oro Blanco M. Co. has been organized to develop mines in Santa Cruz county by C. F. Slack of Tucson, J. W. O'Neill, S. W. Gilman and other Eastern men, with main office at Tucson.

### Yavapai County.

It is reported that the Copper Chief group of claims will be sold for \$3,000,000 to T. F. Cole, J. Hoatson and D. E. Woodbridge of the Calumet & Hecla Co. at Calumet, Mich. The Copper Chief is near Jerome. Cole is president of the Calumet & Arizona M. Co., with mines at Bisbee.

The Poland-American M. Co. has completed building a 120-ton reduction plant on its mines at Poland. Machinery for the mill is going in. The mill set in operation by the F. M. Murphy interests is running steadily. The Poland-American Co. is working the Vassar, Fitzhugh Lee and Joe Wheeler claims.

Foreman J. Phillips of the Rincon M. Co. has thirty men at work developing the Dixie ledge near Martinez. Machinery, including 85 H. P. gasoline engine and an air compressor, is in operation. G. West is metallurgist for the company.

### Yuma County.

The Bonanza & Golden Eagle M. Co. has been organized, with H. D. Hauge and J. B. Martin of Harrisburg president and manager respectively, and A. Martin, and has bought the Harqua Hala mines at Harqua Hala mountain, in Ellsworth district. The group is equipped with 40-stamp mill, cyanide plant, and pumping plant and pipe line.

Superintendent Beemer of the Amalgamated G. M. Co. has put on additional teams in transportation of the company's machinery, supplies and lumber to its mines at Quartzsite. Work will begin on building the 120-stamp mill.

## CALIFORNIA.

### Amador County.

At Defender, a new shaft is being sunk at the Defender mine in Pioneer district. At depth of about 300 feet the pay ore pinched in the old shaft. A new shaft was started on the ledge at 500 feet from the old works. This is reported in payable ore.

At Jackson, at the Kennedy mine the enlarged chlorination works are in working order. The additional forty stamps to the mill will be ready to start up Dec. 1. The sinking of the east shaft is progressing.—At the Zeila mine excavating for a larger hoist has started. The building will be in front of the present hoist. Sinking operations are progressing in the shaft.

### Butte County.

At Hurlston, Burke et al. are putting in a quartz mill at their mine.—The Blue Lead mine, near Bangor, containing a deposit of gold-bearing "blue" gravel, is reported sold to Eastern men, L. Rose and H. R. Jacobs of Oroville and R. M. Green of San Francisco retaining an interest, with L. Rose as superintendent. The ground will be worked by hydraulic elevator process.

S. K. Thornton has bought an interest

in the Elliott mine, near Oleta, and is starting development work.

### Calaveras County.

(Special Correspondence).—The Mountain King G. M. Co. owns eight claims on the extension of the vein of the Royal Consolidated mines at Hodson. The main shaft has been sunk 500 feet and at that depth the ledge between greenstone hanging and the black slate foot wall is 70 feet in width, with 9 feet of white and blue quartz with heavy percentage of sulphurets. The other 61 feet is of black slate impregnated with white quartz. Drifting north and south at 100, 150 and 200-foot levels shows same grade of ore. The first-class ore averages \$10 and the low-grade \$3 per ton. From the 300-foot level 100 tons milled netted \$5.15 per ton. Foundations have been laid and a 10-stamp mill with two Union concentrators and two Standard tables is going in. C. O. Womble, R. B. Parks and W. R. Womble constitute the company.

Hodson, Nov. 8.

(Special Correspondence).—The Big Tree M. Co. bought or secured by contract 480 acres patented land in Tuolumne county, 480 acres of patented land in Calaveras county, 227 acres patented land north of Murphys and 40 acres of land comprising the north part of the Murphy townsite. The two larger tracts embrace land covered with timber, supplied with water and containing deposits of limestone, iron and metal-bearing veins. The office and assay laboratory of the company is at Murphys. The purpose of the company is to construct and operate a reduction and smelter plant at or near Murphys. Stockton men are interested in the project, the officers being G. O. Pearce, president and manager, and C. M. Webber, secretary and treasurer.

Murphys, Nov. 8.

The Utica M. Co. at Angels is putting in a compressor of 20-drill capacity, besides furnishing air for the men in the Cross & Stickle shafts. The flywheel is 16 feet in diameter, with a 40-inch face. Power will be furnished by a motor of 400 H. P. The compressor is at the Stickle mill.

In Chili gulch mining district, near Mokelumne Hill, the Rooney mill is crushing \$3 per ton gravel. Twenty-five men are employed and the mine is reported improving as development progresses. W. H. Curnow is superintendent.—The What Cheer mill is running steadily with twenty men at work. The mine is managed by H. Birch.—The New Buffalo, adjoining the Rooney mine, has been brought by Squires & Hawes, and is under management of J. Oneta of Sutter Creek. The shaft has been enlarged, grading for the mill and hoist is completed and machinery and pipe for the 3000-foot line is arriving. Fifteen men are working.—The Old Buffalo is at present only pumping water, but it is said operations will be resumed. These properties are contiguous on the Deep Blue Lead.—In the midst of this gravel mining is the Hamby mine, opened up by a series of tunnels showing a lead 8 feet wide of fair grade milling ore. J. E. King has a working bond and has started to develop the mine. A three-compartment vertical shaft is being sunk in hanging wall to cut the vein at a depth of 500 feet. Grading is complete for hoist and men are grading for a 20-stamp mill. Boarding and lodging houses are completed, also blacksmith shop and other buildings. There are twenty-five men at work. The shaft will be sunk 1000 feet.

### El Dorado County.

A pump and other machinery for El Dorado C. M. Co., including two 60 H. P. boilers, are being put in on the Eureka mine at Georgetown. The triple-compartment shaft which is down 180 feet will work the Eureka and Woodside gold quartz mines. When the 300-foot level in the shaft is reached a station will be cut and drifting started, says Superintendent Everson.

### Fresno County.

The Limited Oil Co. well No. 19 at Coal-inga in the first twenty-four hours produced 2300 barrels, and its average production is 1200 barrels a day of 24° gravity oil. A pipe line to connect this well with Ora is under way. The company is building a rig for well No. 23.

### Kern County.

J. A. Waltman, superintendent of the Sunset Diamond, at Sunset, reports a producing well has been opened on the Adeline land. The depth is 700 feet, the first oil sand having been struck at depth of 662 feet. The well is flowing 250 barrels a day through the casing. It is operated by Barlow & Hill.

Bakersfield reports say the Standard Oil Co. will again buy Kern river oil at 15 cents a barrel of 14° gravity and over. About two months ago the company cut prices to 11½ cents and then stopped all purchase, with the result that the inde-

pendent producers have organized to market their own oil.

### Nevada County.

W. Bawden and J. Vivian have bought the Midnight mine at Nevada City. There are two tunnels, through which the mine has been worked and ore extracted.

Peer, Hopkins & Co., who had a bond on El Oro mine (the Yuba) at Magnet and spent \$30,000 making improvements in overhauling machinery and putting up a tramway and buildings, have given up the bond. Superintendent Kahler and the other owners expect to start operations in the first level this month.

At Washington at the Sixteen-to-One mine it is reported another ledge has been opened up 30 feet wide and contains milling ore. The 10-stamp mill is pounding ore steadily and another 10-stamp mill is being hauled in. The ore is said to run \$3 to \$6 a ton and is free milling.

P. Dunn, owner of the Julia quartz mine on Deer creek, below Nevada City and adjoining the Mountaineer mine on the east, reports work resuming under S. A. Gilmore for the Con. Nevada G. M. Co. Gilmore has put men at work retimbering the drain tunnel which is in 400 feet and will be extended.

At Grass Valley the Sultana M. Co. has bought south half of claim of Sebastopol G. M. Co. The mine is near Osborn hill. The Orleans M. Co. owns north half of the mine. The Sultana Co. is operating the Green Mountain mine (the Electric), in Grass Valley district. The owners are San Francisco men—J. E. and E. Green, J. J. and J. M. O'Brien, M. E. Wilson and E. B. Lillis.

### Placer County.

The Blakegrave-Meeke quartz mine in Canada Hill district, near Westville, is taking out ore and the 2-stamp mill is running steadily.—Men are at work on the Tadpole mine, in the same district, under the supervision of J. L. Sparhawk.—It is reported that the Ex Ray mine at Sailor Canyon will be started up again.

—A 10-stamp mill is operating at the Salvation mine, near Canada Hill.—The Santa Fe mine will be started up as soon as the water supply is sufficient.—The Golden West mine at Canada Hill has closed down for the winter, but will resume in the spring.

### San Bernardino County.

The Bagdad M. & M. Co., operating mines at Bagdad, Cal., is shipping four cars of ore daily to its 50-stamp mill at Barstow. The ore is said to net the company \$80,000 per month.

### Santa Barbara County.

The Graciosa Oil Co. well No. 3 near Santa Maria was finished last week, producing 816 barrels per twenty-four hours. No. 2, adjoining this well, started off about eight months ago at 396 barrels and is now yielding 430 barrels daily.

### Shasta County.

W. F. Snyder of Salt Lake City, Utah, manager of the Western Exploration Co., has made arrangements for building a smelter at the Balaklala mines, near Kennett. The plant is to have a capacity for treating 1000 tons of ore daily. At 110 feet from the raise in the main working tunnel a body of high-grade copper ore has been opened up.

### Slack County.

At Rollin, Reed & Ball are increasing work on their mines. They have winter supplies in and will start milling ore when the rains start the water supply. They have struck high-grade ore.

The Rader group of quartz mines on Crater creek, East Fork of Scott river, near Callahans, has been sold to the Crater Creek M. & Dev. Co. The mines will be opened on a larger scale. With the successful operation of the Crater Creek group, it is said the section on the headwaters of Scott river, above Callahans, will be worked. J. B. Scott is operating his quartz mine and mill on Indian creek, near Fort Jones, known as the New York mine, with thirty-five men. The mill is run by electric power and the hoisting apparatus by steam.—A. C. Brokaw is pushing work in developing the Golden Eagle quartz mine on Indian creek.—Placer and hydraulic miners are preparing for winter storms.

### Sonoma County.

Explosion of natural gas in the Great Eastern quicksilver mine at Guerneville on the 8th inst. resulted in death of one miner and three injured. A. Abbey is superintendent of the mine.

### Tuolumne County.

(Special Correspondence).—The Carlotta Con. G. M. Co., with D. Neagle manager, has resumed work on the Pennsylvania and Carlotta mines, 2 miles north from Tuolumne. Associated with him is J. T. Thompson of Calaveras county, and prospecting and development work will be pushed. The water has been pumped from the shafts and drifts and the air compressor will be removed from



the Carlotta and placed on the Pennsylvania. The 200-foot shaft will be sunk to 400 feet and new levels started. There are six distinct veins in a width of 800 feet. The pay streak of the two principal ledges are each about 12 inches in width, carrying sulphurets, and plating \$20 per ton in gold. The property is equipped with an air compressor, seven stamps, two Willey tables and two Frue vanners. Hardeocg air hammer drills will be added when full operations begin.

Tuolumne, Nov. 8.

(Special Correspondence).—The Soulsby M. Co., organized last spring, took over the south extension of the Soulsby mine. The mine had a shaft 300 feet in depth, with three levels and over 2000 feet of drift; also, a 10-stamp mill and a canvas plant. Since then, under the superintendency of H. L. Huston, there has been added a new steam plant, consisting of a 55 H. P. boiler, 62 H. P. engine, an air compressor with five drills and an additional battery of five stamps. The shaft has been sunk to 430 feet, with drifting 450 feet north and south at the 400-foot level. The stoping of ore is going on on that and other levels. The shaft is being sunk another 100 feet, with ten stamps crushing ore. The ore is white quartz, with sulphurets, and is in granite. Values over the plates average about \$20 per ton. There was no closing down this season on account of scarcity of water.

The Black Hawk mine, comprising a ranch of sixty acres or three mining claims, near Soulsbyville, is owned by Irish & Chandler of Los Angeles. Superintendent R. H. Barnes sunk the 30-foot shaft to 90 feet and drifted 40 feet, proving up a 12-inch streak of sulphurets bearing quartz enclosed in granite and diorite walls. Two shafts of 30 feet each were sunk and the surface prospected for 650 feet, showing ore outcroppings. When the gasoline hoist and air compressor are in position they will use air drills, sink the double-compartment shaft 200 feet farther, drift 200 feet, cement the walls exposed to prevent influx of water and then sink from 100 to 500 feet additional, as development may determine. A mill will be built.

Improvements have been made the past summer at the Black Oak mine, near Soulsbyville. The rock crusher has been moved to the hoist and the system of cyaniding changed so as to work the sulphurets. The 1100-foot shaft is being sunk another 150 feet and the forty stamps and Frue vanners are handling sixty tons of ore daily. There are sixty men on the payroll, with W. G. Scott superintendent. Soulsbyville, Nov. 9.

Near Jupiter the Stockton Gravel M. Co. has started work on its shaft, near Rose creek, after putting in an engine with which to pump the water and to hoist.—Hauselt & Bros. of Angels and Murphys have bonded the Snell quartz mine for \$35,000. They have the mine cleaned out and are retimbering the shaft, also putting up buildings.—The Bourbon mine is bonded to Howell, Pollar & Co.—The Star M. Co. will put in a larger air compressor, says Superintendent E. J. Olsen.

The Pennsylvania mine, near Carters, is being unwatered by D. Neagle and J. T. Thompson.—Bunting & Co. of San Francisco are increasing work at the New Albany mine, near Carters. The New Albany road has been cleaned out and graded and mining machinery is being taken onto the property, says Superintendent Chandler.

## COLORADO.

### Boulder County.

The Lincoln G. M. Co. has been incorporated by Kansas men and will operate the Lincoln and Blue Bell mines at Sugar Loaf. C. Hughes is president.

### ChasSee County.

Turret reports say the Vivandiere mine and mill are being overhauled to start up again. Shut-down was caused by consolidation of the Turret Mountain M. Co. and the Twin City Dev. Co. into the Vivandiere Con. M. & S. Co., which took the holdings of the two other companies, including the Vivandiere concentrator. The new company will put in additional machinery for the mill and will increase capacity of the mill. The Vivandiere is equipped with air compressor and drills. The shaft, an incline, has reached 600 feet, with levels driven east and west at the 400, 500 and 600-foot stations, showing ore.

At Sherrod the Sunlight G. M. Co. has been organized. The officers are: President, S. Cohen; J. M. Herbert, W. M. Bacon. The company owns the Sunlight group of six claims on Bacon hill, in Sherrod district. Operations have begun. The company is driving a tunnel into Bacon mountain that will cut the main veins at depth. The tunnel entrance is 200 feet from the Colorado & Southern main line and a spur will be built to the mines. Some of the leads on the surface

show values in gold. The Sunlight tunnel will be used as a transportation tunnel for several properties on Bacon mountain. Salda reports say a strike has been made on Chipeta mountain, in the Monarch district. Herzinger & Matthews of Salda struck a 4-foot vein in the Deer Trail lode, giving assays of \$20 in gold.

### Clear Creek County.

At the Newhouse tunnel, at Idaho Springs, is an automatic mucker or car-loading device, facilitating loading of dirt into cars, says the Idaho Springs Gazette. The loader was built by Superintendent Knowles. It consists of belt conveyor for elevating the rock and dumping it into the cars. At the front is a pointed steel plate nose to be crowded into the dirt pile along the plate, thus bringing the dirt upon the belt, which elevates it to the cars. Under the belt at the rear is a small engine geared to high power, which operates the belt and all machinery. The conveyor is drawn into the dirt pile by cables wound on spools connected with the engine. The cables to be used are anchored at the breast before the blast and allowed to be covered by the rock. The loose ends are attached to the spools when the loader is brought up for work, and the engine revolving the spools forces the nose under the dirt. At its first trial the machine loaded fourteen cars at rate of four minutes to the car. In the Gunnison tunnel the contract will require each heading be driven fourteen feet per day, 12 by 12 feet in the clear, which necessitates removal of 2016 cubic feet of rock, or 3000 feet of broken rock, each twenty-four hours.

Georgetown reports say a compressor and machine drills are going in for the Stevens side of the mountain to meet the Argentine or main tunnel from the east side. The Stevens tunnel is in 2200 feet and the Argentine 3400 feet, leaving 4000 feet to be driven to bring the tunnels together. After a temporary suspension for connecting up with electric machinery and adjusting ore crusher, rolls and screens, work has again started at the Stevens concentrator. The power is furnished by electricity and the capacity of the mill doubled.—G. Anderson, who owns a group of four claims on Kelso mountain, will work them during the winter. A tunnel is being driven. Ore on surface is said to mill 700 ounces in silver, \$15 in gold and 12% in lead.—J. Schuler & Co., on the Bismarck mine, have been doing dead work for the past month.—Under Manager Maxton the number of men on the Lebanon has been increased.

W. Schaner is increasing work on the Ramsdale group, near Georgetown, and has crossed the junction of several veins. The ore carries gold, some of the mill returns showing six ounces in gold per ton, with lead and silver values. There is an accumulation of ore on the dump, which will necessitate building a concentrating mill for treatment in the spring.

### Fremont County.

The coal vein, found by W. Ash of Florence, in the Sangre de Cristo range, and which carried 10% yellow copper ore, is being developed. Ash says the copper is carrying small gold values. The coal vein is 22 feet thick. A road is being graded to the mine from the valley, but shipments will not be made before spring.

Florence reports say the Great Western Coal Co., operating the Cuckoo mine, under President F. D. Heath, will increase development and improvements. The Victor Fuel Co. will take its entire output of coal at the prevailing market price. A town is being built about its coal plant. Twenty houses are up, says Superintendent Nichols. A brick boiler and engine house is also being constructed and plans are ready for a blacksmith and repair shop. A water works system is being put in by the company. At the mine the capacity of the main shaft is being increased. A 10-drill air compressor and a 175 H. P. boiler are being put in. An electric plant is under way for lighting the mine and cottages. A spur of the Denver & Rio Grande is being laid from the Chandler mine to the Cuckoo.

### Gilpin County.

The Otto Shatz M., L. & Dev. Co. has been incorporated by O. Shatz, R. Hastie, R. Keenick and E. Beyer to operate in Gilpin county, with main office in Denver.

At the Lynn shaft of the Eldorado M. Co. at Russell Gulch, a shaft building is in course of construction and a steam hoisting plant will be put in. The plant will consist of a 40 H. P. hoist and a 50 H. P. boiler. The company will sink the shaft an additional 200 feet, says Superintendent S. T. Harris. At their Eldorado mine a shaft building will also be put up, and it is intended to put in a gasoline hoisting plant. Operations are progressing underground and milling ores are being hoisted from the 100-foot workings.

The Benzie I. Co. of Denver has a lease and bond on the Eureka mine in Prosser

gulch, near Central City, and operations will be under W. Ballantyne. The main shaft is down 600 feet, being worked by lessees, the milling ores yielding 24 ounces gold per cord, the smelting ores \$50 per ton net. The Benzie company will unwater the mine below the 400-foot workings, those above the 300-foot point to be still operated by lessees. In the 330-foot stopes the vein is 4 feet in width.

During the past month shipments of smelting and milling ores, tailings and concentrates from Black Hawk depot to smelters and to outside points, were 276 cars, or 5775 tons, being the heaviest shipping month of the year, exceeding that of September by 125 tons. The increased shipments the past two months, says the Register-Call, are attributed to the opening of the Golden smelter and to reduction on treatment of ores by the American S. & R. Co.

The Electric Spark G. M. Co., operating the Hall mine at Russell Gulch, Colo., under lease and bond, is making shipments to the smelter, and amalgamating ores to the Polar Star mill on North Clear creek. These ores are being hoisted from the 130-foot level drifts, where Superintendent G. N. Rogers reports they have three feet of vein matter. He will sink the shaft another 100 feet. The company has put in machinery and made improvements to the buildings, besides cleaning out the shaft and retimbering. Nebraska men compose the company.

The Alps G. M. Co. has been incorporated by H. M. Teller, H. Sayre and H. M. Orahoud, of Denver, to operate in Gilpin Co.—Denver and Eastern parties are interested in the Hampton Con. M. Co., operating the Hampton group, near Russell Gulch. They will put in a hoisting plant at the mine, which produces enargite. The company will ship its product.—F. M. Young et al. of Denver have a lease and bond on the Vanderbilt, Summit, Mountain and Pool lodes, in Central City and Lake districts. The lessees have started operations on the Mountain shaft and are taking out milling ores.

J. R. Anderson, manager of the Gold Dirt mines at Perigo, will build a reduction mill for treatment of the low grade ores exposed. The main shaft has been deepened 100 feet and the 600-foot level opened, which has been driven east 500 feet and west 600 feet, both levels opening up ore, containing \$5 to \$20 per ton.

The Reward G. M. & R. Co., owning and operating a group of mines in Enterprise district, north of Central City, will increase development. New York and Pennsylvania men are interested, with W. P. Volgamore of Buffalo, N. Y., secretary and manager. The company owns a group of seventeen lode claims and two tunnel sites. It is a low-grade proposition and is being opened up through tunnels Nos. 1 and 2, which also serve as drainage for the entire group. The main or No. 1 tunnel has been driven 500 feet, gaining a vertical depth of 450 feet and cutting five veins. That tunnel will be extended during the winter and drifting started. They are building bins on the North Clear Creek road, below the tunnel workings. The ores carry values in gold, silver and lead. The company is also building a road to the property.

### Jefferson County.

The National Dredging Co., which has been building two boats to recover the gold in the bed of Clear creek, near Golden, has put its first boat, Eleanor I., in operation. The second boat is nearly completed and will be ready for operation next week.

### Lake County.

Litigation on the Martha lode, at Twin Lakes, has been settled in favor of J. King, J. Kindregan, O. P. DeFord and S. Wilson, and operations have been resumed. The adjoining Washington claim is on the same vein.

The output from Leadville district for October is reported at 72,000 tons. The increase is due to shipments from the Reindeer, Sunday, Yak tunnel and lessees on the Ibex. In November the Coronado will add several hundred tons a day from the new ore body in the lower zone, the Yak tunnel with new electric haulage will add a heavy tonnage, and the Sunday will ship 100 tons daily. Should the Tuscan shaft be completed and the Moyer ore shoot opened in time, that property will be shipping 150 tons a day. The shafts going down on Rock hill, by December 1st are expected to be in ore, and some of them shipping.

### Larimer County.

At Pearl the 50-ton smelter, in course of construction, is expected to be in operation by December 25. A contract has been let for 1200 cords of wood, the winter's supply of fuel. The 10-ton blower has arrived from Laramie, Wyo., having been hauled 80 miles overland by a thirty-horse team.

### Mesa County.

At Debeque in oil well No. 1 of J. S.

Swan et al., a flow of oil was struck last week which runs fifty barrels a day.

### Ourray County.

This week two new mills will be started in Red Mountain section, the Ruby Basin on South Mineral and the Treasury tunnel, near Red Mountain. The former is a 75-ton and the latter a 50-ton plant.

### San Juan County.

The Sultan Mountain M. & M. Co., with properties on Sultan mountain, near Silverton, will be operated with more men. A tunnel started on the Junior Warden vein, now in 300 feet, will cut the workings of the Molus mine 175 feet below the surface in which water prevented further operation. The extensions of the King, Mazeppa and other veins of the Royal M. Co. are owned by the Sultan Mountain M. & M. Co., and it is expected the Junior Warden tunnel will also prospect those veins.

The Sunlight M. Co. is operating its Mastodon gulch mines, near Silverton. With an electric drill one shift of miners are making 2 feet a day in the lower tunnel. The Evening Star and other veins will be cut at depth.

### Summit County.

The Cashier G. M. and R. Co., near Central City, will put in hoisting engine on the Pittsburg shaft. It is a 50 H. P., double-friction hoist. The mine has 40 men on company and leasing account and a regular tonnage is being produced, principally of smelting ores.—The Nevada Con. G. M. & M. Co. has cut the Lamberson and Warren vein, after cross-cutting south from the King mine, and drifts are being driven both ways. The vein shows 5 feet of concentrating ore. They will start up the company's mill.

Breckenridge reports say more men are at work underground at present than for several years and ore shipments are increasing.—For next season's placer operations the Iowa placers are being equipped with a storage reservoir and a 2300-foot pipe line by the Summit County Banner P. M. Co., and the placer gold dredging boat in French gulch, a mile from Breckenridge, is being built by the Reliance G. D. Co. The Iowa gulch placers have been worked by ground sluicing chiefly. A 22-inch main will supply hydraulic giants with water, having a head of 210 feet.

The Widmar & Dean lease on the Silver King, on Nigger hill, Breckenridge, is taking out good grade lead carbonate ore at 29 feet from collar of shaft. The vein is 6 feet wide and nearly vertical. Shaft sinking will be resumed. Assays show 60% lead, thirty-four ounces in silver, with \$1.20 per ton in gold.—W. L. Sprague has a lease on ground northeast of the Silver King and is having trenches dug to open up a pay ore shoot on the Last Chance ground.—The 40-stamp and concentrating mill of the Jessie group and the 40-stamp mill of the Cashier mine are running full time and are shipping gold bullion and concentrates.

The 1000-foot projected tunnel of the Senator G. M. Co. in Blue river section, near Breckenridge, is being driven with machine drills. About 9 feet per day is rate of progress. The air compressor plant is at mouth of tunnel. The tunnel is being driven to develop a group of gold lodes in Star mountain.

### Teller County.

(Special Correspondence).—The Exposition M. & L. Co. is operating on the Burns lease at Altman. The property adjoins the Shurtloft mine. The Burns lease is down 225 feet and work has been started to sink another 50 feet. They have been taking out ore from the 175-foot level. The mine is equipped with steam hoist, electrically driven air compressor and air drills. The property is on southern slope of Bull hill. In same locality are the Zenobia, Eagles, Vindicator and Findley mines. A. D. Kenyon is manager.

On Ironclad hill is the 200-ton cyanide mill of the Homestake Cripple Creek Co. This company is putting up a 1000-ton mill for treatment of its ore. A double-compartment shaft is being sunk and a hoisting engine will be installed.

At Midway, on Bull hill, is the cyanide mill of the R. E. A. & A. M. & M. Co. (See front page.) This company has a lease on the dumps and mine of the Wild Horse Co., owned by Woods Investment Co. of Victor. H. F. A. Riebling, manager of the cyanide mill, designed and built the mill, which has a crushing capacity of 200 tons per day and a leaching capacity of 100 tons per day. The plant will be increased in size. The building contains one gyratory crusher, three sets of crushing rolls and four leaching tanks. They also have a complete laboratory in connection with the mill. They also ship one carload of smelting ore from the mine each week. W. C. Abbott is mine manager.

Cripple Creek, Nov. 6.

Development on the Free Coinage mine on Bull hill by lessees is showing a vein



at depth of 250 feet from surface during sinking of the new shaft. During October 2000 tons of ore of smelting grade were shipped from the Vindicator mine on Bull hill. Operations on the property will be increased.

The output of the Cripple Creek district for October exceeded that of September. Value of ore shipped reached \$2,043,900 for 61,850 tons. The small cyanide plants treated a total of 10,600 tons of ore, containing values of \$49,900. The figures obtained from the mill and mine managers and railway authorities, says the Cripple Creek Times, are:

	Tons.	Value.
Smelters.....	12,000	\$ 720,000
U. S. R. & R.....	25,000	775,000
Portland.....	7,750	232,500
Dorcas.....	3,500	123,500
Economic.....	3,000	144,000
Homestake.....	5,600	22,400
Wild Horse.....	2,500	15,000
Florence Cy.....	2,500	12,500
Totals.....	61,850	\$2,043,900

The Cripple Creek Gold Temple M. Co., operating under lease the main workings of the Gold Sovereign Co., on Gold hill, Cripple Creek, has reached the 700-foot point. Contract for 120 feet of drifting to the ore shoot has been let, the contractors to drive 10 feet per day. The leasing company is shipping 50 tons per day. Manager Taber says he will ship 150 tons per day.

A plant of machinery is being set up on the mine of the Flying Cloud company, near Cameron.

Cripple Creek reports say the Sioux Falls & Cripple Creek M. & D. Co. has been declared bankrupt. This company has been operating the old Fluorine mine, on Copper mountain, and treating ore for cyanide process.

Cripple Creek reports say Russell & Co., who have a lease on the International shaft of the Savage Co., have put in three machine drills and will start regular shipments.

## IDAHO.

### Idaho County.

E. L. Abbott, superintendent of the Sunnyside mine at Roosevelt, says the wire cable for the aerial tramway is being stretched. The mill buildings are completed and the machinery is being set up.

### Lemhi County.

The Oregon-Idaho M. Co. has begun mining operations on its group at Singiser, near Salmon City.

### Owyhee County.

The mill at the Cumberland mine at Silver City will be started up next week.

### Shoshone County.

Near Wallace, at the 16 to 1 mine, the electric line of the Washington W. P. Co. has been completed, and the motor is set up. Electric power will operate the machinery at the mill and the compressor at the mine. It will be several months before the mill is in operation. Fourteen men are raising and sinking between the 400-foot and the 200-foot levels. It is expected to require two and a half months to complete the work. It is said there is a body of concentrating ore blocked out.

Wallace reports say the continued low stage of water is causing the large mining companies embarrassment. If the water continues to fall it is expected the concentrators will be forced to close, which would necessitate closing the mines. The Mammoth mill has been closed partially for several days while a 50 H. P. engine is being put in. This concentrator, and the Standard adjoining, have heretofore been operated by water power, never being connected with the electric power line. It is said never in the history of mining in the Cœur d'Alene have the streams run so low as they are now. This is causing the tailings question to become serious. At the Standard and Mammoth mills all the coarse tailings are being dumped in railway cars and are being hauled away to be used for ballast. Although the stream is relieved of the coarser tailings, it is unable properly to handle the finer ones, and the bed of south fork of Cœur d'Alene river, as it passes through Wallace, is filled to a depth of 4 or 5 feet. During the low stage of water the electric power brought from Spokane has been of benefit. The Bunker Hill & Sullivan M. Co. is equipping its concentrator with more electric power, as is the Federal M. & S. Co. at the Last Chance mill.

## ILLINOIS.

M. Taylor, president of the Hoisting Engineers' Union of Illinois, declared the strike of the hoisting engineers off, in obedience to a referendum vote, which resulted 750 to 315 in favor of returning to work. The engineers return to work at a scale of 5½% less than that received last year.

## KANSAS.

### Cherokee County.

At Baxter Springs the Strong Bow M. Co. is putting down a shaft on the

Abrams land, as is also the Morea M. Co. The Baxter M. Co. has bought controlling interest of the Sunburst and the Post & Co. mine and will put in machinery to develop it. The company has bought three-tenths interest in the Mission mine and the 40-acre lease. Hash & Co. are into ore and are putting in a pump. As soon as the ore face justifies it, they will build a concentrating plant. M. S. Parker and C. W. Craney are owners.

The Merchants' M. Co. mill, northeast of Galena, is running steadily. They have several additional leases and will start prospecting them. The Applejack mine is running steadily.

## MISSOURI.

### Jasper County.

At Webb City the Newport M. Co. has bought the St. Anthony mill and will remove it to its lease. The shaft is being sunk. Five drill holes show 30 feet of ore at a uniform depth. The Thirty-Eight M. Co. has started up its mill after a shut down. M. Wright, F. Stumbo and W. B. Parker of Webb City have developed a prospect of lead ore on the Smith & Stickney lease, 7 miles west of Webb City.

The L. C. S. M. Co., composed of W. C. Stancoff and Montgomery Bros., have found a run of lead on the Allan Hardy ground, 2 miles southwest of Webb City. The ore has been reached in a shaft 115 feet deep. They have a 10-acre lease. A pump was put in last week and development work will be increased.

In Sherwood section of Joplin district on the Creller & Young land the production made since the first of February from the Harry Pears & Co. mine (formerly the Rice M. Co.) has been 2,178,690 pounds of zinc and 22,300 pounds of lead ore, which brought \$42,052.79 at the bins, says the News-Herald. Production was from the ore body under the mill and south to the line of the Excelsior block. This has caused the ground to settle so that it is necessary to move the mill. Then they will resume taking ore from the ore bodies to the east. The Excelsior Z. & L. Co. adjoins this on the south. It has two shafts in operation which are down to the ore zone. They will build a concentrating mill. A. P. Campbell of Joplin has bought twelve lots adjoining the Excelsior on the east. Deposits of ore have been located in shafts and drifts on the block and there is being erected a concentrating plant which will be in operation by December 1. Campbell has also bought twelve lots adjoining the first ones on the north and adjoining the Pears & Co. group on the east. Another mill will be built on these lots.

The sludge mill in Purcell, near Joplin, owned by Joplin men, has started up. The Gundling & Tobias M. Co. of Joplin has been incorporated by E. Tobias, H. and A. Gundling. The Estewena M. Co. in Joplin has been incorporated by W. H. Frickeleton, W. S. Gray, F. C. Ralston, C. M. McCurdy. The Cornucopia L. & M. Co. of Joplin has been incorporated by L. J. Lanphere, E. C. Houk, H. C. Cosgrove. The Lucky Abe M. Co. of Webb City has been incorporated by W. H. and M. C. Smith of Webb City; A. L. and M. Shepard of Chicago, Ill.; S. M. Shepard of St. Joseph, Mo. A company being organized has taken up a lease on the Schiffer-decker 80-acre tract in Chitwood hollow, near the Jackson mine. Three drills have started on the ground and eighteen prospect holes will be put down. A. and R. H. Corbin, C. Moore, L. J. Steverson, A. Onstott and McAntire & Scott are interested. The Joplin Main Street M. Co. of Joplin has been incorporated by G. S. Tarbox and S. R. Duncan of Arcola, Ill.; W. H. Hancock, A. Bragg, A. T. Collison, W. S. and A. J. Smyser, E. E. Kinney and Malachi Kinney, with T. N. Chenoweth, W. L. Owen and J. C. Ammerman of Joplin.

### Newton County.

W. Lambert, J. Woods, O. Pierson, J. Dale, A. Bishop and C. H. Kugel have organized a company and are operating the War Eagle shaft at Granby.

## MONTANA.

### Broadwater County.

A. C. Mason's properties at Hassel, known as the Park and New Era, report strikes in development work. The ore shoot has been opened for 1000 feet, with shipping ore of \$40 per ton. A 1200-foot tunnel will be run and the plant operated by electricity.

### Deer Lodge County.

Anaconda reports say considerable development work is being done at the Gold Coin mine and the mill has been shut down temporarily. The mill will be overhauled and repaired. Ore of high grade has been blocked out. It is intended to enlarge the working force at the mine and mill.

### Jefferson County.

The Amador Con. M. & D. Co. has been

incorporated at Missoula, with the principal places of business at Phoenix, Ariz., and Chicago, Ill., by G. H. Doehr, J. Sherlaw, R. M. Mahler, T. D. Fuller and D. E. McKinnon. W. A. Peck is Montana agent of the company, which owns mines at Iron Mountain, Jefferson county.

### Lewis and Clarke County.

The Inter Ocean tunnel, on Red mountain, at Rimini, has been driven 1200 feet and twenty-two veins are reported tapped, some of which carry values. The best ore is found in the lower workings, where galena is showing.

It is reported that arrangements have been made for the consolidation of the Piegian and Gloster mines, near Marysville. They are on the same vein and adjoin, consisting of twenty-five claims. The Gloster was closed down fifteen years ago. The Piegian Co. acquires the Gloster, whose machinery will be overhauled and repaired. Ore bodies have been blocked out in the Piegian and when the Gloster mill is repaired and refitted work will begin.

Helena reports say M. L. Hewett will put in equipment for the Bullion mine, including a concentrator and sampling works. The company has spent \$200,000 in the erection of its smelter.

The Indian Queen M. Co. is running its smelter on Birch creek, near Helena, twenty days each month.

### Madison County.

R. Knox, manager of the Revenue Co.'s interests at Norris, says the cyanide mill has been put in operation and 100 tons of gold-bearing ore are being received daily. A large tonnage of ore has been blocked out.

Massachusetts and Missouri men have organized the Poor Farm Placer M. Co., which will operate in Madison county. The directors are N. S. Shaler and J. S. Myers of Cambridge, Mass., F. E. Stanley, H. N. Bigelow and P. N. Moore.

### Park County.

Manager Allison of the Cooke City Smelter Co. has put men to work on the site of the proposed plant near Cooke. J. Burke et al. say the Klondike claim is improving and they will build a stamp mill. The Klondike is located near Horse-shoe, Cooke district.

### Silver Bow County.

At Butte the Speculator Co. has resumed operations in its mine, the hoisting engine having been repaired, and 300 men are again at work. The Gagnon mine, closed down for six weeks, is working again. Repairing the shaft has been done. Lessees are again at work on the Ophir claim. They have struck a vein 150 feet east of the main shaft and are taking out ore.

The ground around the Boston & Montana mine, in Meaderville, is reported settling as a result of extensive underground operations.

### Sweet Grass County.

L. E. Tomblin is operating his mine, near Big Timber, where he has a 5-stamp mill, driven by water power. A tramway is being built.

## NEVADA.

### Lincoln County.

Transfer of the Little Mendha group of mines has been made to B. M. Cornish, B. S. Rives, A. P. Gardiner, K. V. Zink of Salt Lake City, Utah, and E. P. Gordon, directors of the Pioche-Nevada Con. Co. Work has been started. A hoist will be put in and buildings erected. Manager Cornish has bonded four claims in Highland district, on the "Yuba dike."

The Salt Lake Route Exploration Co. has been incorporated at Salt Lake City, Utah, by President H. S. Joseph, R. W. Nicol, J. Obendorfer, J. Gauer and H. Hardy. The company owns seven claims in Yellow Pine mining district.

### Nye County.

Ore shipments from Tonopah for last week amounted to 968 tons from the following mines: Tonopah M. Co., bulk 445 tons, sacked 58 tons; Montana-Tonopah, 89 tons; Belmont, 100 tons, bulk; Tonopah Gold Mountain, 9 tons; Klondike mine, Klondike, 21½ tons. Goldfield: Jumbo (McDonald-Fuller lease), 92 tons; Zinn lease, 39½ tons; Florence, 80½ tons; Combination, 18 tons; Quartzite, 16 tons. The freight traffic over the road for month of October amounted to 9000 tons, of which 5000 tons was incoming freight and 4000 tons outgoing (ore). The work of broadening the C. & C. is being rushed, over 200 men being employed.

## NEW MEXICO.

### Grant County.

Work is reported progressing on construction of the smelter of the Comanche M. & S. Co. at Silver City. A foundry and a machine shop have been completed, and the steel frame of the smelter building is going up. S. S. Curry is president of the company.

### Otero County.

G. E. Moffett, manager of the Electric M. & M. Co. at Jarilla (Brice P. O.), says he will put in placer mining machinery and equipment.

## OREGON.

### Baker County.

H. B. Compson, part owner in the Man-of-War group of mines, near Greenhorn, states that work has been progressing on a shaft on the main ore body, but work will soon cease till spring on account of snow.

One hundred and four sacks of ore taken from the Orleans G. M. & M. Co.'s Orleans mine, near Sumpter, netted \$23 per ton, says Superintendent L. V. Swigert. It is expected a 12-stamp mill will be built.

W. Cable is resuming work on the Montezuma group, Cracker Creek district, near Sumpter. The group of four claims—on a vein parallel to the mother lode—is owned by Canadian men and known as the Montezuma Con. G. M. Co. The vein is shown the length of the four claims by a series of trenches and pits, showing an average width and assaying \$10. A tunnel and shaft are also driven. Superintendent Cable will sack ore and ship it to the smelter. In the spring he will put in a concentrating plant.

### Cos County.

Marshfield reports say the flooding of the Beaver Hill mine, which was on fire for a month, was completed last week and the fire extinguished.

### Crook County.

B. F. Allen, of Princeville, states the Oregon King mine, near Ashwood, has closed its workings to put in machinery to reduce the ore. C. M. Cartwright, of Portland, is part owner.

### Douglas County.

The 10-stamp mill at the Vesuvius mine, near Bohemia, was started last week, says Manager Hard.

About 150 feet more of tunnel will be driven in the mine of the Judson Rock M. Co., near Bohemia, says J. B. Keefer of Portland, president of the company. The quartz struck will pay \$30 per ton. The property of the Judson Rock Co. is 2 miles north of Mineral.

### Grant County.

The Iowa-Oregon M. Co. has been organized, with offices in Granite, Or., and Webster City, Ia., by President J. J. Kellher, Pocahontas, Ia., B. F. Keltz, J. J. Hahn, J. E. Thornhill, H. Campbell, H. O. Hyatt, with E. E. & G. Thornburg of Granite. H. O. Hyatt is manager. The Morris mines, near the summit of the Greenhorn mountains, 18 miles from Granite, owned by Thornburg Bros., have been deeded to the company.

The Empire G. D. & M. Co., at John Day, has men at work on its dredger, overhauling and repairing it for the fall run. The company has been defining the pay gravel in the district and securing water rights for development of electrical power for operating the dredgers. Operations are under T. H. Pomeroy.

Operations in dredging are being increased on Canyon creek between John Day and Canyon City by the Empire D. & G. M. Co. For the past three years the company has been operating a dredger near John Day, and the company has bought nearly all the land between the two places for dredging. Manager Carlton of the Pomeroy dredger is investigating the possibilities of Canyon creek and has two steam drills at work prospecting the banks of the stream. It is said two more dredging plants will be built next season.

In Quartzburg district, near Prairie City, the Dixie Meadows G. M. Co. has started up its 80-ton concentrator and is reducing from twenty to thirty tons daily. Ten per cent of the product is free milling. The Equity G. M. Co. reports good work with its 5-stamp mill. The Dixie M. Co., the stockholders being principally Portland men, is doing development work, and it is stated a 5-stamp mill will be put in this fall.

G. W. Wright of Albany reports he has sold his Golden Fleece mine in Quartzburg district to Kissling & Makeing of Portland for \$3000.

### Lane County.

L. Zimmerman, president of the Lucky Boy M. Co., operating at Blue River, reports that owing to scarcity of water in the mountains the Lucky Boy's 40-stamp mill cannot run to full capacity, twenty-five stamps being the limit at present.

### Lincoln County.

It is expected work will begin this month in the black sand beach mines, near Seal Rocks, near Toledo. Several of the miners have been working with small heads of water all summer. B. F. Jones of Toledo says he has 2 miles of the beach sands and will start as soon as there is sufficient water for a sluice head.



**Jackson County.**

A 10-stamp mill is being put in at the Opp mine, near Jacksonville. J. F. Reddy, to whom the mine is bonded, reports progress in development. He reports twenty men at work on the Blueleaf mine, which he also controls.

**Josephine County.**

The New Channel placer is being operated by H. F. Schoenfeld and J. E. Verdin, on south side of Rogue river, 5 miles above Galice. It comprises 120 acres of places ground. The gold is said to be coarse particles. The mine is equipped with hydraulic plant, with No. 2 giant and 1000 feet of 10-inch pipe. A ditch  $\frac{1}{4}$  miles in length has been completed. A 400-foot cable is stretched across Rogue river, fitted with cars for transportation of freight and passengers.

The Oro Pico mine has hauled the 50-ton cyanide plant from Merlin to the mine, 11 miles, and it is being set up. The mine, under Superintendent Chase, has been opened and ore blocked out.

**SOUTH DAKOTA.**

Monthly output, says the Black Hills Review, is being made by the principal mines of the Black Hills as follows:

Name of Mine.	Monthly Output.
Horseshoe	\$54,000
Clover Leaf	30,000
Spearfish	30,000
Homestake	204,000
Wasp No. 2	15,000
Imperial	24,000
Maitland	35,000
Golden Reward cyanide	27,000
Golden Reward smelter shipments	10,000
Miscellaneous	15,000
Dakota	15,000
Hidden Fortune	15,000
Lundberg, Dorr & Wilson	12,000
Black Eagle	2,500
Placer (estimated)	2,600
Total	\$450,500

**Lawrence County.**

Seventy-five stamps are dropping in the Horseshoe cyanide plant near Terry, and it is expected the remaining forty-five stamps in the mill will be added next week. The mill is treating 9000 tons of ore per month, says Manager W. L. McLaughlin. In the mines of the company preparations are being made for winter. The storage bins at the mill are being filled with ore that no delays may result from storms. Ore is being taken out at rate of 400 tons a day. The bins will hold 7000 tons of ore.

The Elliptic Co. is putting in equipment of mining machinery, including two boilers, air compressor and hoisting engine, at the company's shaft east of the Maitland mine at Maitland. The shaft is 170 feet deep, and will be continued to quartzite, which it is expected will be reached at 350 feet.

J. P. Allison of Deadwood of the Hidden Fortune M. Co. says 100 feet of ore is showing in the Bingham tunnel. The company is making regular shipments of ore to its mill below Deadwood and will resume operations in the shaft, where the ore body is shown.

The Gilt Edge-Maid mill, near Galena, has been connected with the electric power line and ore crushing will start next week. The leaching vats are in place.

L. E. Tomblin is doing development work on his mines in Bear Gulch district, west of Lead. Tomblin is also operating in Montana, near Big Timber.—Argentiferous galena is being shipped from the Shamrock mine, in Strawberry gulch, near Deadwood, adjoining the Puritan.

Alterations are being made by the Wasp No. 2 at its mines at Flatiron, near Deadwood. A baby air drill will be used in the open cut for block holing and breaking up boulders to mill size after the heavy blasts. To furnish compressed air for the drill they will put in 1400 feet of pipe line from the mill, where is a small compressor. The company will also put in two adjustable rolls for fine crushing. The crusher will be replaced by a No. 4 Gates. A bar worth \$4500 was shipped from the mill last week, the result of 12½ day's run.

**Pennington County.**

J. N. Wright of Custer, who has a bond on the Oriole mine, near the Golden Slipper, 4 miles northeast of Hill City, has the shaft down 110 feet. The vein shows a width of 3 feet.—At the Dolcode mine, near Hill City, under bond, development is under way with a diamond drill. G. Bain is said to have a contract for four holes, each to be 500 feet in depth.

C. J. and H. Gunderson, A. Lee and M. L. Fox, of Vermillion, S. D., having bought the Holy Terror M. Co. mines at Keystone, will work the Keystone vein by another reduction method. It is said they will sell the present equipment, and buy an entirely new plant of machinery.

**TEXAS.**

**Brewster County.**

Manager H. M. Nesmith of the Dallas M. Co., on Terlingua creek, near Terlingua, is putting in pumping machinery and will increase development work,

**UTAH.**

**Beaver County.**

H. E. Meyer of Salt Lake City, manager of the Federal mine, near Milford, says a hoist is to be put in and work increased.

**Box Elder County.**

The Boston & Terrace C. M. Co. owns a group on west side of Great Salt Lake, near the Lucin cut-off near Terrace, and arrangements will be made to ship ores to the Salt Lake smelters, says President C. T. Burchard. Sinking is still in progress on the vein struck in the main tunnel workings. At the 50-foot point a station will be cut and drifts and crosscuts started.

**Grand County.**

W. R. Wheat, manager of the Grouse Mountain M. & S. Co., with mines in Miners' Basin section of the La Sal mining district, near Basin, says: A carload shipment of rare metals made to the works at Niagara, New York, netted the Welsh-Lofftus Rare Metals Co. \$6200. The ore is said to carry radium, vanadium, uranium and barium, with copper and silver. Manager Lofftus says the returns received from the sale of the uranium, copper and silver paid expenses of mining, transportation and treatment charges. The vanadium brought \$6000 while the radium sold for \$200. Another shipment is being prepared. The product is sacked. The Lofftus Co. has two claims on which work is being done. The vein through which the rare metals are distributed measures 7 feet in width. The Grouse Mountain group is a producer of gold ore. A cyanide mill will be built.

**Juab County.**

F. Sundel of Eureka has bought mining property in Broad canyon, North Tintic district, including a one-fifteenth interest in the Tip Top, the North Star and the Silver King mining claims.

The Wasa M. Co. has bought in North Tintic district the Lucky Boy Nos. 1, 2 and 3, North Star, Tip Top, Red Wing, Silver King, Evening Star and Blue Bird mines.

A 40 H. P. engine, compressor and drills are being added to the Tintic properties of the Scranton M. Co. near Eureka, of which N. Dunyon is manager.

S. Nelson and T. C. Burns have started work on the Home Rule group at Eureka.

At a meeting of the Grand Central and the Victoria directors, vertical lines dividing the two properties were agreed upon which will prevent any future dispute as to the ownership of ore bodies. Arrangements were also made for the Victoria Co. to bring its ore and water to the surface through the workings of the Grand Central and work has started on the Victoria. Mining will begin on the 1500-foot level. The mines are at Eureka.

From the Carlisa mine of Tintic, near Eureka, is being shipped to the valley smelters an average of forty tons of ore daily, this to be increased when the hoist being set up on the 700-foot level goes into commission. In addition to the second-class ore, which maintains average of 5% copper, 7 ounces silver and \$4 gold per ton, the management reports normal tonnage of high-grade ore.

**Plute County.**

H. C. Lawrence, manager, and R. Foster, superintendent, of the Sevier Con. mines of the Gold Mountain district, near Marysvale, report in tunnel No. 3 a body of ore struck and penetrated for 12 feet without reaching the foot wall. The ore averages \$17 in gold per ton. The vein carries a flow of water. The mill is running on eighty tons a day. The company will make enlargements in the spring. The ore being milled comes mostly from tunnel No. 2, where a vein 14 feet in width has been developed.

**Salt Lake County.**

The Copper Belt railway, between the mines of Bingham and the stations on the Rio Grande, forwarded during October 35,000 tons of ore. The heaviest consignments during the month were from the Utah C. Co., also the Boston Con. and the Yampa. The Commercial group of the Bingham Con. system also sent out a heavy tonnage, while Ohio maintained its usual production. The Bingham and New Haven will ship increased tonnage the present month. In addition to ore that passed over the tracks of the Copper Belt railway, there were the tonnages handled by the United States & Utah Con. tramway.

Manager T. Jacobson of the Columbus Con. mine of Alta reports the mill in operation and concentrates will be shipped. S. Bamberger, manager of the Fortuna mine at Bingham, says forty tons of ore are being shipped daily.

Work on the towers of the Continental Alta's tramway at Alta is under way. Manager Crowther says survey for the aerial line has been approved to the first terminal, a distance of 13,317 feet—this to be known as the "angle station."

On the 300-foot level of the Ohio C. M.

Co. at Bingham, Superintendent Cummings says the ledge has opened up 25 feet of copper-bearing ore. Sampling from wall to wall shows average of 6% copper. On the 200-foot level the fissure had a width of 6 feet. Concentrates and ore are being shipped.

**Summit County.**

The roaster at the lead plant of the United States M. Co. at Bingham will be finished this week, says Constructing Engineer G. K. Fischer.

In the Scottish Chief M. Co. mine, near Park City, they have uncovered 20 inches of ore, assaying 700 ounces silver, with \$9 gold, 3% lead, 1% copper. The strike was made on the 250-foot level, says D. B. Hempstead of the company. The ore is largely silver chloride.

Manager J. Hickey of the Comstock mine at Park City says the company will put in an air compressor and use power drills in the mine. The water is now out of the mine, and work is going ahead. The Comstock is in Thayne's canyon.—At the California mine starting of the mill was somewhat delayed by breaking of pump used to pump water to run the mill from the Comstock mine. The mill has been idle for several months. A small dynamo has been placed at the mill to furnish lights for the mill and mine. At the mine, Superintendent Kaas reports conditions improving.

**Tooele County.**

In the drift run on the 900-foot level of the Honoring mine at Stockton the Buhl shoot of ore was broken into last week. This body was opened on several of the upper levels.

The Stockton G. M. Co. mine and mill at Stockton will be lighted by electricity, says Superintendent Galliger. In addition the generator will assist in driving the mill machinery, it being intended to connect the motors with the shaft in the concentrating room. Machinery is being set up and the mill is expected to start next week.

The Sacramento G. M. Co., at Mercur, will make a carload shipment of quicksilver, comprising over 300 flasks.

Manager G. H. Dern of the Con. Mercur at Mercur says at the mill during month of October 2100 tons of ore were treated, the value of which ran \$4 per ton, all of which was saved but 85 cents a ton, which went into the tailings. Manager Dern says headway is being made with construction of the sampling mill.

Shipments from the Buckhorn mine, near Ophir, to the Ophir hill mill, will be started this week. The men at work in the mine has been increased.

**Utah County.**

Lessee Tyng on the Miller hill mines, near American Fork, reports he has opened up ore and has started shipping. The ore nets \$50 per ton. It costs \$5 per ton to haul to American Fork. The Kalamazoo and other claims near the Miller hill mines will also be opened up.

**WASHINGTON.**

**Ferry County.**

Repairs and alterations are in progress at the Northport smelter of the Le Roi C. Co. The buildings have been reroofed and men are making repairs in the mechanical departments. All idle furnaces are being put in shape. The Northport smelter will receive 100 tons of ore daily from the Snowshoe mine at Rossland, B. C., and this, together with custom ores being received with the daily shipments from the Le Roi mine, will increase the working force and place more furnaces in operation, says Manager McMillan.

The First Thought mine, owned by P. Burns & Co., has resumed operations. Approximately 40,000 tons of ore are reported blocked out, ready for shipment. The ore is quartz, running on an average of \$15 per ton. The fall from the mine to the railroad at Orient is 1600 feet, sufficient to operate a gravity tram, which the management will put in. It is intended to increase the number of men at the mine. The smelters at Granby, Greenwood, Boundary, Phoenix, B. C., and Northport have arranged to handle limited quantities of First Thought ore.

**Stevens County.**

Kettle Falls reports say that work on the Silver Queen group of mines has started. The mine is 2 miles south of Kettle Falls and will be developed by R. K. Green of Spokane, who holds a bond. The superintendent is W. W. Warner, of Spokane.

**WYOMING.**

**Laramie County.**

The Amalgamated M. Co., composed of Denver, Colo., mining men, has bought five claims in the Hecla district, west of Cheyenne, making eleven claims owned by the company at Hecla, and increased development will be started. H. Schwartz of Denver, Colo., president of the Hecla M. Co., says he will erect a smelting plant in Cheyenne costing \$50,000. The plant

will be a 50-ton smelter and will handle all of the ore from the mines owned by the Hecla and Amalgamated companies.

**FOREIGN.**

**AFRICA.**

**Rhodesia.**

The Rhodesia Chamber of Mines at Bulawayo reports gold output for month of September at 17,166 ounces for Matabeleland and 8863 ounces for Mashonaland, total of 26,029, compared with 24,669 ounces for August and with 18,741 ounces for September, 1903.

**Transvaal.**

The Transvaal Chamber of Mines at Johannesburg reports the gold output for month of September of Witwatersrand mines at 301,131 fine ounces and of outside districts 11,155 ounces, a total of 312,286 ounces, as compared with 276,197 ounces for September, 1903. The principal producers report the following results:

Cyanide Plants, Ounces.	Tons of Stamp, Cyanided.	Gold Yield, Ounces.	Tons Crushed.	Stamps Dropped.	MINE.
3,084	9,041	3,623	11,665	60	Anglo
3,122	20,070	5,518	20,070	145	Crown Reef
4,002	15,600	6,680	17,812	120	Driefontein Con.
3,008	16,510	4,088	14,165	110	Driefontein Deep
2,361	7,000	4,874	10,048	70	Perreire Deep
2,361	12,000	3,394	15,268	120	Perreire E. & G.
2,343	12,000	2,530	15,268	85	Glendene
1,932	6,830	3,339	10,113	65	Heury Nourse
1,006	9,850	3,447	14,013	95	Jumpers Deep
2,163	17,160	8,024	15,200	150	Knights' Deep
1,363	9,775	5,316	22,900	160	Langlaagte E. & G.
1,363	8,697	5,916	15,080	95	May Con.
2,555	12,881	12,881	24,369	185	Robinson
950	6,000	10,795	21,841	170	Robinson Randfontein
3,075	15,900	2,407	10,128	80	Rose Deep
1,306	7,000	4,327	22,700	165	Sumner & Jack Prop.
1,306	7,000	10,801	27,000	170	Sumner Randfontein
2,384	15,100	3,359	11,614	100	Van Rensburg
		6,246	31,700	160	Village Main Reef
		4,088	15,600		Woluter

**BRITISH COLUMBIA.**

**Boundary District.**

The Senator mine, bonded to the Granby Co. of Phoenix, is being worked under J. Rogers and is making regular shipments to the Granby smelter. The contents of the ore are said to be largely iron, with copper.

Development work in taking out and shipping ore is being done on the Senator group, up North Fork, near Phoenix, under management of J. Rodgers. One car of ore is being shipped daily.

B. Ray, superintendent of the Betts & Hesperus mine, on Hardy mountain, 4 miles from Grand Forks, will increase development work this winter. He has let a contract for building a wagon road from Fourth of July creek to the Betts & Hesperus mine, 1½ miles long. Men are cutting timber for mining purposes.

**East Kootenay District.**

The Southeast Kootenay C. & P. Co., Ltd., has been incorporated at Spokane, Wash., to prospect for coal and petroleum in East Kootenay. The incorporators are G. W. Kerr, Rossland; W. Kelly, Jr., Stewardville, Minn., and W. A. Nelson, Spokane, Wash.

**Nelson District.**

At Ymir a strike is reported made on the Foghorn mine, owned by the Golden Monarch M. & M. Co. of Spokane, Wash. After the mine had been temporarily shut down, two men were left to do surface work. They uncovered apex of one of the veins crosscut in the tunnel, showing 9 feet of ore, says C. Wolfe, superintendent. He has put more men to work. It is also reported in the lower levels ore of good milling grade has been opened, and as soon as the water supply is sufficient the stamps will again be in operation.—The Hunter V. mine is maintaining output of 100 tons a day. This ore, although low grade, is said to be desirable smelter flux. Shipments are being made to the smelters at Northport, Wash., and Granby and Greenwood.

The Belmont group at Waneta has been bonded to R. A. Abrahams of Seattle, Wash. The claims are 1½ mile from the Nelson & Fort Sheppard Railroad and 7 miles from the Northport smelter. The principal values are in silver, assays running 200 ounces.—A strike is reported from the Lucky Boy group at Erie. A shoot of ore averaging, it is said, \$18 a ton, has been uncovered.

**Rossland District.**

At the White Bear mine, at Rossland, unwatering was completed last week and



mining has started with twenty-five men underground. More will be added. They will stop on the 800-foot level. The tonnage hoisted will be rough-sorted, the first-class product going to the smelter, while the balance will be put through the mill.

The Jumbo mine, at Roseland, is making shipments weekly of 500 tons. M. R. Galusha, manager, states a body of ore of shipping grade is being developed between the intermediate and No. 1 level.

A. J. McMillan, managing director of Le Roi mine at Roseland, states the chief idea for the amalgamation of Le Roi, the War Eagle, the Center Star and the Snowshoe mines is to get concentrated management, which will allow a reduction in cost.

#### Slocan District.

A. Ross has a lease on the Young Bear mine, on Slocan lake, near Slocan City. The Idaho mill at Sandon has closed down for repairs to machinery.

#### West Kootenay District.

Development work on the Lucky Boy mine is being increased with fifteen men. As soon as the trail is in shape for raw-hiding shipments will be made of ore assaying \$100.—At the Eva mine at Camborne the miners are driving in No. 1 tunnel and the raise. The raise, which is 225 feet in length, is timbered.

### BRITISH GUIANA.

Georgetown reports show exports from January 1 to October 4:

	GOLD.	Ounces.	Value.
1904.....	60,715	\$1,073,239 17	
1903.....	64,636	1,126,102 36	
	DIAMONDS.	Carats.	Value.
1904.....	8,560	\$67,583 22	
1903.....	6,836 9-16	57,546 39	

### INDIA.

The output of the gold mines of India for month of September is reported at 51,666 ounces—an increase of 149 ounces over August and of 214 ounces over September, 1903.

### MEXICO.

#### Chihuahua.

At San Pedro the Candelaria M. Co. is making improvements in the Leon camp.—L. Bryant of El Paso, Tex., has bought the Smith interest in the San Pedro M. Co. which owns 15 pertenencias in Leon camp. The Isabelita property was sold last week to S. C. Pratt & Co., who own other mines in the camp.

#### Durango.

The American-Mexico M. & Dev. Co. of Chicago, Ill., is preparing to build a 100-ton lead smelter on its mines and also to put in gas engines and hoists. The American-Mexico Co. is planning a 1000-ton smelter at Torreon and another at Velardena. The company will also place contracts for a 5000 H. P. boiler plant.

It is reported the mines of the Santa Rita, the San Nicolas, and the Concordia groups at Nieves, 30 miles west of Canita station, on the Mexican Central railroad, will be reopened. A 100-ton concentrating plant is running on ore from the dumps. The ores are silver-lead.

#### Guanajuato.

The American M. Co., having bought the Valenciana, Cata, Mellado and other mines at Guanajuato, will build a cyanide plant. The old dump will be treated, as well as ore from the mines.—Cyanide equipment is being put in by the Guanajuato Con. M. Co. at the Pastiler mill, to treat tailings from the concentrators.

#### Nuevo Leon.

The Harrison smelter at Cerralvo, 90 miles from Monterey, owned by H. C. Harrison, is reported doing well and working 400 men. This plant is on the Matamoros branch railroad.

#### Oaxaca.

A concession has been granted L. G. Teruel to build a smelter at Ocotlan or at Ejutla.

#### Sonora.

P. E. Murray of Nogales has bought the Jalisco silver-lead mines and will start to operate them next week. Much of the ore is shipped to El Paso, Texas.

It is reported that hoisting machinery will be put in at the Guadalupe mine, near Cananea.

The Sonora M. & M. Co., C. O'Keefe president and manager, will build a 20-stamp mill and cyanide plant on the Juarez mine, near Altar.

#### Zacatecas.

R. C. Gemmell, a mining man of Salt Lake City, Utah, has been granted a title to six pertenencias of mineral land in Parrillas canyon, near Concepcion del Oro. A lead vein, bearing gold and copper values, has been uncovered. Gemmell has named the mine Utah.

### TASMANIA.

The Mount Lyell M. & R. Co. at Mount Lyell report from September 15 to Octo-

ber 12, inclusive, a total quantity of 34,155 tons of ore treated, being 25,142 tons from the Mount Lyell mine and 9013 tons from North Mount Lyell mine. In addition, there were treated 1087 tons of purchased ore and metal bearing fluxes. The converters produced during same period 552 tons of blister copper containing—copper, 545 tons; silver, 49,816 ounces; gold, 1870 ounces. Shortage of metals due to stoppage of converter plant during period, thereby preventing working up of matte containing 101 tons metal into blister copper.

### Commercial Paragraphs.

E. B. WIGGINS has bought the assay office formerly conducted by R. W. Jackson at Phoenix, Ariz.

THE Watt Mining Car Wheel Co., Barnesville, Ohio, received a gold medal for their exhibit at the St. Louis Exposition.

THE Bucyrus Co. of South Milwaukee, Wis., has the contract for five 70-ton steam shovels and for six 95-ton steam shovels for the Isthmian canal commission, bids for which were opened Oct. 6th.

THE Link-Belt Machinery Co. report the sale of two complete tippie equipments to the Victor Fuel Co. The installation was designed by their Western engineers, A. E. Lindrooth, Shubart & Co., and consists of shaking screens, weigh baskets and motors.

COLORADO IRON WORKS Co. of Denver, Colo., report the sale of one large Bretherton hot blast box to the Ladd Metals Co. in Idaho and the shipment of one carload of improved standard wide-faced crushing rolls to the Detroit Copper Co., Morenci, Ariz.

THE Blaisdell Co., Los Angeles, Cal., have a cablegram from A. F. Crank, Johannesburg, S. A., stating that the equipment installed by them at the Robinson Gold Mines, Ltd., is working satisfactorily, and that the 40 feet by 8 inches Class "A" excavator is delivering in good condition 100 tons per hour, on 15 H. P.

The "Connecticut," launched September 29, 1904, at the Brooklyn Navy Yard, is the largest battleship afloat. Length, 450 feet; beam, 76 feet 8 inches; normal draft, 24 feet 6 inches; normal displacement, 16,000; indicated horse power, 16,500; speed, 18 knots; officers and men, 819. She carries the largest electric light and power plant ever installed on a battleship. The plant, which has a capacity of 800 kilowatts, consists of eight Crocker-Wheeler generators direct-connected to Forbes marine-type engines.

THE Borden & Selleck Co., 48-50 Lake street, Chicago, manufacture modern conveying machinery, gas and gasoline engines, coal crushers and screens, etc., and are also contractors and designers of complete plants and docks for storage and handling material. They issue handsome catalogues covering their lines and showing photographic illustrations of many of their installations. This company also issues special catalogues on the Howe gas and gasoline engines, which are combined with pumps, air compressors, hoists and engines.

### Trade Treatises.

Bulletin "A" of international standard metric weights, with grade description, is from Wm. Ainsworth & Sons, 2151 Lawrence St., Denver, Colo.

"The Sullivan Mining Machine for Undercutting Coal in Room and Pillar Mines" is the subject of Bulletin 48-B, from the Sullivan Machinery Co., Chicago.

Catalogue No. 7 of the Raymond Bros. Impact Pulverizer Co., 143 Lafin street, Chicago, Ill., describes the Raymond system of air separation, and their special grinding and separating machinery.

"The Power of the New York Subway" sumptuously sets forth the part played therein by the Allis-Chalmers Co. of Milwaukee, Wis., in the new underground rapid transit system of New York City.

The "Bronco" channeler is the subject of a trade treatise from the Ingersoll-Sergeant Drill Co., 26 Cortlandt St., New York, describing and illustrating the successful operation of a heavy-cutting engine for open quarry work and the development of quarry properties, being an outgrowth and development of the old bar channeler.

### Personal.

S. A. GILMORE is superintendent of the Julia mine at Nevada City, Cal.

E. P. FLEMING is assayer at the Copper Queen smelter at Douglas, Ariz.

C. H. MARKHAM is manager of the Guffey Petroleum Co. at Beaumont, Tex.

W. CABLE is manager of the Montezuma G. M. Co.'s mines, near Sumpter, Or.

A. C. MASSEY is superintendent of the McCabe mine at McCabe, Yavapai county, Ariz.

M. H. FRENCH is manager of the Black Hills & Denver G. M. Co., near Rollinsville, Colo.

C. M. BECKER is manager of the Stratton's Independence, Ltd., at Independence, Colo.

G. WEST is metallurgist for the Rincon M. Co., near Martinez, Yavapai county, Ariz.

F. H. SHEPHERD, C. E., of Victoria, B. C., is inspector of coal mines for British Columbia.

A. R. PARSONS is assistant manager of the Bamberger De Lamar mines at De Lamar, Nev.

J. S. JOHNSON of Houghton, Mich., is superintendent of the cyanide plant at Blanchard, Ariz.

A. C. GARDE, for the past three years manager of the Payne mine at Sandon, B. C., has resigned.

S. J. SPEAK is manager of the Ymir G. M. Co., Ltd., at Ymir, B. C., vice G. H. Barnhart, resigned.

W. W. TRAVELL is assistant manager of the Stratton's Independence mine at Independence, Colo.

P. H. AHIER is manager of the Idaho-Alamo mines at Sandon, B. C., vice W. S. Jenkins, resigned.

W. W. WARNER of Spokane, Wash., is superintendent of the Silver Queen mines, near Kettle Falls, Wash.

H. O. HYATT of Webster City, Iowa, is manager of the Iowa-Oregon M. Co., operating near Granite, Or.

G. F. RANSOM is manager of the Payne mine at Sandon, in Slocan district, B. C., vice A. C. Garde, resigned.

J. D. MCKENZIE of Chihuahua City, Mexico, has gone to the Cerro de Pasco mines at Cerro de Pasco, Peru.

W. S. JENKINS has resigned as manager of the Idaho-Alamo mines at Sandon, B. C., in the Slocan district.

N. F. HEATH is superintendent of the Standard mine at Quartzburg, near Sumpter, Or., vice Z. Houser, resigned.

E. ENDERLEE of New Orleans, La., is at Forest, Idaho, where he is manager of the Idaho Placer & Quartz G. M. Co.

W. FITCH has assumed his duties as manager of the United States M. Co.'s mines and reduction works at Bingham, Utah.

G. W. KEEL, having resigned as manager of the Butterfield mines at Bingham, Utah, has gone to New York and London.

J. FITZSIMMONS has left Cananea, Sonora, Mexico, for Johannesburg, South Africa, to become identified with mining there.

N. B. KNOX, mining engineer, is in San Francisco, Cal., and will leave on Nov. 15th to examine concessions in Japan and Korea.

A. BUCKBEE of Salt Lake City, Utah, part owner of the War Eagle mine, near Silver City, Idaho, will remove to Boise, Idaho.

W. H. CLAY of East Orange, N. J., has been appointed to the engineering staff for the Panama Canal construction, and will be at Colon.

W. Y. WILLIAMS of Spokane, Wash., recently general superintendent of the Granby mines at Phoenix, B. C., has gone to Wales on business.

S. K. THORNTON has resigned as superintendent of the Shenandoah mine at Plymouth, Cal., and is in charge of the Elliott mine at Oleta, Cal.

R. B. GREEN, formerly chemist for the Minnesota Iron Co. and for the United States Steel Co. in Minnesota, is with the Sumpter smelter at Sumpter, Or.

F. TAYLOR, till recently superintendent of the Bingham-New Haven M. Co. mines at Bingham, Utah, is manager of the company, vice A. J. Molloy, deceased.

O. F. LACKEY has resigned as chief en-

gineer of El Cobre mines of Santiago de Cuba, to become assistant engineer in the office of Harbor Engineer, Baltimore, Md.

H. L. MILLER, manager of the Libertad M. & S. Co. of San Antonio de la Huerta, Sonora, Mex., has returned there from three months' visit in the East.

F. O. HARVEY of London, England, consulting engineer to Mason & Barry, Ltd., has been appointed consulting engineer for the San Miguel C. M. Co., Ltd., operating in Spain.

D. M. PHILLIPS, for several years manager of the San Ricardo mines in Sonora, Mexico, has resigned, and is devoting his time to his interests in Ures district, with headquarters at Ures, Sonora, Mexico.

W. L. LOVELAND has been appointed manager of the mining and crushing machinery department of the Allis-Chalmers Co. He assumed his new duties October 18th at the main office of the Allis-Chalmers Co., Chicago.

### Obituary.

WM. DUNN, a mine owner of Arizona, died at Phoenix, Oct. 30. He was interested in mines in the White Tank mountains.

W. H. BUCKETT, a pioneer miner of Nevada county, Cal., died at Grass Valley, Cal., Oct. 31. Deceased was a native of Cornwall, aged 75 years.

G. W. CURRIER, a pioneer mining man of Colorado, died at Denver, Colo., on the 1st inst. Deceased was a native of Newburyport, Mass., born in November, 1839.

J. W. JONES, a pioneer mining man of the San Juan, Colo., died at Kansas City, Mo., Oct. 18th, aged 69 years. Deceased was a native of West Virginia, and went to Colorado in 1872.

G. H. KNOX, a pioneer miner of California, died at Redding, Cal., Oct. 21, aged 74 years. Deceased was a native of Maine, and was part owner of the Bully Choop mine in Shasta county.

A. SHERWIN, a pioneer smelter man of Leadville, Colo., died at St. Louis, Mo., Oct. 21. Deceased was 76 years of age, a native of Vermont. He was manager for several years of the Elgin smelter at Leadville, Colo.

M. J. MCNAMARA, a pioneer of Colorado, a director of the Colorado Mining Exchange, and vice-president of the Colorado Marble & M. Co., died at Denver, Colo., Nov. 5th. Deceased was born in Ireland, May, 1843.

W. W. HOOTON, a pioneer miner of California, Caribou, B. C., Washington, Montana and Idaho, died at Idaho City, Idaho, Oct. 31. Deceased was locator of several mines, among them the Sub Rosa group and the Washington, near Idaho City. He was born in Philadelphia, Pa., 74 years ago.

J. B. BRADLEY, an oil producer of Bolivar, N. Y., and one of the first men to discover petroleum on Oil creek, near Titusville, Pa., died Oct. 30 at Chicago, Ill. Deceased was 78 years old. In 1859, when E. L. Drake sank the first well on Oil creek, Bradley went there and leased property on the banks of the stream. During the forty years he was engaged in oil production he is said to have put down several thousand wells. He also operated at Pithole, Petroleum Center, Oil City, Edenburg, Bradford and Titusville.

### Books Received.

The Journal of the Canadian Mining Institute for 1903, Vol. VI, has been received. It contains the papers and proceedings of the Institute. This volume contains a number of interesting and valuable papers, mostly of a practical nature. Others are of a scientific and theoretical character.

The sixth edition of "Accidents and Emergencies," by Chas. W. Dulles, gives a concise and complete account of the means of relieving injured persons till the arrival of skilled assistance. In addition to its treatment for poisoning, drowning, fits and other common accidents, the procedure in case of electrical and machinery accidents is good. An understanding of the facts set forth would do much to reduce the mortality in our mines if they could be promptly applied. This book is published by P. Blakiston's Son & Co., Philadelphia, Pa. It will be sent by the MINING AND SCIENTIFIC PRESS upon receipt of \$1.



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## Tunnel Locations.

Among the oldest form of mineral locations are the "tunnel sites," as they were formerly called. Locations of this character were made even prior to the enactment of the Federal mining laws. The discovery of new mineral districts often resulted in the location of numerous "tunnel sites," sometimes laid on the four slopes of a mountain. As this class of location became popular, legislation was enacted to make the acquisition of mineral veins by this method possible while doing away with the frequent litigation arising from the unorganized acts and rules of the miners.

In some districts where the vein system was complex it was impossible to locate a "tunnel claim" without strife. The first tunnel legislation was unsatisfactory, as this, as well as other mining legislation, was largely based upon the miners' rules and customs, which were often crude, and insufficient to meet the wide range of geological conditions which often had a direct effect upon the provisions of the law. The first laws were amended by the passage of the law of May 10, 1872, which provided that "where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within 3000 feet from the face (or beginning) of such tunnel, on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as if discovered from the surface; and locations on the line of such tunnels of lodes or veins, not appearing on the surface, made by other parties after the commencement of such tunnel, and while the same is being prosecuted with due diligence, shall be invalid, but failure to prosecute the work on the tunnel for six months shall be considered an abandonment of the right to all undiscovered veins

on the line of such tunnel." The ambiguity of this statute—the only one on the subject in the Federal mining law—has been the cause of much litigation. Many questions in tunnel litigation have fortunately, however, been settled by the United States Supreme Court.

The Federal law does not prescribe how a tunnel location shall be made, and this matter has come to be regulated by rules prescribed by the General Land Office. By these rules the tunnel locator is required, as

soon as his projected tunnel goes under cover, to give notice at the entrance to the tunnel, by posting the same in a substantial and conspicuous manner the following: Names of the persons, or the company claiming the tunnel right; the proposed actual course of the tunnel; the height and width of the tunnel; the course and distance from the entrance to some permanent well-known objects in the vicinity, by which to fix and determine the locus of the tunnel entrance, as in lode claims.

To mark the "line of the tunnel," it is necessary to set a double line of stakes or monuments 6 feet apart (the width of the tunnel) and extending for 3000 feet to the end of the claim farthest from the mouth of the tunnel.

The United States Supreme Court has definitely determined that the right of a tunnel locator to claim a vein arises from his discovery of the vein in his tunnel, and may be exercised by locating 1500 feet of said vein, and this may be taken as desired, in equal distances from the center of the tunnel or in such proportion thereof on either side as he may desire.

A discovery made in an ordinary tunnel (not a tunnel site claim located under the tunnel laws) requires that the discoverer mark the boundaries of such claim on the surface, the same as if such discovery were made on the surface; but in a tunnel right claim, where the claim has been properly taken, the discovery of a vein in such tunnel does not require the same to be located at the surface. In addition to these several phases of tunnel site law, there are many others not passed upon by the courts.



Homestake Cyanide Plant No. 1, Gold Run, S. D. (See Page 339.)



Homestake Cyanide Plant No. 2, Blacktail, S. D. (See Page 339.)



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THE upward advance in the price of copper is having a salutary effect on the industry, and if long continued cannot fail to result in increased production, particularly in the Western United States, where there are many new and idle mines ready to start up. While the demand for copper has increased the past five or six years, the total visible supply has steadily fallen off, being reduced by large sales of stock on hand. In 1899, the total visible supply November 1 was 26,847 tons. The first of each succeeding November since then has seen the visible supply shrink to smaller amounts each year, until on Nov. 1, 1904, it was but 13,505 tons, a comparatively small amount. Contemplated electric installations indicate a demand for copper fully up to the present production, if not exceeding it. A short time since, when copper was but 13 cents, it seemed possible that 15-cent copper would soon be a reality, and now it is within a small fraction of that figure with every indication that it will pass the 15-cent mark. To what figure it may advance it is impossible to say, but it seems not too much to expect, under the existing conditions, a further substantial increase in the present price of the metal, possibly 16 cents, or even more.

AMONG the notable accomplishments of the modern mining industry was the recent unloading in four and one-half hours of 10,000 tons of iron ore from a steamship on Lake Erie at Connaught harbor. In this work eight electrical unloading devices (four each of two types) were employed. The best previous record for ore handling from ship to land for an equal amount was about ten and one-half hours, actual time, although the machines worked off and on for fifteen hours, making four and one-half hours lost time. In the recent example here mentioned only five minutes time was lost. These occurrences show clearly the drift of the tide of human ingenuity, the capabilities of which have not yet been reached.

## The Miner in Rock Studies.

A great deal of attention has been given by students of geology and petrography to the origin and composition of rocks—particularly the igneous rocks. In these studies it has constantly been the aim to find typical examples of the various rocks and to secure them as fresh and unaltered as possible, that their identification might be more certain. Probably no branch of geological science has undergone so much investigation and has caused so great an amount of discussion as that of the character and origin of rocks, unless, indeed, it be the character and origin of ore veins and deposits. The nomenclature and classification of rocks has been changed time and again in the past years, and each new student who comes to be recognized as an authority attempts to create new species, and to make further hair-splitting differentiation among the rock masses, which only serves to still further complicate a classification already seriously involved. It is a well-known fact that from different portions of the same rock mass it is often possible to secure half a dozen or more distinct types of rock—the disappearance or appearance of common and essential minerals at once altering the name and character of the rock, while the chemical analysis still shows that no very material change has taken place. In a single rock mass it is possible to find granite, quartz-porphry, syenite, aplite and several other varieties of the granite magma.

While the exhaustive studies of rocks, their composition and origin, have resulted in a large fund of valuable information on this subject, the metamorphism and alteration to which normal rocks have been subjected by dynamic and meteoric and other agencies, has largely been neglected, but the recent publication by the United States Geological Survey of a monograph on this important subject, written by that careful observer, C. R. Van Hise, will prove a welcome addition to the classics of mining and geological literature. Really from the standpoint of the miner a knowledge of metamorphosed and altered rocks is of far greater importance usually than of normal unchanged rocks, as ore deposits rarely occur in wholly unaltered rocks of any kind. Their most prominent normal constituents are often replaced by strange minerals. Hornblende or mica may be removed in a granite to give place to valuable gold bearing minerals, as at the Independence mine in Cripple Creek district, Colo. The feldspars of diabase may be altered to silica with infiltration of gold and auriferous pyrite as an accompaniment, as in the Mother Lode region of California and elsewhere. Dark, hard and tough rocks are changed to soft talc schist. Granite becomes schist near the vein, and many other changes take place in the rocks, and it is a knowledge of these occurrences that is more valuable and necessary to the miner than the knowledge that the country rock of his vein being granite should consist of orthoclase, quartz and mica. He knows that, for all the text books tell him so, but he constantly finds conditions and combinations of minerals with which he is unfamiliar, because the text books do not treat of these. He finds a fine-grained, light greenish colored siliceous rock. He may believe it to be felsite, but is not sure for the reason that a short distance away the rock is limestone, apparently a portion of the same rock mass, which it really is. It is on these matters that the miner desires information.

## The Hoisting Engineer.

No man about a mine assumes graver responsibilities than the hoisting engineer. He must be not only a competent engineer and a machinist, but he must possess peculiar personal characteristics not necessary to success in other occupations. He must have quick discernment and be able to act promptly. His judgment must be intuitive, and he must almost anticipate the wants of the men far underground, and whose means of communication with the surface is a slender bell cord. Bell systems sometimes become disarranged and signals are not as clear as they should be, but by long familiarity with the ringing of the bells the engineer can almost unerringly tell what is wanted, but under such conditions he assumes grave risks. He becomes accustomed to the different methods of ringing and can thus usually feel certain who the person is giving the signal from below.

He should occasionally make the trip through the shaft, in order that he may become thoroughly familiar with it, particularly if there are changes in its dip or alignment, or dangerous projections in the shaft, such as settled wall plates, chute aprons, pipes or other objects dangerous to the men. When he leaves one place of employment to perform similar duties elsewhere, if the levers, throttles, etc., by means of which the moving skips and cages are controlled operate differently from those to which he has been accustomed, his responsibilities are greatly increased, and if it can be satisfactorily arranged these levers should be changed to suit the runner. Particularly is this the case with steam throttles. Some are drawn toward the engineer to start the engine, others are pushed away, for the same purpose. When a man is accustomed to this operation of a throttle by working at it for months or years, it becomes "second nature" to him to move the throttle in whichever direction the exigencies of the case require. Removing to a new situation, for days and weeks, possibly months, he has to guard carefully against moving the throttle in the wrong direction.

## Risk vs. Economy.

Men who are working mines under lease will ordinarily surround themselves with the necessary precautions to avert, or at any rate, postpone a dangerous condition, but as they have usually no permanent interest in the property they do not make as substantial improvements as are made by owners, either private or corporate. Lessees will assume great risks sometimes to secure a small amount of rich ore. At one time in the Calico district in San Bernardino county, California, miners might have been seen swinging by ropes over a perpendicular cliff in upper Wall Street canyon, where were found small pockets or bunches of rich chloride of silver in vugs and spots in the volcanic rocks. Some mines are worked in so niggardly a manner by owners, as well as lessees, as to leave insufficient support to the walls, and the few pillars left are robbed from time to time by succeeding and more daring workers until the pillars cease to be much of a factor for safety. It is told of the last days of operations in a mine in Sonora, Mexico, some distance east of Hermosillo, that this had been the style of mining practiced, but the company taking up the old mine recovered a large amount of ore from the old workings by scaling from the walls the thin slabs of ore left in the haste incident to mining the rich vein, until all that was left were a few small insecure pillars. These contained rock running into the thousands of dollars per ton. The weight of the walls was beginning to tell on these frail columns which were cracked and splintered by the pressure, and miners feared to touch them with pick or bar. The wealth was aggravatingly in plain sight, but just beyond reach. As an interesting experiment, the expedient of shooting off fragments of the ore by well-directed rifle shots was tried and succeeded so well that several thousand dollars more were recovered in this manner without injury to the workmen. It was then determined to undertake the recovery of a larger amount of lower grade ore by blasting. The result was disastrous. The entire upper works caved, a workman was killed and several others barely escaped with their lives. This mine is to be reopened by a new and expensive vertical shaft sunk in the hanging wall, which will reach the vein far below any of the old workings, and in time it will doubtless again become a producer. The above is only a single example of the risks men will take to recover a small amount of rich ore at a minimum of expense.

IT is not only requisite to have many acres of land, great veins, and heavy machinery to make mining profitable. It is even more essential to have sufficient value in the veins to make profit in mining possible. Low-grade mines of large size are in demand, but there is a limit to the lowness of the grade. Moreover, a grade of ore which will insure dividends at one mine may be wholly inadequate to produce like results at another mine, for many reasons, due to situation, cost of labor, materials, and many other things, and in some instances to the management.



## CONCENTRATES.

CARBON is a non-metallic substance. It is between the two, but has not the properties of a metal, hence by some chemists is styled a metalloid.

It is seldom well to buy an imitation; it is usually better to buy the thing imitated. There is less trouble and better result and less cost in the long run.

IN modern mining practice the tendency is to increase the load hoisted, rather than increase the speed of hoisting. By this means economy and safety are both promoted.

SULPHATE OF ALUMINA 15° B will make timbers fire proof, and if ferric sulphate be added will preserve them from decay. The cost of such impregnation is about \$10 per m. ft. b. m.

THE trend of ore shoots in many important veins is to the right, in looking down the dip of the vein; but this is not universally the case, as there are exceptions equally important.

THE barometric reading in inches multiplied by .4908 equals atmospheric pressure per square inch. The barometer at 23.8 shows a pressure of 11.68 and an approximate altitude of 6420 feet.

THERE is an occurrence of quicksilver (cinnabar) near Santa Ana, in Orange county, Cal., but the mine has never been profitably worked. The development is only superficial. As far as known, no serpentine is present in the vicinity of this cinnabar.

EACH 1% of water or moisture in wood will detract about that much from its fuel value. A pound of oak wood is worth no more than a pound of pine if both are dry; about two and one-fourth pounds dry wood equals one pound soft coal in fuel value.

LITTLE success has attended efforts to extract the gold values from iron sulphide without fine grinding. Experiments made in a number of places indicate that the percentage of extraction bears a strong relation to the degree of fineness of material treated.

SOME of the largest gold mining operations in the world are in progress in New Zealand, in Waihi district. New shaft equipment at the Waihi Co.'s mine have recently been added, which will nearly double the output. A pumping plant has been put in to handle the water to a depth of 3000 feet.

RICH lode gold mines do not always produce rich placers, and rich placers are often known where the lodes do not pay to work. Although millions of dollars have been taken from the telluride ores of the Cambrian strata, near Lead, in South Dakota, these deposits do not produce valuable placers.

THE copper mines of Missouri are in St. Genevieve county, about 11 miles from the Mississippi river. The ore occurs in a series of shoots or lenses lying nearly horizontal in limestone. There are at least two horizons at which these ores occur. The mines have been operated off and on for years. Idle at present.

THE fact that a certain rock formation is of Carboniferous age does not necessarily imply the occurrence of coal in the formation at that place. The Carboniferous rocks in the Western part of the United States rarely, if ever, contain beds of coal, though they are frequently the repositories for rich bodies of ore—copper, lead, silver and gold.

WHERE two machine drills are operated in a single face—drift or shaft, or even in a stope—they may be so set up that a single "chuck-tender" can attend both drills, working a crew of three, instead of four men. If the runners understand their business, the chuck-tender will have an easy time; but an incompetent runner can keep a chuck-tender busy throughout the shift.

THE amount of water being sent out from the Sutro tunnel, on the Comstock Lode, from the Con. Virginia & California mines, which is the point of central drainage below the Sutro tunnel level, is about 1500 gallons per minute. This is in addition to the amount coming in under pressure in the hydraulic elevator. There are many mines which make more water than this, but the water is not hot, as at the Comstock mines.

THE grade of flume which will carry the tailings from a stamp mill depends on the amount of water present in the tailings, the character of the material, size of the flume, and on the temperature. A flume which will discharge perfectly during summer may clog as soon as freezing weather sets in because of insufficient grade. A grade of 2 inches to the foot will usually suffice in any but the coldest countries, where the amount of water is abundant.

WHERE a person legally relocates a mining claim, he also has the right to locate a claim on the ground ad-

joining, if the same be public land and open to location, and this location may be made on the same vein as that first mentioned. Assessment work may be done on either of two contiguous claims for both of them (\$100 worth for each), if it can be shown that this work is for the benefit of both, even if a creek run between the two locations on the surface.

A STEEL INGOT is not a finished product. It is a raw material for a rolling mill. It is a product that is obtained by pouring metal into a mold. An ingot 17 inches square at the small end and 19 inches square at the large end and 5½ feet long would weigh 5500 pounds. In the rolling process the ingot is passed through rolls, reducing its size to bloom, billets and slabs. Anything below a bloom and slabs are billets. A bloom is the largest size. Eight inches square or larger is ordinarily called a bloom; below that it is a billet, until the ½ inch or ¾ inch size is reached, when it becomes a rod. These terms are approximate and lap over.

HYDRAULIC "GIANTS" used in placer mining are of several kinds, and the modern device has been evolved from the experiments of fifty years. Various devices have been employed to prevent the stream from spraying, and two of the most important are the placing of several longitudinal wings, called "rifles" by the inventor, though they are not spirally arranged. The lip of the nozzle is also provided with a small channel (cut by machine). This channel or groove is situated just within the outer edge of the nozzle, and is claimed to reduce the tendency of the stream to spray. The wings are calculated to prevent the stream from assuming a rotary movement, and the groove is claimed to keep the stream from feathering.

REDUCTION of tellurium dioxide and tellurous acid to metallic tellurium by means of sulphur dioxide occurs only when the solution is mixed with from half its bulk to an equal bulk of strong chlorhydric acid, and then only after several hours' heating and passage of the gas, but in the simultaneous presence of sulphur dioxide and iodohydric acid the reduction is immediate and complete, even in the cold. To the solution of about 0.3 gram of tellurium dioxide in sulphuric or chlorhydric acid diluted to 100 c.c., add 1 to 2 grams of potassium iodide, heat to boiling and add about 50 c.c. of a solution of sulphur dioxide. Pass through a weighed filter, wash with water containing sulphur dioxide and finally with alcohol and ether, dry at 100° to 105° C. and weigh.

A CONVENIENT DOOR for ore chutes in shafts, either vertical or inclined, is the plate-iron door supplied with rack and pinion. The chute bottom should have a slope of at least 45° to keep rock from clogging, though the outside extension may be made somewhat flatter than this angle. If desired an apron of plate iron may be secured beneath the chute lip by bolts at the sides, so that it may be folded back when not in use, out of the way of the bucket or skip. For safety some miners also place a board across the chute, secured by cleats about 6 inches outside the door to catch any stray pieces of rock that may escape after attempting to close the door, but the better plan is not to overload the bucket or skip, and not to "ring it away" until all ore has ceased to fall from the chute.

HANGING BOLTS in shafts may be safely removed from those timbers above three sets from the bottom of the shaft, if the ground is hard and the sets have been tightly wedged. If the ground is too soft to firmly sustain the timbers in place, bearers should be put in at least every ten sets until hard solid rock is reached. On these bearers, which extend into the shaft walls at its ends, the entire weight of ten sets must rest, consequently it is important they should have a firm foundation, or rest on a ledge of rock or in hitches cut for them. It is also a good idea, in such cases, to put in permanent hanging bolts to aid in holding the weight and to make the frame as rigid as possible. In shafts where these precautions are necessary the work should be in experienced hands, as mistakes may lead to serious results.

IN designing a quartz mill it should be the object to utilize only sufficient timber, or other material, to make the structure strong and durable, and to distribute it in such manner that it will form the least possible obstructions to the view, and movement of materials from place to place, compatible with strength and durability. In no case should the rock breaker be set in the mill proper if it can be avoided, but if not then the breaker should be set on a timber frame resting upon the bedrock, or other secure foundation and wholly detached from the building, or the great vibration set up by the operation of the crusher will be communicated to the entire structure. The most important feature in mill construction is the foundations, and these must be secure and ample to carry all weight. No timber should be laid upon the earth, either wet or dry, or it will rot in a short time, causing more expense than would have been necessary if the work had been properly done in the first place. Dry walls, as well as masonry walls, are suited to mill work when the walls are carefully made by experienced men.

WHERE two compressors are operated by a single motive power, as by belt between them, and the pipes lead to one main pipe, it is proper to have a valve on

each of the individual pipes, and also one on the main line intermediate between the compressors and the air receiver. By means of this arrangement either of the cylinders may be thrown out of commission while the other is operated, and in the event of the necessity of stopping both sides of the compressor for a few minutes, this may be done by closing the valve on the main pipe, the air under pressure in the receiver then being available as long as the pressure is effective. The safe speed for running a compressor depends wholly upon the make of the machine. Some old style compressors are at top speed with sixty revolutions per minute, and more modern ones are run at much higher speeds. Mine ventilation by means of compressed air is expensive. A large volume of air may be blown into mine workings by means of fans. Compressed air is useful to drive out smoke or gas from a face or in a raise after a blast, but the scheme is of doubtful economy. It is better to provide the necessary fan ventilators.

EIGHT persons may take up 160 acres of placer ground as a consolidated single location or claim. In Idaho the State law requires that within sixty days from date of location the locator shall sink a shaft to the depth of 10 feet and not less than 16 square feet in area. Any excavation which shall have been completed within sixty days from date of location, and which shall measure 160 cubic feet in extent, shall be considered a compliance with this provision of the law. The Federal law requires that \$100 be expended annually upon each claim, and as the 160-acre tract located by the association of eight individuals is a single claim, but \$100 worth of work or improvements is required on this claim annually. Mineral lands must be paid for at the rate of \$5 per acre, in addition to the assessment work or other improvements made, no matter how extensive. The applicant for patent must also pay the fees for publication of "notice of application for patent," which must be published in the newspaper nearest the claim. In the event of the land having been surveyed by the United States, and the lines of the placer conform to these lines of survey, no new survey is necessary.

THE first cement copper was produced in Spain at Rio Tinto in 1752 from heaps of low-grade sulphide ore that had undergone decomposition through natural process. The copper was leached out by water, the metal being precipitated on iron. It was first thought to be merely a coating of copper on the iron, but it was found that if left long enough the replacement became practically complete. At Stadtberge, Germany, copper ores, consisting of the oxides and carbonates of copper, metallic copper and copper glance, are crushed and charged into cemented vats to a depth of 3 feet. A weak solution of sulphuric acid is turned into the vats (the acid being obtained by roasting sulphide copper ores in furnaces). It takes eight to nine days to leach a tank containing sixty-five tons of ore. In the United States a patented process employs the action of sulphurous acid on copper oxides and carbonates, in the presence of water and an excess of the sulphurous acid. The oxidized compounds of copper are attacked by the solvent, the copper going into solution as cuprous sulphite, which, although insoluble in water, is soluble in an excess of the sulphurous acid solution. If the excess of sulphurous acid be driven out by heat, cupric sulphite will be precipitated from the solution in the form of cupro-cupric sulphite, a finely crystalline dark red salt, containing 49.1% copper, which, after drying, may be melted in a crucible, with little or no flux, to a mass of pure copper. There are numerous methods of leaching copper ores, but all of these processes are more or less complicated and involve an extensive knowledge of chemistry, without which only moderate success can be anticipated.

IT is not an uncommon thing to find an accumulation of ore, a pocket, or a bonanza, in a vein where the dip changes from a steep to a flatter indication. This is often found to be the case in pocket mines, in simple fissure veins, and elsewhere. The bonanzas of the Comstock lode, Nevada, mostly occurred under these peculiar conditions, notably those of the Con. Virginia and California. In the development of most pocket mines it is found that the pockets occur with some regularity—that is, like causes appear to produce like effects, and in some mines this systematic occurrence of bonanzas, or pockets, has been studied and the mapping of these several occurrences has shown that the pockets appear in a zone or shoot within defined limits, and that search for pockets beyond these limits is not fruitful of good results. The size of bonanzas, or value of pockets, cannot be anticipated, but often their distribution in the vein or zone can, with a fair degree of certainty. This would indicate that the arrangement is not haphazard, but systematic. These conditions are particularly observable where pockets of gold occur along a fissure which at intervals is intersected by small fissures or veins crossing it in strike and dip. In some instances a third fissure appears, having approximately the same strike as the main fissure, but a different dip, which results in an intersection of these veins, the bonanza, or pocket of gold occurring where the three planes intersect each other. Sometimes one of these planes, instead of being a fissure, is a particular band or stratum of rock (not a vein), as a layer or band of "mineralized" slate, that is, slate heavily impregnated with iron sulphide. In some instances it is a strip of talc schist, probably representing an altered dike.



Native vs. White Labor in Central America.

To THE EDITOR:—In your issue of July 30, under "Concentrates," you give a few paragraphs respecting white labor in Spanish America—outside of Mexico. With respect to the opportunities and remuneration for white miners, it occurred to the writer that, possibly, a few words respecting white labor in Central America might prove acceptable.

Generally speaking, with regard to this and other countries of the Central American republics being suitable as a field of enterprise for skilled white miners, outside of those brought here under contract, I should be inclined to give but scant encouragement.

In the first place, almost all the manual part of mining is done by native labor, which is decidedly cheap, and, as regards its efficiency—for the class of ground that we have here, at least—I should be inclined to place it somewhere in the ratio of two to one in favor of good, skilled white miners. Good native miners are, therefore, fairly efficient and, under contract, they will work long hours (ten) and work hard. Their remuneration, reduced to a gold basis, is very small. Miners in this part of Nicaragua receive \$2.25 paper per day, which, as the rate of exchange is about seven to one, makes their remuneration on a gold basis equal to about 32 cents. Consequently, if my premise is correct in the ratio of two to one, the local remuneration due to a white miner to compete with natives would be about 64 cents gold—a wage that no white miner would dream of accepting. On the other hand, if he cannot turn out a greater proportion of work, it is clearly not the good policy of the mining company to pay him more; and there is very little charity in Central America—any more than in other parts—in solving the equation of cost versus results.

A man's value, manually, is equal to and is, more or less, reckoned at the cost of native labor he is capable of displacing, and this formula applies to all trades.

White miners are utilized as shift bosses and mine foremen; but, again, clearly their numbers are limited, and, besides, on account of the highly unsatisfactory conduct of imported men through taking to "guaro"—a native spirit, peculiarly disastrous in its enervating effects—and other depreciatory digressions, they often become more burdensome than helpful, so that there are many who prefer native foremen, at least for all but the most responsible positions. It must not be forgotten that white men in the States and elsewhere are under a different environment than they are when living in the tropical Central American countries; and to many, if not most, especially those with any pronounced structural weakness, this change of environment induces too readily and perceptibly a change conformable thereto, resembling the condition of the inhabitants of these countries, which, to say the least, is neither desirable nor conducive to the benefit of the individual. The Central Spanish Americas, in the writer's opinion, offer inducements to only those who are qualified to fill responsible positions efficiently and honorably. The requirements call for men of stamina and of a decidedly moral fiber—men who do not need "props," but men who are men and who can stand alone. To such there is undoubtedly a field in the Spanish Americas, but to such men there is usually a position to be filled at home, for these men not only make good miners but good citizens—men whom the world needs everywhere.

As an example of the cheapness of labor, together with its efficiency, herewith is added a statement showing the cost of contract work, which may be taken as about the present average at this mine, and which, I think it will be agreed, it would be impossible to anywhere approximate in any mining district, not only in the States, but also in any country where white labor is exclusively employed. Of course, this result, figured on a gold basis, is mainly due to the depreciation of currency in this country, which may change. In that event, unless wages were correspondingly lowered, the costs must necessarily increase; but most will allow, I imagine, that there is a good margin before—with such economic costs—one must seriously consider cutting wages or its equivalent, the price of contracts.

Finally, I would say with regard to Central America—for I know nothing of South America—that it is most decidedly not the country to which white miners should come, unless under contract at a satisfactory remuneration. This, as stated, is mainly due to the "impossible-to-meet" competition of native labor, giving the costs recorded, and also on account of the moral disintegration that so often happens to those not cast in a sufficiently strong mould.

And, moreover, I would emphasize the potentiality of the remarkably cheap labor that is capable of yielding such results.

That this labor is not without certain serious drawbacks cannot be denied; also, that at times it is somewhat difficult to procure in adequate quantities. But, as an instance of what native labor can achieve in these countries, the writer considers the attached

tabulated statements may prove of interest to many mining men, and also of service in comparison with costs of other cheap native-working countries. Probably it may not be considered a remarkably cheap performance by local experts. The writer rather hopes that this may, indeed, prove the case, as he is humanitarian enough to know when his corporation is getting good and efficient returns and the toiling native some sort of adequate remuneration for his industrious efforts. In this instance, as the wage is \$2.25 per day (paper) it will be seen that all the contractors are making from 50% to 100% over day wages, which, in the writer's opinion, from the strenuous application is richly deserved:

struction at one particular place. Of course there are other ways in which a rope may receive injury while on the drum for an unusual length of time, such as being wound on in very hot weather and remaining until the weather is cold; that was not so in this instance, however, and it is more than likely that the cause was as above suggested.

Gravel Milling in Calaveras County, Cal.

Written for the MINING AND SCIENTIFIC PRESS by M. P. BOAG.

The deep gravel mines of Calaveras county are ancient river beds, which can be traced for miles

CONTRACT COST STATEMENT—TWO WEEKS.

DRIFTING BY NATIVE LABOR IN NICARAGUA, CENTRAL AMERICA.

EARNINGS.		EXPENSE.		PRICE PER FOOT.		Feet Driven.	Shifts.	Ft. Driven per Man per Shift.	NET EARNINGS PER MAN PER SHIFT.		Dimensions, Feet.	DESCRIPTIONS.
Gross.	Net.	Total Exp.	Cost pr Ft.	Paper.	Gold.				Paper.	Gold.		
\$48 00	\$39 40	\$8 60	\$1 43	\$8 00	\$1 14	6	12	.500	\$3 28	\$0 47	5 x 6	Soft, mostly picking ground; stulls placed every 5 feet by contractor; price included.
36 00	29 80	6 20	1 55	9 00	1 28	4	8	.500	3 72	0 53	5 x 6	
185 00	130 00	46 00	2 48	10 00	1 43	18½	45	411	3 09	0 44	8 x 8½	Firm to medium hard (mostly shooting) ground.
140 00	114 30	25 70	1 47	8 00	1 14	17½	23	.760	4 97	0 71	7 x 6	Medium hard, with picking ground.
123 00	106 95	16 25	0 81	6 00	0 85	20½	20	1.025	5 32	0 76	7 x 6	Fairly soft, with considerable shooting ground.

NOTE—All costs for powder, fuse, caps and candles included under "Expense." Powder \$1 per pound; fuse per foot, caps (each) 5 cents; candles 20 cents (paper currency).

SCHEDULE OF NATIVE LABOR PER DAY OF 10 HOURS.

	Paper.	Gold Equivalent.
Foremen.....	\$5 00	\$0 71
Miners.....	2 25	0 32
Carmen.....	1 90	0 27
Masons.....	3 70	0 53
Carpenters.....	3 70	0 53
Bullmen.....	1 90	0 27
Mozos.....	1 40	0 20

Nicaragua, C. A., Sept. 19.

H. E. WEST.

The Care of Hoisting Ropes.

In a recent report contributed to his Government on mine accidents, W. Fryar, Inspector of Mines for Queensland, Australia, has the following to say regarding the care of hoisting ropes:

The care of the ropes is of the utmost importance. They should be examined every day, and during that examination they should make the journey up and down the mine before any persons descend.

The French law provides that, where persons ordinarily ride in cages or buckets without safety catches, the ropes must be subject, among others, to the following regulations:

1. Two meters (6 feet 6½ inches) or more shall be cut off once every three months from the end of the rope.
2. Unless tests are made every time the end is cut off, the rope must not be employed for more than a year for winding purposes.
3. If the tests are made upon the end of the rope cut off every three months, the rope may be kept in use so long as its resistance to rupture, or its breaking strain, has not been reduced more than one-third.
4. For regularly lowering or raising persons, it is forbidden to use a wire rope which has been spliced, or one which has been returned on account of having been strained, or one which has not already worked successfully in several trial journeys in winding material.

A remarkable bit of experience was obtained at one of the Gympie mines toward the close of the year touching the care, or want of care, of ropes. Among the vicissitudes of the mining industry is the necessity of obtaining exemption from work for certain periods. Such necessity had arisen, and the ropes were wound on the drums in the engine house, where they rested for a term. The ropes had not done much work, and, to use a common expression, they were "good as new." On resuming work, however, it was soon found that one of them was gone in one of its strands; fortunately, this was discovered before any harm was done; the other strands were easily broken at the same place, and a valuable rope was destroyed. In many cases an occurrence of this kind is "shrouded in mystery;" but the necessity of searching out the hidden mysteries of these and other dangers has been so frequently brought under notice that the cause was sought and apparently discovered. The roof of the engine house had been used before it had attained to that position, and a number of nail-holes were in it; it was corrugated galvanized iron; the holes were not on top of the corrugations, but in such a position that they allowed the rain water to descend on to the rope, and hence its de-

through this and adjoining counties. Their course is not influenced in the least by the mountains and valleys at the present day. The rivers had defined channels in the bedrock. The whole country was then overflowed with lava, covering up the streams. The depth at which these channels are found varies with the locality. The gravel in the channel is from a few feet thick to several hundred. All, or nearly all of this, carries gold. The richest is mostly found on the bedrock, though deposits of rich gravel have been found just under the lava capping. The gravel consists principally of decomposed serpentine, schist, granite, quartzite, slate and quartz. This decomposition, especially of the serpentine, has formed a clayey cement, binding the pebbles and boulders of quartz so hard that milling is necessary to release the values. The usual practice in milling in this neighborhood is to dump the mass as it comes from the mine onto an inclined grizzly. The fine separates and goes directly to the storage bin. The lumps fall onto a horizontal grizzly. The largest of the quartz boulders are sorted out by hand and thrown over the dump. The clayey chunks are broken up with hammers till all will pass through the grizzly into the bin. The bars of both grizzlies are spaced 2 inches apart. It is fed from the storage bin to the stamps by a large Challenge feeder. The screen used has 1/16 of an inch mesh. When fine enough to escape through the screen it passes over wood riffles charged with mercury. The gold usually being bright is easily amalgamated. At one mill a plate is being used with excellent results. An ordinary stamp mill, with 800-pound stamps, will crush one ton per hour per stamp. After being about one month in one of these mills I would offer the following suggestion and experiences. It is, however, distinctly understood that the question of one or more discharges or any other practices usually found in quartz milling are not here discussed. I do not consider the stamp mill best adapted to this kind of work. In my opinion a mill of the revolving cylinder type is better. It is a well-known fact that not less than 80% of the wear and expense of the stamp mill is caused from crushing the quartz pebbles and small boulders which are entirely worthless; whereas, in a cylinder mill they would be useful as a means of pulverizing the cement. If a stamp mill must be used the 2 or 3-stamp mortar is to be preferred. With a 5-stamp battery there is difficulty in preventing the two outside stamps from pounding iron. I tried a 5-inch drop but found it would not work. This material does not scatter well when being crushed. Better results were obtained by giving stamp numbers 1 and 5, 6 inches drop; Nos. 2 and 4, 6½ inches drop; No. 3, 7 inches drop. This mill had been run with back and front discharges. By stopping up the back discharge and using the single discharge only I found the mill worked much better, besides increasing the tonnage crushed. I believe the principal cause of the increased capacity when using only the front discharge was due to the water being more concentrated, and having consequently more moving power, keeping the screens from getting clogged by the clay.

In front of the plate was a distributing box with holes 1 inch from bottom. The discharge from the mortar struck the holes, making the flow very uneven over the plate. By putting in a piece of 1x4, resting on the front of the box and sloping towards the back and 1 inch from the bottom, I found that the flow over the plate was much more even. By adding mercury to this box it was possible to save a high per cent of the values here. By making this box not less than 12 inches wide and putting in slats in the form of a riffle, the greater part, especially of



the coarse gold, can be saved. The plate is a great benefit, especially for the fine gold. The riffles should be used, but only for safety. If a stamp mill is used the feed throat should be not less than 6 inches wide.

### The Homestake Cyanide Plant.\*

The most extensive cyanide plant in America is that of the Homestake Co., in the Black Hills, S. D. The plant is in two sections, one on Gold Run, below the city of Lead, and the other at Gayville, at the mouth of Blacktail gulch, 1½ mile north of Lead. The company mills daily over 4000 tons of ore from its extensive system of mines. The ore is crushed in six mills having a total of 1000 stamps. That from the open cuts and superficial workings is treated in the three mills (containing 360 stamps) on the north

the mortars. The cost of milling and amalgamation in the mills at Lead (two of 200 stamps each and one of 240 stamps) is 40 cents per ton. As the pulp leaves the plates it consists of about ten parts water to one part of solid material (ore), sands and slimes. The tailings are sized, the coarse (remaining on 100-mesh screen), being 22% of the whole; the middles being 100 and 200 mesh) 18%, and the slimes (passing 200 mesh), 60%.

The pulp is passed through several series of classifying cones. From the first series a portion of the water is pumped back for re-use in the mills. Recently a set of sixteen cones, 10 feet in diameter, has been added to the Gold Run plant.

From the lower part of the cones is drawn the pulp, which consists of all the leachable material and a portion of the slimes. The water passing off at the top of the cones contains very little that is of value. That portion separated, which contains the values, is conveyed to the cyanide plant on Gold Run,

the battery has a beneficial effect upon amalgamation. The lime is crushed through a screen having a mesh ½ of a square inch.

There are fourteen vats each 44 feet diameter, 9 feet deep inside, and holding 610 tons of sand. A vat fills in eleven to eleven and one-half hours. The material is given five days contact with solution. The first solution contains 0.14% potassium cyanide. This solution is continued, with frequent intervals of drawing off to admit oxygen, for three days, at the end of that time, the weak solution containing 0.10% cyanide is turned onto the charge and contact maintained for two days, completing the period of leaching. Wash water is then turned on and continued until the effluent solution shows only 0.02% to 0.03% KCy, and from 5 to 7 cents per ton in value. The charge is then sluiced out with a hose.

Precipitation is effected in the large tanks of 300 tons solution capacity, by agitating by means of compressed air, while spraying the agitated solution



The Homestake Mines and Mills, Lead, South Dakota.

end of the property. The leachable portion of these oxidized north-end ores are treated in the plant in Blacktail gulch (see engraving on the front page). The ore from the lower levels is mostly mined at the southern end of the property and crushed in the mills at Lead. This ore is described as a hornblende, garnetiferous schist, which has been infiltrated by silica and auriferous pyrite, the latter constituting 7% to 8% of the entire vein rock.

The ore is crushed in rock breakers at the hoists, from whence it goes to the stamps in three mills comprising a total of 640 stamps. The mortar is narrow and gives a rapid discharge of this ore through the steel needle slot type of No. 8 screen, though the height of discharge averages 10 inches above the top of the die. These conditions with this granular, half schistose ore result in producing an extremely fine pulp—80% passing a 100-mesh screen. The capacity of the batteries is four tons per stamp per day.

To properly handle this amount of crushed rock the quantity of water necessary is fully eight to ten times the weight of ore.

Amalgamation is practiced both inside and outside

(see engraving on front page), where the pulp is subjected to a second classification by passing through another set of settling cones. The overflow from these cones is carried to a large tank and holds in suspension only the finest sediment. This material is little more than clouded water and is employed in sluicing out the leachable material from the cyanide tanks. The material discharged from the bottom of these gravity settling cones is passed through thirty-six hydraulic classifying cones.

The slimes separated from the sands by these several series of classifiers constitutes about 30% of the ore crushed, all of which will pass a 200-mesh screen. The remaining sands form a product which is rapidly and successfully leached by cyanide solutions. The amount of sand treated at this place daily is 1450 tons, the largest in the world.

The leachable pulp (very fine sands), which contains 10% to 15% pyrite, is charged into the vats by means of a rotary distributing device. The normal leaching rate of this material is 3 to 4 inches per hour throughout the treatment. Lime is added to the pulp before it reaches the tanks. The lime was formerly added in the battery, but was found to seriously interfere with amalgamation, whereas, in South Africa it is claimed that the addition of lime to

with an emulsion of zinc powder and water. The entire contents of the tank are then pumped through two large filter presses. The gold, silver and excess of zinc remain in the filter while the barren solution passes through to the weak solution tanks, its value having been reduced from \$2 to 5 or 10 cents per ton. The value of the slimes from Homestake is \$0.80 to \$1.10 per ton, but these are not being treated at present.

This refined and exhaustive treatment of the tailings leaving the Homestake mills, several of which are illustrated in the accompanying engraving, is strongly in contrast to the treatment of tailings in former years. At first the mills were only provided with plates of raw copper, inside and outside the batteries. From time to time experiments were made in the concentration, but these were spasmodic and never wholly satisfactory. For several years, beginning with 1879-80, a rude concentration was attempted in so-called blanket houses. There were two houses, each about 300 feet long, having a grade of 2½ inches or more to the foot from end to end. In these were arranged shallow sluices, 22 inches wide, in which were laid 50-foot strips of Brussels carpet. Over these the tailings were run, the greater portion of the sands passing on with the

\* See illustrations on front page.



water, the heavier particles of pyrite and iron from the mortars settling on the carpets with some sand, forming a dirty and low-grade concentrate. These were recovered by turning off the stream of pulp from one section of the several lines of sluices and removing the carpet, which was washed in a tank, the carpet being replaced in the sluice, and the pulp again run over it when the several strips of carpet in the section had been washed.

These concentrates accumulated in large quantity during the several years that the plant was maintained, and in time the entire lot was sold to the pyritic smelter at Deadwood, where it was used in the smelting of the siliceous telluride ores from the Terry peak region.

### A Concrete Lined Shaft.

Written by FRANCIS DONALDSON.

The United States Coal & Coke Co. at Tug River, W. Va., has just completed two coal shafts which are noteworthy in being elliptical and lined with concrete. Both shafts penetrate two coal seams, the No. 4 seam at a depth of 100 feet, and the No. 3, or Pocahontas seam, at a depth of 175 feet. These shafts are described in the Engineering News as follows:

**AIR SHAFT.**—The air shaft is 14 feet 2 inches by 20 feet in the clear, and is divided into two compartments by a line of 6x8-inch buntons carrying a brattice of tongued and grooved boards. One compartment is for an air passage; the other is to contain a spiral iron stairway. As this shaft is to be used as an upcast, and the rock penetrated is very solid, it was necessary to concrete it only for 45 feet to cut off surface waters. At the point where it was decided to start the lining, bearing timbers were

and except at the surface no timbering was required. The sump and the necessary excavation for the arches at the lower seam were completed before any lining concrete was placed.

A mixing board was built between the shaft and the engine hoist. In the shaft, 4 feet below this level, a platform large enough to hold two shaft buckets side by side was set on the cross braces (Fig. 1). A paddle mixer was set up on the mixing board, with its spout overhanging this platform, and a movable chute was adjusted so that the concrete could be run into either bucket. When a bucket was filled the chute would be thrown over, the bucket would be hoisted enough to swing clear of the platform, lowered into the shaft and dumped. It was thus possible, by filling one bucket while the other was being emptied, to run the mixer continuously.

The sump lining and the arch bench walls for a distance of 10 feet back from the shaft at each opening were completed before the arch centers were set. For filling the arches a platform was set about level with their crown. A horizontal elliptical ring of the shape of the cross-section of the shaft was set to correspond with the shaft lines 2 feet above the crown of the side arches. Vertical lagging was run from this to the arch centers all around and the concrete thus brought to a level. The placing of all this concrete was continuous, making the lining of the shaft bottom monolithic.

The forms for the vertical lining were built in 5-foot rings, each having eight sections. These were constructed of 2x6-inch vertical lagging, nailed to segments or frames at the top and bottom. The bottom frame of each section was fastened to the upper frame of the section below by two 1½-inch oak dowel pins. The tops of the sections were held together by cleats nailed at the joints, and by 6x6-inch braces bolted to the under side of the upper frames. Spaces of 1 inch were left between sections at the side and end joints to facilitate the removal of the

stand rough handling. The cast iron buntun pockets should be either omitted or modified so that it would not be necessary to cut holes through the forms.

The concrete should be placed wet and faced by working a perforated shovel or similar instrument next the forms.

Springs delivering any considerable volume of water should be drained to the shaft by a pipe through the concrete. These pipes, if plugged at all, should not be plugged until the concrete has set hard. The work was done under superintendency of the writer.

#### COST OF CONCRETE SHAFT LINING FOR HOIST SHAFT, 5.9 CUBIC YARDS CONCRETE PER FOOT OF DEPTH.

	Per Foot of Depth.	Per Cubic Yard.
Stone .....	\$ 5.90	\$1.00
Sand .....	1.77	.30
Cement .....	19.18	3.25
Labor .....		
Mixing .....	\$3.83	.65
Placing .....	3.40	.58
Firemen and pumpmen .....	2.19	.37
(Lumber, \$13 per M. ....)	1.83	.31
Forms .....		
Making, \$21 per M. ....	2.93	.50
Placing .....	4.83	.81
Platform for starting upper section .....	.92	.16
Superintendence .....	3.03	.51
Plant .....	.28	.05
Oil .....	.21	.04
Sundry .....	1.06	.18
Tools .....	.24	.04
Totals .....	\$51.62	\$8.75

### A Ride on an Aerial Tramway

TO THE EDITOR:—One and one-half miles north of Silverton, Colo., is located the Silver Lake mill, on the Animas river. From this mill to the Silver Lake mine and Unity tunnel is an aerial tramway. The line to the Unity tunnel is 6200 feet in length and has a fall of 659 feet and a capacity of eighty tons in ten hours. It is known as the Bleichert system, made by the Trenton Iron Works Co., Trenton, N. J. About half way to the mines from the mill is a station (Midway), where the buckets are switched to and from the main line to the mines.

I secured a pass from the company to ride over this tramway to their mine and return to the mill. I got into the bucket, which is 2 feet 6 inches long, 2 feet wide and 15 inches deep, and holds 5 cubic feet, or about 700 pounds, of ore. I was somewhat nervous, not being pleased with the idea of being suspended in the air anywhere from 20 feet to 600 feet from the ground. But once in the bucket there was no backing out. The tramway man pushed the bucket out to the line and fastened the grip to the running cable and said "Good bye." Before I knew what was happening I was out of the building, going up the line, and found myself grasping the sides of the bucket for fear of falling out. After passing a few towers I soon breathed easier, as I found out it was no use to be frightened—the bucket was going ahead and I was in the bucket and there was no getting out. Several hundred feet up the line from the mill is a "break over" and then a straight line for Midway station. One place just after leaving the break over is a very high tower and quite a long span, and I thought that was the long span I had heard of, and once over that I again breathed with more freedom. I reached the Midway station without mishap and was still grasping the sides of the bucket. As I rode into the station the tramway man at this point asked me if I wanted to go to the Unity. Upon assuring him that I did, he pushed the bucket around to the Unity line, set the grip and said "Good bye." I was again off, up the line. It looked pretty steep, and it was. Some of the towers are over 100 feet high, and in crossing the gulch one span is 500 feet long and something like 600 feet from the ground. At this point I still clung to the bucket. It looked a long distance between towers and seemed to me it was a mile or such matter to the ground. During the trip, which occupied something like thirty-five minutes, it rained several times and the weather was cold. Arriving at the mine I was met by another attendant, who helped me to alight from the bucket, and I was glad to get out.

I immediately went to the blacksmith shop, where there was a fire, and got warmed up. In a short time the foreman of the mine came out of the mine and we went to dinner at the boarding house, which is a part of the mine buildings. After dinner I visited with several of the men until it was time for them to go under ground. The tramway did not run during the noon hour, and shortly after it started up I again seated myself in a bucket and started down the hill for the mill. But a short distance from the mine is located the long span, and it looked higher than ever, and I caught myself gripping the bucket tighter than ever. At several of the towers heavy timbers and rock have been placed to keep the snowslides from tearing out the line. I had been out but a few minutes on the line when another light shower passed over. In making the switch from the Unity line to the main line at Midway my hat was knocked off and it looked as if I would go the remainder of the distance hatless, but, as luck would have it, the attendant caught me before I got out of the building. In a short while I was again at the mill, having made the perilous trip in safety.

In coming down the line I could not help looking at the rope above and the little sheave wheels traveling along on the standing cable, and to notice the grip

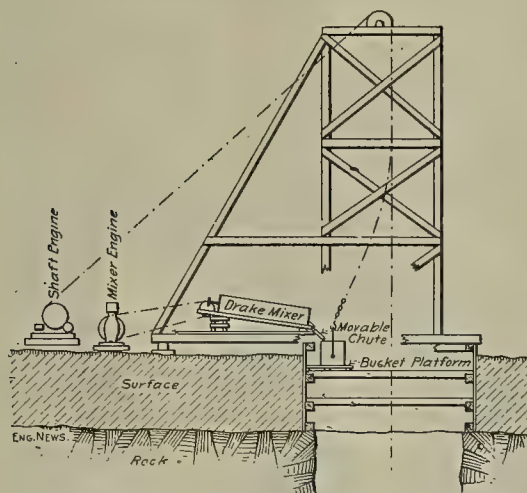


Fig. 1.—General Layout of Concrete Plant for Lining Elliptical Shaft.

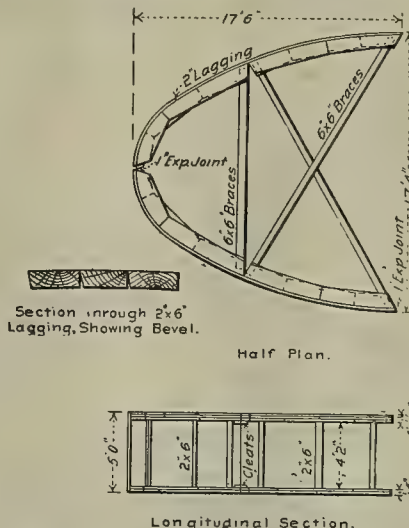


Fig. 2.—Movable Form for Concrete Lining for Elliptical Shaft.

placed, and a foundation ring cut into the rock. A platform was built upon these timbers to support the first set of forms. The concrete was brought up in 5-foot sections, the method being similar to that used in the hoist shaft, which is described below. The plans required the lining to have a thickness of 1 foot. This concrete was hand mixed.

When the surface of the bedrock was reached the overflowing water was led to a point at one side of the shaft, where a small dam was built. A pipe was then placed from this dam so as to lead the water through the inner concrete form to the interior of the shaft. The concrete was tamped around the pipe, and after it had set sufficiently the pipe was plugged, thus completely cutting off the surface water.

**HOIST SHAFT.**—The hoisting shaft is 17 feet 4 inches by 33 feet in the clear, and is concrete lined throughout, with concrete arched entries at both seams. This shaft is divided by three lines of 8x12-inch buntuns into an air way, two hoist ways and a pipe way. At the bottom, under the hoist ways, is a sump 8 feet deep, lined with concrete. Each seam has two 24-foot, three-center concrete arches over the main entries, and a 15-foot arch over the air course. The lower seam has, in addition, an 8-foot entry for pipes at one end of the shaft. The plans for the hoist shaft lining required a thickness of 1 foot at the sides and 1 foot 6 inches at the ends. The buntuns are held by cast iron pockets or boxes imbedded in the concrete lining, so designed that the buntuns may be readily changed.

Both shafts were sunk simultaneously. Compressed air was used for drilling and electricity for lighting. Three eight-hour shifts, six days a week, were employed. The average weekly progress in the hoist shaft was 16 feet, and 20 feet was the best week's work. This shaft was 19 feet 4 inches by 36 feet through the rock, and contained 20.2 cubic yards of rock per lineal foot. The rock penetrated was solid,

forms. The cracks thus left were covered with strips of roofing paper.

Lining was carried on in two shifts, one placing a ring of forms and the other filling it with concrete. A platform was laid on each set of braces for dumping the concrete. As this platform was level with the top of the ring, placing the concrete was not laborious. Little ramming was needed, as the concrete was mixed wet. A smooth surface was obtained by working a long, narrow spade up and down against the forms.

The cast iron boxes for the buntuns were placed in holes cut through the forms, and were lined and held in place by temporary buntuns made of boards.

The arches at the upper seams were put in similarly to those at the lower. The shaft forms below the upper seam were then taken out and used one by one above it. Only ten rings in all were made, and these served for lining the entire shaft. When these ten were all in place again above the upper seam, the lower rings were removed one at a time and used for a third time.

The form shift consisted of an engineer, headman, two carpenters and two helpers, the latter working either inside or out, as might be required. The time required to take a ring out from below and reset it was about the same as that required to set a new ring lowered from above.

The concrete shift consisted of an engineer, headman, about twelve laborers for the mixer and five men in the hole, placing and ramming the concrete. To fill an average ring, containing 30 cubic yards, took ten hours.

The finished lining is generally smooth and water tight, and is a satisfactory job. This work has shown that the most important points which must be observed to make a concrete shaft lining a success are: The forms must be rigid, smooth and practically water tight. They must be built in sections small enough to be readily handled and strong enough to



attached to the running cable. And as I came down I kept thinking to myself, "Suppose that grip should break, where would I be?" I would then argue the question to myself, "Hundreds of men have gone over the line before me and came out all right; guess I will get through all right." M.  
Silverton, Colo.

## Use of Crude Oil for Fire Assaying.\*

Written by F. C. BOWMAN.

The principal fuels used in assaying are coal and coke, while charcoal and wood are used in special cases, and in some portable furnaces gas and gasoline are employed, although it is difficult to obtain the same even heat with the latter as with the coal and coke furnaces. In some portions of the country, however, the high cost of these fuels and the difficulty of obtaining a good quality of such fuel often leads one to adopt the gasoline furnace where the work is light.

It was in view of these facts that I was led to experiment with crude oil, which was comparatively cheap as a fuel, although I was informed by a very prominent manufacturer of gasoline furnaces that others had not been very successful in this line.

A new two-muffle 11"x16"x7" furnace, which was constructed to burn coal, had just been completed, as is shown in the accompanying cross-sectional draw-

ing. The full width of the fire box and the other brick arranged as shown in the section and extending the full width of the fire box. The successful working of the furnace depends largely on the arrangement of this firebrick.

In starting the fire a piece of oil waste is lighted in the fire box just back of the burner nozzle. When this is burning well oil and steam are turned on at the same time until the oil ignites and the oil valve set to give the proper flow of oil, after which it is regulated by the steam valve. Plenty of waste should be used to furnish a blaze until the furnace is hot enough to ignite the oil, otherwise an explosion is liable to take place from the gases formed by the oil in the partially heated furnace.

The valve DV at the end of the steam line is left slightly open to let the water of condensation drain off, which if passed into the furnace will cool it off and is liable to crack the muffles. To obtain the best results the steam should be absolutely dry, and for this reason the steam is passed through a coil around the stack before going to the burner. A small steam coil is placed in the oil tank to heat the oil and make it flow more evenly, and also serves to keep the heavier oils from settling.

About fifteen minutes after the fire is started the muffles are red, and after from thirty to forty-five minutes the crucibles are ready to pour. With this furnace I have run through twenty-five to thirty assays in one and a half to two hours, and from fifty to sixty assays in two and a quarter to three hours, including cupelling. This time is counted from the time the oil is turned on until it is turned off. The amount of oil used varied from 4.2 gallons per hour to 5.3 gallons per hour, varying with different lots of oil and also with the quality of steam furnished. With oil at 8.7 cents per gallon delivered at the burner, the cost per assay was 2.2 to 2.8 cents.

In a coke furnace with a single 11"x16"x7" muffle and using forced draft, the average consumption of coke per hour was thirty-four pounds. The time was counted from the lighting of the fire until the heat was too low to be used for cupellation. With coke costing \$2.25 per cwt. delivered at the furnace, the cost per assay for fuel was 7.1 cents.

In a No. 31 Cary combination gasoline furnace of F. W. Braun & Co.'s make, using a 2-inch Cary burner of the same make, the average consumption of gasoline was 0.65 gallon per hour, the gasoline being delivered to the burner under an average pressure of ten pounds. The time was counted from the time the gasoline was turned on until it was turned off. With gasoline at 40 cents per gallon delivered at the burner, the cost per assay for fuel was 5.2 cents.

In the discussion following C. W. Comstock said: "By way of additional information as to fuel consumption in assay furnaces the following may be of interest: Twenty-three heats aggregating 117.25 hours were made in a coal-burning furnace with one muffle. The muffle was 12"x19"x7½". The grate was 19"x12½", and its upper surface was 17½" below the muffle. Two tons of coal were burned, one ton of Maitland screened nut and one ton run-of-mine from an unknown locality. The grate area was 1.66 square foot. Coal was burned at the rate of thirty-four pounds per hour, or twenty and one-half pounds per square foot of grate surface per hour. No record was kept of the number of assays made during this time. The average time per heat was 5.1 hours, the shortest 3 hours and the longest 8 hours. Fire was started in a cold furnace at the beginning of each heat.

"A No. 37 Cary double muffle furnace made by F. W. Braun & Co. of Los Angeles consumed gasoline as follows: Two heats aggregating four hours and fifty minutes consumed 6.36 gallons, or 1.30 gallon per hour. The air pressure in the gasoline tank was forty pounds. One heat of two hours and twenty-five minutes consumed 2.70 gallons, or 1.12 gallon per hour. The pressure was thirty pounds at the beginning, but owing to a leak ran down to seven pounds at the end. One heat of four hours and twenty minutes consumed 5.95 gallons, or 1.37 gallon per hour. The pressure was thirty-five pounds. One heat of two hours and twenty minutes consumed 2.70 gallons, or 1.14 gallon per hour. The pressure was twenty pounds. The total consumption was 17.71 gallons in fourteen hours, or 1.27 gallon per hour. One of the muffles was 6"x12"x4" and the other was 10"x16"x6½". The burner was a Cary hydrocarbon burner, 2¼" in diameter."

## A Big Contract.

The California Gas & Electric Corporation of San Francisco, Cal., has contracted to supply the United Railroads of San Francisco with all the power necessary to operate its electric lines for twenty years, beginning January 1, 1906. This means that electricity developed by water power in the Sierra Nevada mountains will be transmitted nearly 150 miles at 40,000 volts to operate the street cars of San Francisco. To prevent any interruption of service, a 16,000 H. P. auxiliary plant is to be installed in San Francisco. This will consist of 4000 K. W. dynamos directly connected to gas engines operated by crude oil water gas from a new gas-making plant to be installed. Contracts for the auxiliary plant have been let.

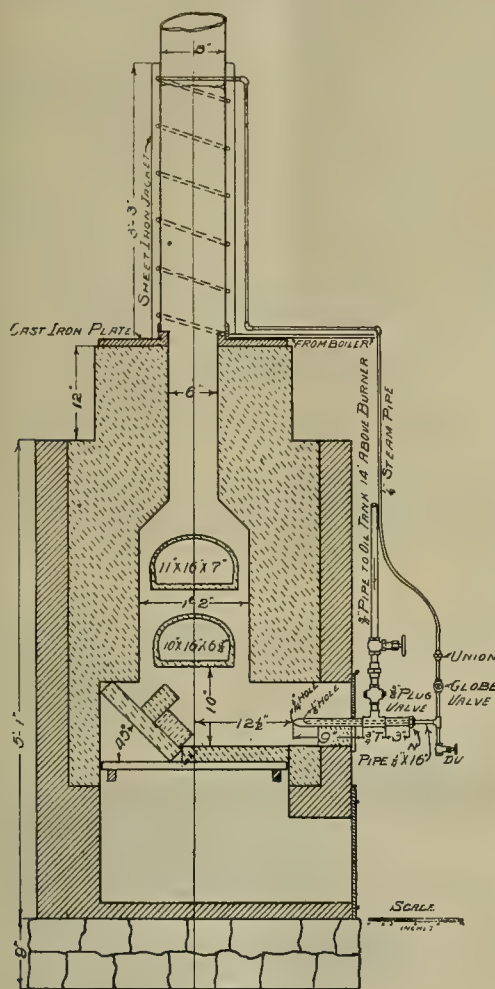
## Quicksilver in Pan Amalgamation.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by W. J. ADAMS.

In the first place, the quicksilver must be in perfect condition before its addition to the pans. It must not be "sickened"—i. e., the globules must quickly become incorporated with the mass and not repel each other. It must be bright and very active. Unless in this condition, one of two methods of regeneration must be employed. Either retort the entire amount very slowly or put it in the clean-up pan with a small amount of potassium cyanide, some copperas and a very small quantity of unslaked lime and grind for at least two hours before drawing off. Even if the loss is heavy, it will be more than balanced by the subsequent saving, not only of the floured quick, but also of an increased amount of the precious metal contents of the ores. In the second place, handle as little as possible, because whenever it is poured from one vessel to another, even into water, there will be a loss of floured quick, besides, at times, a greater loss from the spattering of the big globules. Quicksilver becomes so comminuted that a collection of the particles will look milky and can only be combined by rubbing the globules together for some time, so that it is important to prevent this separation in every possible way. From the first time that the newly purchased flasks are emptied, the quicksilver should pass mechanically through the entire journey, from its entrance to the pans to its deposition below the strainers, except that portion which is mechanically and chemically combined in the amalgam. The tanks below the strainers contain water to break the fall of the quick, which is dripping from the canvas sacks, and from there it is pumped to a tank above the pans, from which it runs automatically, as required. Caution must be exercised that there is no leak in any part of this system, so that the losses can be confined to the time that it is in the pans and settlers and in the handling of the accumulating amalgam. To extract the balance of the quick from the amalgam, don't hit the sack with a club, but raise it in the iron box and drop it smartly on the iron ring, while in scooping out the contents hold a vessel under the scoop till it is over the receiving car. In shoveling into the retort, see that a tight dam of clay is placed at the mouth and a large vessel with water in it underneath to catch the drip. Start the retorting slowly and carry it through till the last drop of mercury has been distilled. In this way the losses can be controlled by conscientious work, except while the quick is with the pulp.

This is where we find flouting and, to a very limited extent, chemical loss. This chemical loss is much less than is generally supposed. If some of the quicksilver is changed to calomel, it is immediately decomposed by the copper sulphate and the iron of the pans or the iron scraps, which are always in the pulp from the wear of the crushing and pulverizing machinery, so that the entire loss in quicksilver can be definitely stated to be mechanical, and under nearly every condition the majority of it can be saved if proper devices are put in, as in gold mills. Take the head of a tailings pond, where the slimes and sand fall from the flume, the accumulation of quicksilver and amalgam in a very short time becomes of monetary importance, showing that no intricate or expensive devices are required. To control the loss in the settlers is very difficult, as the pulp does not remain long enough for this, besides, when a fresh plug is withdrawn, the sudden lowering of the surface will carry off an appreciable quantity, through the increased velocity, until the outflow balances the fresh water added. This loss can be kept to a minimum by always having the wooden shoes on the bottom and only revolving the arms at such a speed as to keep the sand from packing and accumulating on the bottom. This speed must be determined for each individual ore. Either by the continuous process or by individual pans there is a constant flow leaving the mill—i. e., the flume is never dry—so that no trouble is experienced from the choking of traps, which, should it occur, can be remedied by having a stream of water entering the flume outside the mill. Of all the methods to save quicksilver, whether floured or in coarse globules, none are as efficient as those which require the pulp and water to ascend a short distance before overflowing, owing to the specific gravity and the rounded shape of the quicksilver particles, which present the least resistance to the force of gravity. As soon as there is a collection of quicksilver, the saving is increased from the incorporation of the fine globules into a heavy mass. As the intermittent flow from each settler will not admit of placing any saving device in the launders leading from the settlers to the main flume, it is in the latter that an effort must be made to catch the escaping quicksilver and accompanying amalgam, as in the flume there is always a continuous flow of tailings from a mill having several settlers. First put into the flume cross-rifles from ½ inch to 1 inch high or a layer of expanded metal, which can be easily removed. Second, dependent on the fall between the mill and tailing pond, put in several traps, either



Cross Section of Furnace.

ing. It was rather doubtful at first whether this could be adapted to the burning of oil without very radical changes, but comparatively few additions were found necessary.

There are a great many styles of oil burners on the market, all having their special claims, but the general result arrived at is the breaking of the oil into fine particles by the use of steam or compressed air, and at the same time forcing it into the fire box.

The burner which I have adopted, though probably not as efficient as some sold by manufacturers, has proven quite effective and is simple and easily constructed by any one. It is shown in the section of the furnace and consists of a ½-inch pipe connected by a T with the oil line and through which passes a ¼-inch pipe connected with the steam line. This steam pipe passes through a packing nut (N) which allows of the adjustment of the distance between the opening in the nozzle and the opening in the steam pipe, this distance affecting very materially the flow of the oil even when the inlet valves of both steam and oil are set. A slotted hole was first used in the nozzle, but a round one was found to work better in such a small fire box.

The arrangement of the firebrick was only determined by experiment. The grate bars are covered

\*Trans. Colorado Sci. Soc.



made of wood by the carpenter at the mill or of iron, with a taphole in the bottom. These traps should have but one division under which the pulp is forced to flow. Clean these up either monthly or when sufficient has accumulated to warrant its removal. The results will be very satisfactory, and even if the price of quicksilver is so low that a little loss need not be considered, the amalgam saved will so add to the output that it will be of sufficient importance to warrant the expenditure.

Summing up the results, it can be briefly stated:

First.—See that the quicksilver is bright and active and with no repellent globules.

Second.—Grind and add chemicals always before adding the quicksilver.

Third.—Run the settlers at as slow a speed as will prevent packing with the ore under treatment and thin with clear water as long as possible.

Fourth.—Put riffles in flume and traps between sections of same, even if only wooden boxes.

Fifth.—See that no filth or grease from water or machinery gets into pan, settler or flume.

In conclusion, the writer wishes the reader to understand that the above is the result of practical experience; chemical equations and theories are left out, as well as the results of laboratory work. This laboratory work is only useful as a guide, as the small quantity taken allows a closer saving of the quicksilver than could ever be possible in practice.

As there are still many pan mills in operation, it is hoped that the above will prove of benefit, particularly as very little, if any, expense is required to change the existing conditions of the average mill.

### Hydraulicking in the Yukon Region.

Written for the MINING AND SCIENTIFIC PRESS by  
C. R. SETTLEMEIER.

With the practical demonstration that the frozen placers of the Yukon basin can be worked by hydraulic process on an extensive scale, an incalculable range of possibilities in mining in the North is opened. It has been proven with hydraulic plants from Atlin, in northern British Columbia, to Nome, on the Bering coast, within the last five years that hydraulic mining can be pursued profitably over all this vast stretch of territory where gold has been located, and the number of hydraulic plants are being yearly increased at a rapid rate. Ground, which for a long time baffled the early prospector in his simple and primitive manner of operation, is being secured by big companies and made to yield profitable returns to capital invested.

When gold was first discovered in the Yukon it was feared by many that hydraulics never would be prac-

as the sun can thaw it. By the time one end of a claim is washed clean the apparatus can be directed to another end, and thus the work never ceases. Some of the gravels are so dry that the frost troubles the miners but little, and great areas of gravel are washed freely without the sun-thawing precautions being necessary.

In Atlin, at the head of the Yukon basin, the ground contains no permanent frost, but the auriferous deposits there are not as rich as in the Klondike. Atlin has several hydraulic plants that handle great quantities of dirt annually. One company, the Sunset, has a ditch 8 miles long.

The Big Salmon diggings, east of White Horse, are worked successfully by hydraulic, and the Alek diggings, west of White Horse, are said to be admirably adapted to that process of mining.

The Rampart camp, on the lower Yukon, this summer received its first impetus in hydraulic mining. The Pittsburg Gold Hydraulic Co. landed there this summer 170 tons of equipment for a big hydraulic plant for the company's property on Big Minook creek. The plant includes 3 miles of 22-inch wrought iron pipe and giants. The Gold Bug Hydraulic M. Co. had delivered a hydraulic plant at Rampart, late this fall, for its claims on Rhode Island creek. The property in the camp, owned by ex-Governor J. H. McGraw, of the State of Washington, it is understood, is also to be worked by hydraulic.

On American creek, near Eagle City, on the Yukon, the Evergreen Hydraulic Co. has a big plant at work, under the direction of Dr. Cook of San Francisco. In the old Birch creek diggings, back of Circle, hydraulic apparatus, it is said, could be used successfully. Already a steam shovel has been taken into that district.

Nearly all the heavy equipment installed in the Yukon basin placer camps this summer, aside from steam boilers and the winter thawing apparatus, has been hydraulic apparatus. In the aggregate, hundreds of thousands of dollars have been spent on such equipment.

In the Klondike alone—that is, in the rich British Yukon camp, within a radius of 55 miles of Dawson—two or three of the most heavily capitalized companies in the far north have been floated and the preliminary work done toward opening the placer ground on which the new holders will work with aid of gravity water systems and hydraulic giants. Before the beginning of the present year ten or more large hydraulic plants were at work in this camp, and next year more will be under way. The mines, which startled the world when Klondike was discovered in 1896, have yielded in excess of \$125,000,000, and this year, together with the modern equipment, the same mines produced \$9,500,000. This is all from the little area within one day's ride of Dawson. The richer claims have seen their best days, and gradually the ground on bench and creek bottoms is being absorbed

by J. S. Baker of Tacoma and others; the Pacific Coast Mining Co., operating on Cheechaco hill, on Bonanza, and backed by American capital. The Detroit-Yukon Mining Co. has worked extensively this summer with steam dredgers and controls much ground originally intended for hydraulic purposes. For the last year or two the Big Bonanza Co., managed G. T. Coffey, on Fox and American gulches, has been working with hydraulic process at a profit. Other smaller hydraulic operators also are busy throughout the camp. A few of the larger companies have endeavored to hydraulic by lifting their water by steam pumps from the creeks to the hill or bench levels, but it is demonstrated to the satisfaction of nearly all Klondike operators that for profitable hydraulic work in this country it must be done by gravity and the water must be obtained at no expense other than for ditches.

In bringing water to their grounds most of the operators in the Klondike thus far have drawn on the local supply—that is, the supply from the passing creeks and the drainage from the adjoining watershed. But to supply all the camp and wash all the hundreds of thousands of acres of auriferous gravels in the Klondike by this process is impossible. A supply equal to a river would be necessary, and it may be safely said that, were the entire supply of a navigable river available to distribute over the hundreds of gold-carrying streams and their wealth of ancient contiguous gold channels, such a supply would not be sufficient to tear down and wash away all the gold-bearing gravels now known to be auriferous within an area of 50 miles square and lying mostly to the southeast of Dawson.

The Acklen enterprise, which is the most pretentious on the gravity plan in the Klondike, has one ditch 12 miles long, just now being completed and running to the Twelve Mile river. Another ditch is being planned by the same people to run 40 miles across hills and benches and up the Twelve Mile river to near its source in the Rockies.

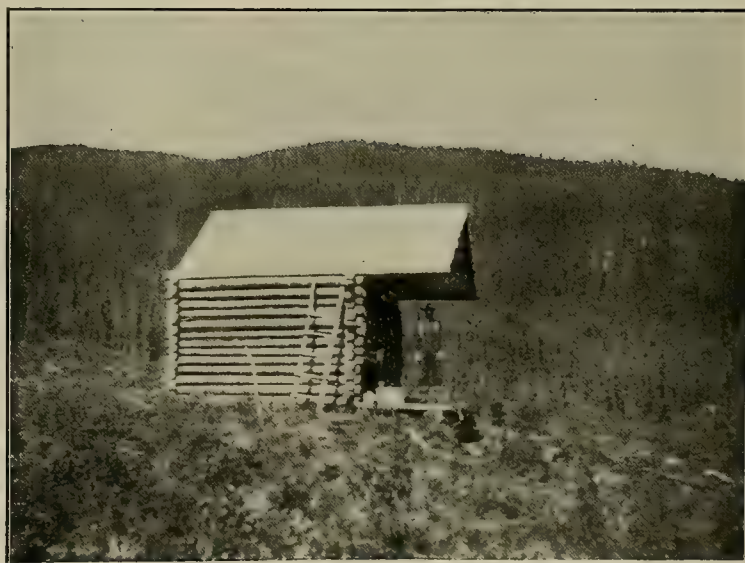
The North American Transportation & Trading Co., which put part of its new plant into operation on Miller creek this summer, brings its water several miles through ditches. Next year it will have iron piping added to the ditch system and will greatly increase the flow. This plant alone will cost \$250,000 or more.

The thoroughness with which the Bonanza Creek Hydraulic Co. is going at the work is demonstrated by the fact that this winter they will dig 800 feet or more of tunnel to carry off tailings. The company has already spent more than \$100,000. The other companies mentioned nearly all plan to spend \$100,000 at least in early work, and some will spend much more.

One of the biggest mining enterprises ever undertaken in Alaska, or the Yukon basin, has been inaugurated in the old Forty Mile country, on Chicken creek. Six miles of this stream and its principal



Miners Rocking on Forty Mile, Alaska.



Home of a Miner in the Yukon Basin.

tically applied in the country because of the permanent frost which permeates the ground. The frost disappears to the depth of 2 feet every summer, but below that it is permanent. Frost has been followed in shafts in the Klondike to a depth of 210 feet. The frozen gravel is as hard as rock, and in all instances must be thawed before it can be removed. At the depth of 210 feet the limit of the frost line evidently was reached, because, at that depth, with a temperature of 50° or more below zero, running water was found. Scores of other shafts 100 to 150 feet deep have been sunk in the Klondike without getting beyond the frost.

The hydraulic operators in the Klondike overcome the difficulty of frost by letting the sun thaw the first few inches of dirt, and then washing it away. By having a large area it will require the attention of several giants to wash off the exposed surface as fast

by companies which obtain many claims in a group and operate them in the advantageous manner described.

The new hydraulic concerns which go to work this season in the Klondike camp include the Bonanza Creek Hydraulic Co., Ltd., managed by Emil Weinheim, and backed by New York and London capital, and operating on Adams hill and on hills near discovery on Bonanza; the North American Transportation & Trading Co., of which the Cudahys of Chicago and others are chief owners, operating on Miller creek, 50 miles west of Dawson; the Acklen Hydraulic Co., owning groups of hillside properties of many acres, opposite the mouth of Bonanza creek and almost immediately back of Dawson City, and backed by British capital; the Fuller-Lawson-Norwood Co., owning a big group on Bonanza; the White Channel Gold Mining Co., operating on Gold hill and backed

tributaries have been grouped for the purpose of being worked by hydraulic. It is estimated that \$500,000 will be required.

Water will be brought to the creek from the Mosquito fork of the Forty Mile by ditch or pipe line. The supply of water is so easily obtainable and the fall so great that it will be almost like diverting a river to the field of operation.

It is estimated that in the ground on Chicken and the tributary of Myer's fork, which virtually comprise all the ground secured, there is \$10,000,000 in gold.

The Chicken creek proposition is considered by certain Klondikers, who have examined it and are conversant with the place, as more inviting than most big propositions in the heart of the Klondike, or, more properly, in the section within a radius of 50 miles of Dawson, popularly known as the Klondike.



camp. It is considered more inviting for the reason that it can be supplied with an abundance of water by going a comparatively short distance. To get such a volume of water on the richest creeks of the Klondike camp would require running a ditch perhaps 50 to 100 miles. Thus far no such extensive ditches have been finished in the Klondike. The Aeklen ditch, now under way, is the only thing that will approximate such an enterprise, and it will be 40 or more miles long before it can supply all it is planned to carry.

In the Chicken creek enterprise 2500 to 3000 inches of water can be placed on the ground without great difficulty or expense. Perhaps the volume could be greatly increased over that by simply providing a larger conduit or ditch. The head available for hydraulicking will be 200 feet.

Another advantage the Chicken creek proposition has over the Klondike is that on Chicken the gold is found from the surface down through the 18 or 20 feet to bedrock, while in the Klondike most of the streams have no gold save in the layer of 2 to 6 feet of gravel immediately over the bedrock.

Pay has been located on 3½ miles of Chicken and on 1½ miles of Myer's fork. Stonehouse creek, which may also be included in the big group later, likewise has pay located.

Pay has not only been located but is also being taken from the individual claims on Chicken, Myer and Stonehouse. Last winter sixty men worked on Chicken and Myer and took out many thousands of dollars.

On No. 9 below discovery on Chicken, \$38,000 was taken out last winter. On No. 8, \$30,000 was produced during the same time. Other claims and their yield last winter were: No. 8 bench, right limit, \$16,000; No. 6, \$10,000; one claim on Myer's fork, \$10,000; two or three claims on Stonehouse, \$2500. Four or five boilers, weighing two or three tons each, were the only plants of machinery of any consequence which was used on Chicken or tributaries last winter. Other Chicken claims also have produced well.

The benches are shallower than the creek bottoms. Some of the benches are no more than 3 feet deep, and the creek ground averages 16 to 35 feet. The area over which the gold pay streak is traced spreads from 500 to 1300 feet. Bench and creek claims are included in the big group.

The hydraulic improvements planned for the creek, the promoters say, should wash as much gravel as several hundred men could handle. As there are no large boulders, it could be worked by dredger as well as by hydraulicking.

The Forty Mile district is perhaps the greatest grubstake camp in the world. It has afforded grubstakes to miners for twenty years or more, and the most interesting part of it is that the greater number of transient grubstakes have been washed from the river bars with little trouble.

Oftentimes the rockers have yielded from \$4 to \$40 a day when working gold taken simply from river bars. The benches of the Forty Mile country are believed by many to be scarcely touched and now only on the eve of an awakening to operation by modern hydraulic methods, which will mean the annual output of great quantities of gold for many years.

Several attempts were made to group and amalgamate the Chicken creek properties before the efforts became successful. One of the most prominent mining promoters in the North attempted the work last winter, but the plan was then unsuccessful because he did not have the large sum of ready cash which individual claim owners asked him to advance. The work was successfully undertaken this summer by others.

Some express the idea that perhaps in time all the Forty Mile benches may be torn down by hydraulic. The rich deposits on the bars of Forty Mile, miners say, seemed to have been hydraulicked out by nature, the streams crosstcutting the benches.

The hydraulic method is the most promising in the Yukon for the reason that fuel is a mighty factor there, and pumping processes, thawing by steam boilers and steam points, and all such work entailing the consumption of fuel, means a vast consumption of the gold yielded in the getting of the fuel. Coal exists in the Yukon in commercial quantities, but it costs money to mine coal. Wood is to be had, but at a great expense. Any work entailing labor entails expense, and no expense is light in the Yukon. Water, when it can be secured by gravity and applied by gravity, is the great economical force in Yukon mining.

Henry Powers, mining engineer for the North American Trading & Transportation Co., predicts that fifty years hence thousands of men will be mining in Alaska, from Skagway to Nome, and the vastness of the gold deposits, the area they cover and the possibilities in hydraulic work over the new empire verify the belief in the popular and practical mind of the North to-day that, with economical methods, the gold mines of the American and the British Yukon cannot be exhausted in many years.

Dredging has received some attention and promises to receive more, but the dredging areas do not compare with the hydraulic areas. Steam shovels are used in some of the big Klondike works to-day, but they are few compared to the hydraulic plants.

## By-Products in Metallurgy.

In these days nothing goes to waste in mining and metallurgical operations if the management is competent and the waste product can be converted to any useful purpose. The tailings of mills are carefully concentrated by various methods and the waste from the concentration process is cyanided or otherwise treated. Smelting methods have been so far improved that slags are now practically devoid of valuable metallic contents, and in some cases the usually useless slag is converted into paving blocks or bricks for structural purposes, forming a by-product of value. The one thing that causes the smelter the most concern, if not the greatest loss, is the gases escaping into the atmosphere from the stacks of the furnaces, and even these may be commercially and profitably utilized in some localities. Whenever sulphide ores are reduced sulphurous fumes are a necessary result, but by proper arrangement these sulphurous fumes may be conducted to lead-lined chambers where they are absorbed by water forming commercial sulphuric acid, useful in other metallurgical operations. The Broken Hill Proprietary Co. of New South Wales, Aus., within the past year have installed such a plant at Broken Hill. This plant is illustrated in the accompanying engraving. So suc-



Sulphuric Acid Plant of the Broken Hill Proprietary Co., Broken Hill, N. S. W.

cessful has been this innovation at those works that a similar though larger plant is to be added to care for a greater quantity of the sulphurous gases coming from the furnaces. This not only results in the making of a valuable by-product of the smelting operations there, but it prevents to a great extent, if not entirely, the escape of these obnoxious gases into the atmosphere.

In California the Iron Mountain Copper Co., operating in Shasta county, recently determined to put in a sulphuric acid plant constructed and operated on similar lines. The cost of making sulphuric acid as a by-product is not excessive and the acid can always be used, as previously stated, about the works where it is manufactured in other metallurgical operations, or sold to other mines for this purpose. At Broken Hill the acid is employed in connection with the "salt cake" process of separating blende from the other sulphide minerals with which it is naturally associated in those ores. The plant is capable of producing thirty-three tons per week of chamber acid from concentrates and sulphide slimes.

## Radium in American Carnotite.

Recently, before the American Philosophical Society, A. H. Phillips described experiments made by him with ore from Richardson, Utah, containing about 10% carnotite. The radio activity of the product obtained was deemed sufficiently high to indicate that radium could be produced in quantity from carnotite, at least from this locality, as twenty-five pounds of rather lean ore had been used. Had a ton been worked over in the same way it would have yielded a gram of chlorides of 60,000 radio activity as compared to uranium. This specimen was separated in November, 1902, and is as active now as then.

Carnotite is comparatively a new mineral, having been described by Friedel and Cumenge in July, 1899, and for this reason it is not found in most books on mineralogy and is therefore but little known to the general prospector. It was first discovered in the western part of Colorado and occurs in Montrose, San Miguel and Mesa counties of that State and the adjacent counties of Utah. It is a uranyl-potassium vanadate with three molecules of water of crystallization. Carnotite occurs as a light canary-colored powder disseminated through a fine grain sandstone. It is easily soluble in acids and is treated in this way for the commercial production of uranium salts.

## The Mother Lode in Tuolumne County, California.

NUMBER VIII.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

Before closing this chapter on the occurrence of mines along the Mother Lode in Tuolumne county, it will be well to refer again to the Clio mine near Jacksonville, more particularly in reference to the recent developments in that property. In this mine there are two distinct zones or veins of mineralization. The workings of this mine are principally on what is locally called the "back" vein—a vein of massive quartz from 4 to 12 feet wide. The shaft has been sunk to the 300-foot level, where the vein in places is 10 feet in width, carrying payable free gold, beside about 2% of auriferous iron sulphide, said to assay \$100 per ton. In the hanging wall of this quartz vein is a zone of amphibolite schist, from 10 to 20 feet wide, as determined by crosscuts driven from the levels on the back vein. The schist is siliceous and impregnated with iron sulphide, as is usual in these zones of mineralization, and the superintendent states that these schists contain from \$2 to \$7 gold per ton.

The mine is in the development stage as yet, but has the prospect of becoming a producing mine, when the surface arrangements are properly adjusted and some cheaper power than steam is provided.

Southward, along Moccasin creek, from the mouth of Grizzly gulch at the foot of Priest's hill, the vein is obscure for about 3 miles, when again occurs one of those characteristic isolated buttes which appear at intervals along the line of the lode. These have been previously remarked, among them being Whisky hill (rather a ridge than a butte), Quartz mountain and Golden Rule hill. This new occurrence is known as McAlpine hill. It is near the line dividing Tuolumne from Mariposa county. About 2 miles to the southward in Mariposa county is a similar, though larger eminence, called Pinon Blanco, and farther south, in the vicinity of Coulterville, are the Margaret hill, Louisa hill, Mary Harrison hill and others, all of similar appearance and geological structure. The central mass is a broad zone of ankerite, in which occurs numerous ramifying veins of quartz, large and small. The associated rocks are serpentine, black clay slate, diabase, diabase tuff, gabbro, diorite, and other less common rocks at intervals.

On McAlpine hill considerable mining has been done, and it is reported that in early days a large amount of gold was taken from this property. Recently the mine has been reopened, but the writer is unfamiliar with the results of these late operations. A striking feature of the McAlpine mine is its bold quartz outcrop. On the east hillside the slope and canyon are strewn with the great boulders of quartz which have rolled down the mountain from the cropings. The vein at the McAlpine is 100 feet wide. The best pay is usually found near the hanging wall, associated with talc schist. Serpentine, slates and graywacke are the most prominent rocks associated with the lode on McAlpine hill.

The occurrence of occasional bunches or pockets of gold along the Mother Lode in this county resulted in forming very rich placer mines in the streams cutting the region tributary to the lode, due to the erosion of millions of tons of gold-bearing rock with a concentration of the gold in the bottoms of the streams, and the harvest reaped by the placer miners in the early fifties was rich indeed. This has also been the case in sections where quartz mining has not proven profitable as yet, although there are some noted and largely profitable quartz mines on the Mother Lode in Tuolumne county.



## Treatment of Silver Sulphides and Gold Ores by Electrolytic Methods.

The practical metallurgist is often apt to belittle the research work of the chemist, not appreciating that many of his own methods were probably worked out by years of patient trial. One of the important offices of the modern university is to furnish means for such investigations. These, when developed in the hands of the practitioner, often solve the successful treatment of ores formerly considered refractory and economically valueless.

Belonging to this latter class are the grayish quartzose ores from Tonopah, Nevada, containing galena, pyrite, calcite, silver sulphide and gold. The silver sulphide is largely stephanite, the black antimonial sulphide of silver, together with argentite and ruby silver.

In a series of investigations in the chemical laboratories of the University of California, M. Vaygouny has found that the values of these ores can be effectively dissolved with a solution of 1% to 2% ferric chloride, 15% to 20% sodium chloride and 1% hydrochloric or sulphuric acid. The ore is first crushed and then leached with this solution, which is electrolyzed as it leaves the vats. By this action the values are deposited on the cathodes, and the ferric chloride—the active solvent agent—is continuously regenerated through the oxidizing influence of the chlorine liberated.

Consequently the main items of expense will be electric power, common salt and acid. The latter might be too great with alkaline ores, as the precipitation must take place from an acid solution. Sulphuric acid is as satisfactory and much cheaper than hydrochloric acid. The chlorine is obtained directly from the latter or by the action of the former on salt.

The time of treatment is three hours, if the mass is kept boiling and continually stirred, and three days if treated cold with an occasional shaking.

The results of a large number of experiments give a silver extraction of 95% to 97% and a gold extraction varying from about 60% to 88%, the success of the latter depending upon the continuous presence of chlorine in the solution and fineness of crushing. The higher gold extraction was obtained by crushing to 120 mesh, showing that the gold is finely disseminated throughout the ore mass.

Mr. Vaygouny states that it is difficult to always get a coherent deposit on the cathode, but suggests the addition of a fraction of a per cent of some mucilaginous substance to the solution, perhaps in conjunction with Tomass's method of revolving cathodes, from which the deposit is quickly removed mechanically. Graphite electrodes are the best as regards duration and cheapness.

He finds that if the solution be warmed and glue added that a firm whitish-gray deposit is formed on platinum electrodes with a current density of .1 ampere per square decimeter and 1.5 to 2 volts.

The practical application of this process on a large scale has not yet been tried, but offers an interesting possibility for the economical extraction of silver and gold from their ores.

## THE PROSPECTOR.

It is more common to begin the development of a prospect by means of a tunnel than by a shaft, and in most cases where either method may be employed, the tunnel is usually preferred, for the reason that it is less expensive and one man may alone accomplish much more than one could alone perform in a shaft, though there are instances of record where prospectors have alone, and entirely unaided, sunk shafts approximating 100 feet in depth. In starting a tunnel prospectors, in their haste to get "under cover," frequently start the tunnel before they have a face in the open cut sufficiently high to give solid ground as a back to their tunnel, being still, in fact, in loose earth and grass roots. This is unprofitable, as a rule, for the reason that it not only requires timbers at once (which may also be the case in rock), but timbers are always short lived when placed in contact with soft earth and particularly in loam full of roots, etc. It is better to have a solid back of at least 3 feet of rock. The first set may project 2 feet or more if the rock shows a disposition to cave. It is also a good plan to cut a drain above the tunnel so that surface water will be carried off to the sides. Some miners make the open approaches to these tunnels wide enough to admit the building of solid rock walls along the sides, employing the rock subsequently taken from the tunnel for this purpose.

The rocks from Marion county, Or., have been determined as follows: No. 1 is a feldspathic rock showing indistinct feldspar crystals and partly altered hornblende; it might properly be termed diorite porphyrite; it also contains some infiltrated iron sulphide. No. 2 is similar to No. 1, but the hornblende has largely been altered to epidote; it also contains iron sulphide in finely disseminated

crystals. No. 3 is similar to Nos. 1 and 2, but is much altered; the porphyritic crystals of feldspar show more plainly owing to their carious condition; the iron sulphide is more abundant than in the other specimens and is in coarser crystals. A few hornblende crystals are still to be seen in this much altered rock. No. 4 is somewhat altered, but is evidently diabase; it shows very little iron sulphide as compared with the specimens previously examined. No. 5 is a typical quartz porphyry, though decayed; it contains considerable iron sulphide, the appearance of which suggests that it may be auriferous.

The metallic mineral in the black sand from Valdez, Alaska, is josephinite, a highly magnetic compound of nickel and iron. The two crystals accompanying the sand are garnet. The black sand consists principally of grains and fragments of magnetic iron oxide, but the josephinite is more highly magnetic than the sand.

The rock from Julian, San Diego county, Cal., is an amphibole schist, in which there is a large amount of quartz and magnetite, but no feldspar. The rock is evidently metamorphic.

## Geology of the Treadwell Ore Deposits, Douglas Island, Alaska.\*

NUMBER VII—CONCLUDED.

Written by ARTHUR C. SPENCER.

The presence of these minerals can not be pushed to the value of evidence, as neither of them have been universally observed in the district, but, even for those who hold the theory that the final source of mineralizing water is mainly meteoric, their occurrence may be admitted as probably significant of at least accessory contributions to the vein-forming solutions from igneous sources.

It is concluded that known facts do not lead to a recognition of the actual source of the solutions which have formed the mineral deposits, and for any present idea of their origin recourse must be taken in the direction of speculation. I am inclined to believe that the very wide occurrence throughout southeastern Alaska of intrusions related to and of practically identical date with the Coast range diorites strongly indicates the possibility of a great buried couche, or reservoir, of igneous rock underlying the whole region. It is evident throughout the field that the veins were formed at a period subsequent to the invasion of the diorite, and they were probably formed long after intrusion had ceased; but it is not a violent supposition to consider that the deep-seated magma, from which the masses now observed at the surface had been given off, remained in a molten condition for a very long time.

A plausible hypothesis for the formation of the veins, based upon the foregoing ideas, is that the unknown forces, which at various times have caused general elevation throughout the region, were transmitted to the other overlying rocks by this great residual magma. In adjusting themselves to the changed conditions of equilibrium the rocks were fractured; then, as the deep-seated magma gradually cooled and crystallized, water and gases expelled from it found their way into the overlying rocks, and, searching out the easiest routes of travel along existing fractures, escaped to the surface.

Undoubtedly waters of this origin might carry in solution all the elements which have been observed in the veins, and they would deposit their mineral contents under various conditions, as from decrease of dissolving power through diminishing pressure and temperature, from precipitation through metasomatic interchange with wall rock materials, or again from precipitation due to mingling with solutions of some other derivation.

**SUMMARY.**—The formations of the mainland of southeastern Alaska are thrown into three lithological groups, which are distributed in parallel zones following the general trend of the coast. Two of these groups—the schists and the slate-greenstone band—are mainly metamorphosed sediments, the greenstone beds, however, representing ancient volcanic flows of andesite and basalt. The third is the great complex of intrusive granular rocks, mostly dioritic, forming the mass of the Coast range. The general structure of the region is monoclinical, strikes being usually northwest and southeast and dips always toward the northeast.

The region is one of very general mineralization which has taken place since the diorite intrusions, and there is a probable correspondence in date with the extensive gold veins of the Pacific States.

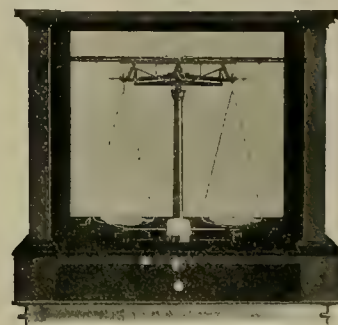
The Treadwell deposits appear to have been formed during the general activity of vein-forming solutions throughout the region. The ore bodies consist of mineralized dikes of dioritic rock lying between a greenstone hanging wall and a slate foot wall, with a few detached masses near by in the slate. Hot ascending currents of water are regarded as the source of the minerals which have been introduced into the

dikes, where they fill fractures and also replace the original minerals of the rock. The origin assigned leads to the expectation that the character of mineralization will not change with further depth, and deep mining is more likely to be limited by increasing expense of hoisting ore than by gradual decrease in gold tenor.

Speculation as to the cause of fracturing and the source of vein-forming waters, for the region at large leads to the suggestions that the former have been attendant upon recognized continental uplifts in the region since the invasion of the Coast range diorites, and that the latter emanated from a great reservoir of igneous rock, underlying the whole region at great depth, during its consolidation from a molten condition.

## Short Beam Analytical Balance.

The accompanying illustration shows a new analyti-



Short Beam Analytical Balance.

cal balance just placed upon the market by Wm. Ainsworth & Sons, balance manufacturers, Denver, Colo.

The beam is made of hard-rolled nickel aluminum, the design being to enable it to maintain its adjustment throughout a wide range of temperature and still have ample strength to carry 50% more than its rated load. The rider apparatus is so constructed that the rider arm or carrier can not touch the beam, and, if need be, the rider can be taken off and replaced in the dark without dropping it off the rider carrier or knocking it off the beam. The hangers are of skeleton construction, similar to those used on their button balances, and have a maximum carrying capacity with a minimum amount of weight. Two sensitive levels are set in the metal base in front of the index and in plain view of the operator. The case is of French polished mahogany, with counterpoised sliding door in front and removable sliding door in back. A plate glass sub-base covers the entire top of base. All metal work is gold plated.

In the illustration the counterpoised sliding door has been removed to better illustrate the balance. Full particulars regarding this balance will be furnished by the makers, 2151 Lawrence St., Denver, Colo.

## The Elmore Oil Concentration Plant at Le Roi No. 2 Mine, B. C.

The ore consists of a heavy gabbro (therefore basic) rock, mineralized with pyrrhotite, a little pyrite and chalcopryrite and some free gold. It is crushed and ground to 40 or 60 mesh, and treated first on concentrators, which take out about one-half of the sulphide contents, which contain 45% of the gold value of the ore and considerably less than one-half of the copper value.

The tailings from the tables, diluted at least 10 to 1, with the water usual in grinding and in the table work (all this water has to be heated to a temperature suitable for the subsequent work), is passed through the mixers, thence to the separators, the oil being fed in with the pulp with pumps.

The oil-containing concentrates is collected in a receiver in advance of the separators, the latter acting as storage reservoirs, while the separators work out a charge.

The tailings after passing through a trap pass continuously to the sluice. Two additional trapping tanks, for saving oil, have been put in the line of the sluice since the plant was started. The loss of oil is reported to have been 1.03 gallon per ton of ore treated, and 55% of the gold remaining in the material from the tables is said to be recovered in the oil concentrates. A saving of practically all the copper in the tailings treated is claimed.

The grade of material worked has been about \$5 total assay value in gold, silver and copper, and the cost of treatment has been about \$2.50 per ton—that is, the entire treatment, including crushing and grinding, is covered in cost named.

Crude oil had been costing 30 cents per gallon; but the duty of 5 cents per gallon having been removed, it may now be a little cheaper. A two unit plant treats fifty tons per day.

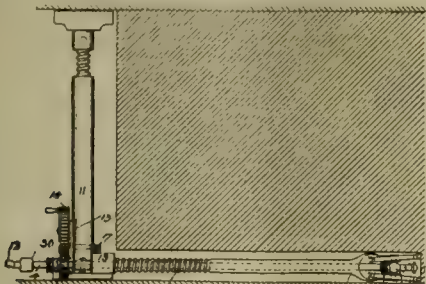


Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 8, 1904.

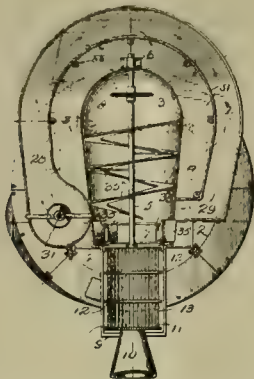
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

COAL HOING AND CUTTING IN MACHINE.—No. 773,882; A. E. Millward, Accrington, England.



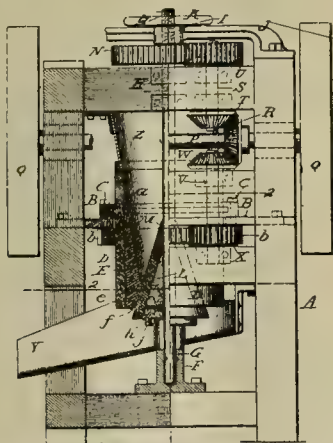
Mining machine comprising casing, driven shaft supported therein, and pair of forwardly diverging rotary cutter wheels on shaft, and ore cutters operating between cutter wheels.

ORE WASHING MACHINE.—No. 774,704; G. Seberg, Racine, Wis.



Ore disintegrating and washing machine, comprising suitable receptacle 3 having extension 9 upon one end thereof, receiving and agitating drum mounted within latter receptacle; inclined, spiral sluiceway extending from receptacle 9; chamber 21 located at end of sluiceway, stand pipe extending from chamber upward to top of machine; elevating shaft having suitable elevating devices comprising worm secured near bottom and top of shaft and agitating blades at lower end thereof, located in stand pipe in combination with agitating devices in receptacles 3 and 9 whereby when receptacles, sluiceway, chamber and stand pipe are filled with water devices within stand pipe will induce continuous circulation of water through parts.

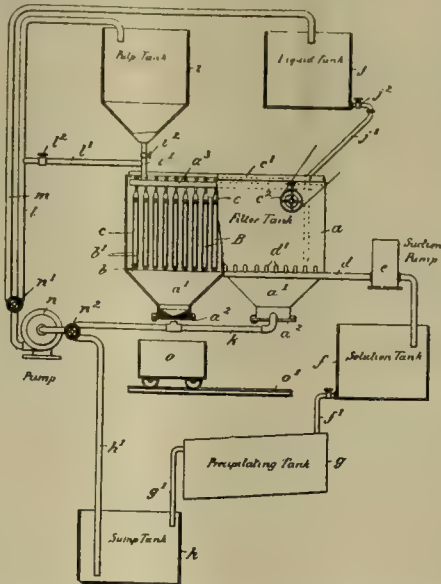
ORE GRINDING MILL.—No. 774,273; C. C. Pratt, Portland, Or.



Ore grinding mill comprising main frame having apertured crown bar; bearing block on lower portion of frame, horizontally disposed annular plate fixed in frame at intermediate point in height thereof, annular collar connected to plate and having interior groove, cylinder having exterior rib disposed in groove of collar, and also having interior vertical grooves, shell arranged in cylinder and having vertical ribs disposed in grooves thereof; shell being interiorly tapered from upper end to point adjacent to lower end and gradually enlarged and smooth from point to lower end, upright shaft journaled and movable vertically in crown bar of frame and bearing block and having threaded upper end, hand screw fixed on end above crown bar, cone

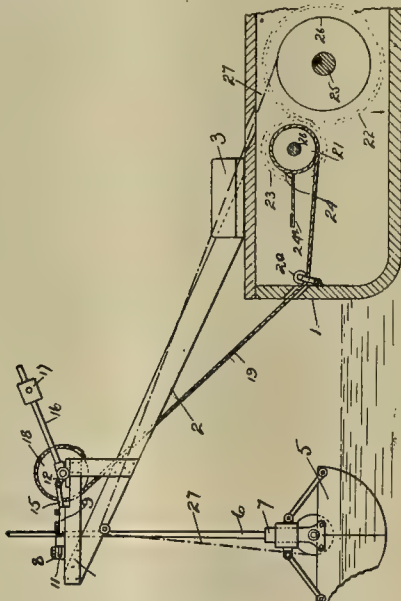
fixed on shaft and having vertical grooves, mantle mounted on cone and having ribs disposed in grooves thereof, and also having smooth surface opposed to that at lower end of shell, shaft journaled in main frame and provided with fly wheels, driving connection intermediate of shaft and cylinder, and driving connection intermediate of shaft and cone.

PROCESS OF FILTERING SLIMES.—No. 774,349; H. R. Cassel, New York, N. Y.



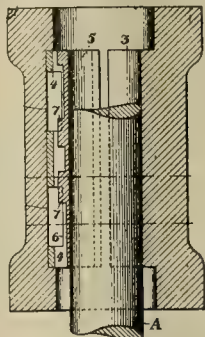
Process of filtering slimes, which consists in filtering off liquid from pulp by suction in tank containing filter cells, and simultaneously agitating pulp between cells.

DREDGING DEVICE.—No. 774,280; J. L. Searfoss, Providence, R. I.



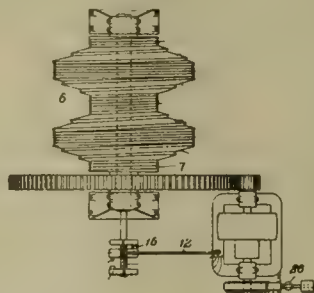
In dredging machine, boom supported at one end, bucket supported by poles from opposite end of boom, means whereby outer end of boom is held from rising and means for automatically locking poles.

STAMP STEM AND TAPPET ATTACHMENT.—No. 774,398; W. Reine, Quartz Mountain, Cal.



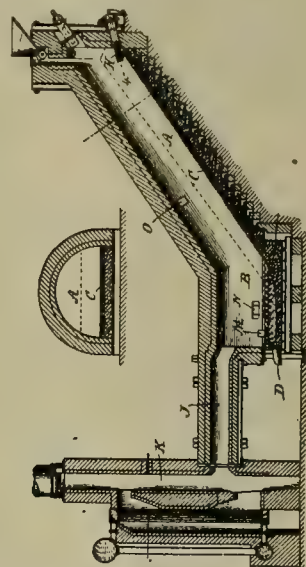
Device for securing tappets to stamp stems, comprising fixed and movable segments within tappet and embracing one-half of circumference of stamp stem, shoe inclosing and conforming to movable segment and fitting chamber within tappet and movable with relation to one of segments, segment and shoe being tapered in opposite directions and adapted to lock segments upon stamp stem.

HOISTING APPARATUS FOR BLAST FURNACES.—No. 774,387; H. Heffrin, Pittsburg, Pa.



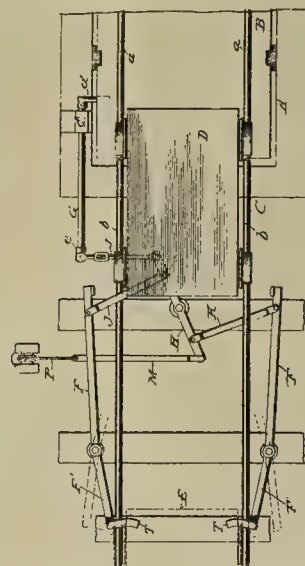
Hoisting mechanism for blast furnaces having in combination skipway, car movable along skipway, means for moving car and automatic means for stopping car shifting mechanism and for preventing operation of such shifting mechanism in same direction without prior operation in reverse direction.

METALLURGICAL PROCESS.—No. 774,304; M. P. Boss, San Francisco, Cal.



Method of reducing ore body and introducing carbon into metal extracted therefrom in sufficient amount to convert it into steel, which consists in subjecting ore body to action of hydrocarbon flame, and metal extracted therefrom to action of highly heated free hydrocarbon vapor.

SAFETY DEVICE FOR MINE SHAFTS.—No. 774,655; Norval W. Dickerson, Derwent, O.



Combination of elevator shaft, elevator car movable in shaft and provided with rails, landing provided with rails arranged to register with those of elevator car, horizontally movable lever fulcrumed at intermediate point of length alongside of one of rails on landing, and having forward arm for preventing passage of car when elevator car is at landing, means for normally holding lever so that its forward arm rests in path of car on landing rails, rock shaft journaled in suitable bearing and having arms at ends; one of arms being arranged to be engaged by elevator, longitudinally disposed lever fulcrumed at intermediate point of length of landing, bar connecting other arm of rock shaft and forward arm of lever, and bar connecting lever and first-mentioned lever.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

O. G. Herning at Seward, manager of the Klondike & Boston Co. M. Co., says the Klondike & Boston Co.'s property is on Willow creek and Grubstake gulch. The company owns thirty-one placer claims. Willow creek runs east and west and these placers are in a small basin 30 miles above its junction with the lower Susitna. The Alaska Central Railway crosses Willow creek near there. These claims are 24 miles from tide water at Knik; the distance is 110 miles. Herning has landed at Knik hydraulic machinery to operate the mines, which will be sledged in this winter. The machinery consists in part of a grizzly and elevator and three giants. Ditches have been run.

## ARKANSAS.

### Marion County.

Hodges Brothers have leased five acres of the Zinc basin holdings on Clabber creek, near Yellville, and will sink a shaft near the two now going down. The ore is on same run as that found in the Beulah mine. The Hodges have also leased twenty acres from the Zinc Basin Co., in Searcy county. This mine is reported having a shaft passing into 10 feet of zinc ore.

## ARIZONA.

### Cochise County.

F. H. King of Boulder, Colo., says he will put in machinery to cut and polish marble at his quarries in the Santa Rita mountains.

### Gila County.

The Old Dominion C. M. & S. Co.'s production of copper at Globe for month of October from its new smelter was 970 tons, or 1,940,000 pounds, made from one furnace in commission the entire month, and a second furnace running half the month. The output on the last of the month was 46 tons of copper. With two furnaces it is expected 2,500,000 pounds of copper can be produced. The third furnace will probably not be started until the concentrator is completed. Then the Old Dominion is expected to produce a minimum of 3,000,000 pounds of copper per month. It is expected to get cost down to 7½ cents per pound laid down in New York, which is said would permit of annual profits of \$2,000,000 on a 13-cent copper market. As the efforts of the management have been directed toward completion of the smelter and other surface improvements, and also sinking the new shaft, underground work has been retarded. The plans call for a large amount of development, which will require a year's time to complete.

### Graham County.

The production of copper by the Shannon C. Co., at Clifton, for October was 1,025,000 pounds, and shipments for same month 1,050,000 pounds of copper.—A hoisting engine for the Copper Center group of claims, controlled by the Standard Con. Co., is being placed on the main shaft. Sinking the shaft will be resumed. Development work on the San Jose group, owned by same company, is reported showing up well.

### Maricopa County.

(Special Correspondence).—Twenty men are working at the Relief mine, 15 miles north of Peoria. Work has been resumed in the west drift and a black diorite carrying free gold is showing in the drift. The mill is in operation and producing bullion.

The Grand Traverse & Arizona Co., operating in Cave Creek district, has increased number of men at work. A road is being built to the property to replace the one washed out last summer.—J. E. Maddox will put men to work on Welch & Dunn's property in the White Tank mountains, west of Phoenix.

Men are at work on the Bismuth property, east of Phoenix. The ore will be sorted and shipped and the lower grades of ore worked by leaching process.—Cleberat & Co. have resumed work on their mines west of Hot Springs Junction.—J. V. Creath will arrastra several tons of ore from the Salt River mountains. He will cyanide the tailings.

Phoenix, Nov. 14.

Phoenix reports say the Cleopatra C. M. Co. is increasing development work on its properties in Deception gulch.—The Jessie M. Co. is planning additions to its equipment. It will build a 50-ton mill with concentrating and cyaniding plant. The water problem has been solved by arrangement to bring water from Agua Fria river at the DeLarge ranch. Tunnels and shafts have been driven and there are 40,000 tons of low-grade ore on the dumps.

### Mohave County.

F. Merrill et al., who have a 2-stamp prospecting mill in Bill Williams Fork section, near Signal, are putting in a gasoline engine to furnish power for the mill.

## CALIFORNIA.

### Calaveras County.

Twenty stamps of the Balliol mill, near Sutter Creek, are being moved to the Lampheer mine in Spring gulch, 2 miles from Mokelumne Hill, where they will be put in operation.

The stockholders of the Big Trees M. Co. of Stockton have authorized a bond issue to build a 200-ton a day capacity smelting plant at Murphys. Part of the money will be used to construct a railroad of 11 miles from Angels Camp or from Valley Springs, by way of San Andreas, as well as develop, open up and work the mining lands of the Big Trees M. Co., near Murphys. G. O. Pearce is president and manager of the Big Trees M. Co. Work will start this winter on the mines. The smelter will be built next year.

D. A. Nuner at Central Hill, near Mokelumne Hill, says he has men clearing out and retimbering the tunnel. Payable gravel has been taken out. The number of men will be increased. A mill will be built as the company has gravel on the dump.

### El Dorado County.

Preparations are being made to resume operations on the Mameluke Hill gold mine, north of Georgetown, by the New Highland G. & C. M. Co. The two 60 H. P. boilers for El Dorado C. M. Co. hoisting works at the Eureka gold quartz mine are being set up.—Work was started last week by the company which has bought the Delwisch gravel mine, near Georgetown.

Development work has been resumed on the Kelsey G. & S. Co. mine. It extends from the American river, above Chili bar, to the Big Sandy mine, near Kelsey. A 3-stamp mill for prospecting purposes has been set up.

### Kern County.

It is reported the old Amalie and the Barbarossa mines at Amalie have been sold to J. J. Mack et al. who will build a mill there.

The Yellow Aster G. M. Co. at Randsburg proposes improvements with additional machinery that will increase capacity of its mills. It expects to put in two rock breakers to reduce the ore to smaller size, enabling them to put more ore through the mills. The breaker at the 30-stamp mill is worn out. A larger breaker will be put in at the 100-stamp mill in addition to the one now in use. E. H. Barton is superintendent.

### Los Angeles County.

(Special Correspondence).—The Lowell & California M. Co. of Los Angeles, operating mines at Shoemaker, has completed its concentrating plant and is operating ten stamps and four tables. An electric light plant has also been added. The ore is low grade and free milling. Large ore bodies have been opened up. At the present time 1000 tons per month are being treated. The company expects to add to the equipment next spring. F. C. Fenner is manager.

Shoemaker, Nov. 16.

### Nevada County.

The Chicago mine, near Nevada City, which has been idle for twelve years, is again being opened up. It is east of the Pittsburg mine. W. P. Martin has charge of the work.

Superintendent C. Graham reports he is making headway in reopening the Canfield (the Grizzly Hill) gravel mine on the South Yuba river, opposite Blue Tent, near Grass Valley. It will be operated by drifting process. The 10-stamp mill in construction will be ready to run about December 1st. The gravel channel that yielded results when hydraulic method of working was in use, shows in the face of the bank, and a bedrock tunnel through which to mine it will be started.—At the Blue Tent gravel mine Superintendent C. Graham is getting out gravel keeping the 20-stamp mill busy. The breasting is being done to the north of the 1550-foot bedrock tunnel.

Pumping machinery for the Union Con. mine at Banner mountain, near Nevada City, is being put in. The three-compartment shaft is down to the drain tunnel which is being reopened.

Manager B. Wilkins reports shipping last week a gold bar, value \$5000, as returns of a clean up from the mill in which is being crushed the debris found under the floor of the mill and around the batteries and in the rock breaker at the Idaho-Maryland mine at Grass Valley. The stamps have been dropping for a month and the work is not yet finished. Improvements at the Idaho-Maryland are progressing. The shaft has been cleaned out and repaired down to 200 feet, the old timbers have been taken out and replaced by new, and now that the remainder of

the shaft is open the work of repairing and retimbering the shaft will be more rapid. The air shaft in the brick building is also being put in repair. The Cornish plunger pump in the main building was started last week and the water in the shaft was lowered 18 feet in the first twenty-four hours.

### Placer County.

(Special Correspondence).—W. H. Cass is secretary T. C. G. M. Co., 628 7th street, Sacramento, Cal. The company will put in an entire new plant next February. The mine is 5 miles from Westville, Placer county. A fine body of ore is now being opened up by tunnel work.

Westville, Nov. 16.

R. A. Davis et al. have contract to sink another 100 feet at the Bouk mine between Auburn and Ophir. Superintendent G. Foster says the company will put up a mill.—They are putting on full number of men at the Southern Cross, near Towle. Superintendent W. R. Tremble has put in a compressor.

The Golden West mine at Canada Hill, near Blue Canon, will resume work, says Superintendent F. P. Armstrong. They will drive the tunnel to open up the ore bodies.

### Sacramento County.

A 5-foot lead of coal is reported struck in a shaft being sunk by D. Finch on the B. F. Biggs ranch, near Folsom, when prospecting for gold.

### Shasta County.

Thirty men are on the payroll of the Marina Mariscano M. Co., operating the Sunny Hill mine, 12 miles west of Igo, and the number will be increased. The cyanide plant is being built.

### Siskiyou County.

Fort Jones reports say the Sheba mine was closed down last week by creditors. The mine was bonded to C. J. Fry & Co., who had sixteen men employed in the tunnels and 10-stamp quartz mill. No notice that the mine would not be responsible for contracted debts was posted about the Sheba, consequently the Denny-Bar Co. and the miners have attached the property, including the mill.

The Mount Vernon quartz mill on the divide between Greenhorn and Cherry creeks, near Yreka, is running steadily on ore taken out during the past summer. The mill is run by electric power and the ledge is 2 feet wide.

### Tuolumne County.

The New Calico Co., operating on the Lucio ranch, ½ mile east of Stent, have men at work with G. H. Gerken, one of the bondees, in charge. A shaft operated by a steam hoist has been sunk 108 feet. At a depth of 80 feet two drifts have been run. The width of the vein is 12 feet. They have free milling ore on the dump.

The Los Angeles G. M. Co., operating the Phillips claims, is working ten men and will increase the number. Buildings are being erected and a flume is being built to bring in water for power. J. S. Kuns is superintendent. Development work and ore extraction are under way, and the mill will be started up. The mines are situated on north fork of Tuolumne river, ½ mile from the Mobican mine, near Tuolumne.

## COLORADO.

### Clear Creek County.

Near Central City, the Onoko G. M. Co. has a lease and bond on the Annex mine in Lake gulch, reported to have the extension of the Chemung-Belmont vein. The main shaft is down 200 feet, and the property is equipped with steam hoisting plant and top buildings. The company will sink the shaft. Smelting ores have been taken out.

Idaho Springs reports say ore shipments from that station during month of October were 244 carloads, or nearly 5000 tons of ore and concentrates. During the same month of 1903 shipments were 116 carloads. Mine operators are being obliged to restrict their output because of inability to get miners, and also because they cannot get their ore hauled or treated at the mills. Several mills are enlarging their capacities. Development work which has been done in the past few years has resulted in opening up many large blocks of ground, and the mines are in a position to make large outputs had they the facilities. The increase in ore shipments recently is attributed to the present low schedule of smelting charges caused by the competition of the Independent smelter at Golden with the American S. & R. Co.

### Fremont County.

Florence reports that the ruins of the burned Metallic reduction works have been leased by the United States R. & R. Co. to a local man. The gold and dust in the ruins are estimated to be worth several thousand dollars.—M. Williams is opening another mine on a 4-foot vein of coal near Williamsburg. It is known as the Rockvale vein.—Another coal mine

is being opened near Coal Creek by the Cowan Co. The mine is being driven on the Old Slope vein, from which coal was hauled by wagon to Denver, across the plains, forty years ago.—The closing down of the United and Independent companies' oil wells, near Florence, for a few days, pending the building of new storage tanks and the repair of the old ones, did not interfere with drilling operations.—D. Goldstein of Denver has bought the scrap iron of the cyanide mill, north of Florence, and is shipping the material to Denver.—The Union mill has started another furnace.—The Florence mill is operating almost exclusively on the sand dump of the burned El Paso mill. There are 30,000 tons of material in the pile.

### Gilpin County.

Central City reports say that during the month of October there were shipped over the Colorado & Southern Railroad to Denver and Golden smelters, and to other points, 276 cars, or 5775 tons. This was the heaviest shipping month in the year, exceeding that of September by 125 tons.—The Otto Shatz M., L. & D. Co. has been organized by R. H. Hastie of Denver, with local parties, and will operate in Lake and Russell districts, starting operations this month.

### Gunnison County.

At Ohio City, near Pitkin, President Brant has begun operations with the Golden Islet mill. It is run by steam power. The Golden Islet mill has ten stamps and is expected to handle thirty tons daily. It has three Wilfley tables and concentrates seven to ten tons of ore into one. Brant states that there are 3000 tons of ore in sight in the workings of the Golden Islet mine and 500 tons in the bins. The lower tunnel is in 900 feet. The mineral is sulphide. Two ore shoots have been cut by the lower tunnel, one at 150 feet, giving 100 feet of stoping ground, and the other at 900 feet, giving 550 feet of stoping ground. The first is 4 feet wide, with a pay streak of 18 inches and the balance milling material. That at 900 feet is 3 feet wide. S. Nathan is in charge of the plant. D. H. Casey is foreman of the mine.

A hoist is being placed on the Gold Cross group, owned by G. Brant et al., near Pitkin, and the shaft will be sunk. Ore shipments will be made. If arrangements can be made with the Colorado & Southern Railroad to have a switch put in, only a short wagon haul will get the ore on the cars.

### Lake County.

Leadville reports say the Midas M. & L. Co. has started hoisting ore from the bodies of lead carbonate opened in the lower levels of the Coronado shaft below the parting quartzite. The Midas Co. prospected its down-town properties with diamond drills which were sent down from the former bottom levels of the Midas, the Coronado and Penrose shafts. The diamond drills passed through the Cambrian quartzite to the granite and the cores showed mineralized strata between the parting quartzite and the Cambrian quartzite. West of the Elk fault the formations were found to be regular and in place. The Coronado shaft, formerly 640 feet deep, has been sunk 200 deeper and at the 805-foot level a drift passing medium-grade sulphide ore struck high-grade lead carbonate ore. The drifts and raises have proven the extent of the carbonate ore body thirty acres. It averages 145 feet thick. It carries fifteen ounces of silver. The accuracy of the diamond drill explorations has been shown. The Midas Co. installed heavier plant of machinery at the Penrose shaft and will continue sinking in that shaft to a level corresponding to that in which the ore was found in the Coronado. The Penrose is several hundred feet south of the Coronado and is expected to show the extent of the ore body in a south and southwesterly direction beyond the present limits of the Coronado drifts.—G. Bassinger, operating in Lake Creek park, reports opening a vein of high-grade ore. He drove a tunnel 600 feet into northern slope of Lake Creek gulch and found a 12-inch vein which carries fifty ounces of silver, 0.2 ounce gold and 10% lead. The owners of the Silver Queen, which adjoins the Bassinger group, report they expect to resume operations.

During the past summer placer operations by the Saguahe Hydraulic M. Co. in the Arkansas valley, near Leadville, are reported producing good results. The company secured ground in Arkansas river valley and in California and Birdseye gulches. This has been prospected and dredging done in two gulches. The main work of the company has been done in the valley and around Granite. The company has an area in the gulches leading from the river toward Twin Lakes from Granite. About 100 men have been worked steadily. California gulch was prospected by the company with churn drills and



preparations made to carry on dredging operations. It is expected the gulch will be dredged during next summer.

The air compressor has been set up and the power house completed on the Manhattan M. & P. Co. group at Twin Lakes and they have resumed work with steam power.—Operations will be continued this winter with increased number of miners in the Ida-May group in Sayer's gulch.

The Iron-Silver M. Co. is sinking a shaft at north end of Moyer placer at Leadville to develop an ore body shown by diamond drill explorations in its Tucson claim. The shaft of the Tucson was down 640 feet and diamond drill holes driven to additional 520 feet. The ore body is said to be 600 feet in length, 200 feet in width and 30 feet thick—assaying 300 ounces silver, with 40% lead. This discovery shows the continuity of the Iron and Rock hill series of ore shoots which are said to pass under the Moyer and Tucson, 1 mile from the outcrop being worked in the Reindeer and Nil Desperandum on Rock hill.

#### Larimer County.

It is said work will be resumed on the Tully mine at Pearl. It is intended to stoop out 300 tons of ore this season. Assays show 22% copper and \$4 in gold. There are twenty tons of this grade ore in the bin. The Tully has 300 feet of sinking, crosscutting and drifting and is equipped with steam plant.

#### Ouray County

The Camp Bird mine at Camp Bird, near Ouray, reports the statement from the mine manager for the month of September, showing that the mill ran thirty days and crushed 5917 tons of ore (dry weight), yielding 8547 ounces of bullion and 326 tons of concentrates. Number of feet of development, 871. Amount received from sales during the month:

Bullion (including cyanide bullion)	\$166,274
Concentrates (375 tons)	38,603
Total	\$204,877
Less expenses (including development, transportation and treatment of product)	\$ 51,560
	\$153,317
Less monthly London expenses (estimated)	3,500
Balance	\$149,817

There was expended on construction \$2827, making a total since May 1, 1904, of \$58,155.

The Ouray Chief M. Co. has struck a 3-foot streak of ore in drift from bottom of shaft. They also have ore in breast of main tunnel, in stopes above main tunnel and in bottom of shaft. In the bottom of the shaft ore runs \$30 in gold and 100 ounces in silver. Stopping from the drift from the shaft and shipping will be started. The shaft will be sunk to the lime contact. Manager Wood says the number of men at work will be increased.

#### Park County.

The mining situation at Alma shows a satisfactory condition at beginning of winter, says the News. The mines are increasing number of men at work. The London mine has about seventy men. It has seven teams hauling ore for shipment, and these are inadequate to relieve the ore bins at the north side, while arrangements are being made to begin shipping from the south side also. The mine is continuing its development, four machines being used in driving drifts. Other working mines of Alma district are the Paris, Hock Hocking, Russia, Moose, Ling Star, Lee Goss, Kentucky Belle, Viking, Montgomery and Dolly. The Lee Goss, a former producer of the Green Mountain group, on North Star mountain, has resumed operation and shipments to Denver, the Leadville Leasing Co. having it in charge. The Russia is being again developed, a tunnel being run to cut under the ore measures. The Paris resumed work the past summer under superintendency of J. P. Isben, of Denver, and has begun to make shipments. Two carloads were shipped last week, and are expected to run \$200 per ton gold values. In the Hock Hocking mine a strike of native silver has been made, and two carloads of the ore taken out for shipment. The ore shows free silver. The vein is 15 inches wide. Development has consisted mainly in prospecting its levels for richer ore measures. The Ling Star mine is being developed by Eastern men. It has shipped occasional cars of ore taken out in course of development, netting \$100 per ton in gold. The Kentucky Belle is in Bucksburg gulch. It is being developed by the Philadelphia M. Co., with offices in Colorado Springs. The Viking and Montgomery properties are at head of Platte river, 8 miles above Alma, and are being developed by tunnel. The offices of these companies are in Denver. The Dolly and Moose are former producers. The placer season recently closed at Alma is reported satisfactory by the operators. A good amount of dust, coarse gold and some large nuggets were secured. The greatest amount of work was done

upon the Snowstorm. A year ago the Alma placer ground was combined with the Snowstorm and its ditches extended to the latter. It is intended by the Snowstorm Hydraulic Co. to improve the Alma placers by laying high-pressure pipes and building a more extensive reservoir higher up the Platte.

#### Pueblo County.

The News says a deficit of \$1,584,857 for the fiscal year ended June 30, 1904, is shown by the annual report of President F. J. Hearne of the Colorado Fuel & Iron Co., with iron furnaces and steel works at Pueblo.

#### San Miguel County.

Telluride reports say notices were posted at the mills of the five principal mines of the Telluride district, on the 14th inst., that in the future the eight-hour day will prevail in the mills. The plants concerned are those of the Smuggler-Union, Liberty Bell, Tom Boy, Nellie and Alta. It was the demand for this concession in the mills of the State that caused the strike in the mills and mines of Colorado. The minimum wage promised under the new arrangement is \$3 a day. At one time the Western Federation of Miners offered to accept \$2.75 for an eight-hour day. It is said that under the new order no discrimination will be made against the employment of union men.

#### San Juan County.

The Eureka Con. M. Co., operating near Silverton, is driving a tunnel at rate of 5½ feet per diem at Eureka into Crown mountain. The tunnel is in 245 feet and within the next 200 feet vein No. 1 of the group of twenty-seven claims, known as the Eagle, will be cut, from which point another 100 feet will cut the Cliff vein. The equipment consists of a 100 H. P. marine boiler with a compressor with capacity to operate eight drills. Until sufficient water can be obtained from the tunnel a well near the power plant is furnishing supply which is raised to the boiler by a pump. Fourteen men are working. S. Davis is superintendent.

The Green Mountain M. & M. Co., near Silverton, will postpone building of the mill until next summer. The 4500-foot pipe line that will convey Cunningham creek water to the mill site for power was completed last week and excavating started for the mill foundation. Development of the mine has progressed and the ore bodies opened up have caused a change in the plans for a larger mill. The raise from the main level on the Ocoela vein to the upper working, 330 feet, is complete, while the Leonard and Ocoela veins are opened so that stoping may be started.

At Gladstone, the original mill of eighty-five stamps and Frue vanner concentrators of the Gold King Con. M. Co. continues in operation. The new auxiliary mill, however, is also running. The process is expected to effect a separation and saving of 95% of the gold and silver values from the tailings and slimes that have escaped from the tables of mill No. 1. The mill is run by electricity. There are two floors, the upper being 16 feet above the lower. The upper floor is divided into two rooms, one for motor, the other for amalgamation, the equipment of the former being two marine boilers of 150 H. P. each, a steam turbine of 250 H. P., direct connected to two electric generators of 75 kilowatts each. A series of eight silvered plates, with sand pumps from below, comprise the equipment of the amalgamating room. The lower floor is equipped with thirty-six Wilfley slimers and four cylinder revolving mills, charged with pebbles, and a drying room. The slimes and tailing product from mill No. 1, reduced in the cylinders, is lifted by sand pumps to the plates above. The total power system comprises fourteen electric motors.

#### Teller County.

Cripple Creek reports say that each month the output of the small cyanide mills in the district is increasing. During October a total of 10,600 tons, containing on an average \$5 per ton, were treated by the few mills of the district, and the amount recovered reached \$50,000. A few years ago it was the general opinion that the low-grade ores of the camp could not be handled at a profit. There are other portions of the district where cyanide mills are under contemplation, in addition to those already in operation or being built.

The Elkton Con. Co. at Cripple Creek is pushing work of development. They are breaking and shipping 100 tons of ore daily, which with the ore shipped by lessees makes a total output from the property of 3000 tons per month.

Extraction of gold has begun at the Gillett mill at Gillett under direction of Manager W. G. Beyerly. The machinery consists of a crusher, three sets of rolls and six leaching tanks of 150 tons capacity each. It is expected that 150 tons of

ore may be treated daily, owing to the length of time each tank is in use, which is about five days between the time of loading, treatment and unloading. They have contracted to handle ore from several properties, principally oxidized ore.

Near Cripple Creek, the shaft that I. O. A. Carper of Denver is sinking on the Free Coinage Co. group is down 50 feet and a steam plant will be put in. It is a three-compartment shaft and is projected to reach 1000 feet before the expiration of the lease, which is for five years. The shaft is within the town of Altman.

The Ajax Co. at Cripple Creek is at work again in its twelfth level. When the water was last measured it was found to be standing between 7 and 8 feet above the bottom level, and it is receding about 4½ feet a month. Since the company adopted the leasing system ore has been opened at a number of places in the territory, and there are six openings through which ore is being hoisted. About 800 tons of ore is being shipped a month, and the showing of both leases and company account is encouraging.—The Tunnel M. & L. Co., operating the Abe Lincoln mine, will start sinking the shaft an additional 100 feet from the 600-foot level. This is an illustration of the effect of the drainage tunnel. Now that that bore has been completed and the water course tapped, the Abe Lincoln shaft can be lowered without pumping. About thirty tons of \$30 ore is being shipped daily.—Taylor & Co. have a lease on the dump of the Porcupine mine, on Bull hill at Victor. The dump was made in the early days of the camp, when one had to ship \$40 ore to make a profit. Taylor will assort and screen the dump rock.

J. S. Osborn, who has a lease on the Dexter mine on Bull hill at Victor, will sink the shaft another 100 feet, it being at 600 feet from surface. The property is a low-grade proposition and is yielding heavy tonnage of ore. A vein of smelting ore has been opened.

Cripple Creek reports say construction work has started on the cyanide mill on the Summit claim of the Michardo Co. on Ironclad hill. The mill will have capacity of thirty-five tons a day to start with. Values have been received of \$4 per ton.

Shipments are being made weekly from over 100 leased properties of the Cripple Creek district, says the Cripple Creek Times. There are 200 shafts through which ore is being hoisted. One hundred cars leave the mines daily.—Production of both low and high-grade mineral is being made from the Los Angeles. One runs \$5 to the ton, the other \$30. The Abe Lincoln and the Moon-Anchor yield two or three cars a week, the former running \$50 and the latter \$20.

At Gillett, Superintendent J. Losbaugh, for a New York company, has started work on a group covering 100 acres of mineral land. A 50-ton cyanide plant will be built to handle ore said to assay \$4 to \$7 at the surface. The territory to be developed by the company is on Sheep mountain, near Midland and north of Gillett.

Development of the Big Twenty M. & M. Co.'s mine, below Beacon hill, Cripple Creek, is progressing. Its ground is being penetrated by a crosscut tunnel, in 1000 feet, which has cut several veins. The main purpose is to reach ore bodies 500 feet ahead. The ore is largely oxidized and it is thought a cyanide plant will be built.

While shipments from the Acacia Co. group on Bull hill, near Altman, are unimportant in quantity, considerable prospecting is being done, says the Times. On the Morning Star claim Hansbrough & Gray have sunk a winze 160 feet below the 400-foot level, following a shoot, and are using an electric hoist to raise waste. On north end of the Burns claim Wyatt & Burns have put in machinery and will develop above the 400-foot level. On south end of the Burns the Exposition L. & M. Co. is sinking to the 250-foot point. Surveys are said to indicate that the body of ore that traverses the Findley and Shurtloff mines will be found in the Burns. Lessee Hawkins is taking out ore from workings near the Burns shaft.

Construction work on the cyanide mill by the Giant M. Co. down Pony gulch, west of Cripple Creek, is started, says D. B. Burch, manager of the company. With this mill in operation, the producing area of the district will be widened 2 miles in that direction, says the Gazette. At Cripple Creek W. H. Sanford, R. A. Kincaid, L. L. Rees, E. Whitley and I. F. Feek have incorporated the Columbine G. & C. M. Co.

F. Burke, who has a bond and lease on the Alpha & Omega mine, near Cripple Creek, will work through the new shaft on the Caledonia mine, which gives him a depth of 250 feet to start with. A drift has been run 200 feet from the shaft, so Burke will drive another 250 feet to reach his ground, where he expects to open up the extension of the Henry Adney ore

shoot.—The R. E. A. & A. Co., operating under lease the Wild Horse mine, on Bull hill, last week made a cleanup. The plant has been treating eighty-five tons a day and the cleanup covers a period of one month, the ore running \$6 per ton. The cleanup returned \$15,000 gross.

The Pharmacist Con. M. Co., whose mines are on Bull hill, at Victor, will lease out its property in blocks. The company will sink the shaft.

Development of the Teutonic mine, on Ironclad hill, at Cripple Creek, which adjoins the Jerry Johnson, is being pushed by Lessees Duncan & Cain, who are sinking the shaft to attain a depth of 300 feet. The shaft is 200 feet in depth. During the sinking the lessees have cut three veins between the surface and the present depth. The first ran 5 ounces in gold and 100 ounces in silver. With the 300-foot point reached they will extend the level.

Cripple Creek reports say the smelters have put a clause in their contracts that is new to the shippers, and is said to be causing dissatisfaction among them. The new clause provides that whenever the shipper and the smelter do not agree on the contents of the ore the settlement will be made at the point nearest the umpire's result, which means that there will be no split, and that will be the basis upon which the shipment is settled for.

The Metallic G. M. Co., leasing on the Bill Nye claim, on Copper mountain, near Cripple Creek, will sink a deep shaft. A road will be completed to the claim. A plant of machinery in the Copper mountain tunnel will be removed to the shaft house.—Shipments are again being made from the Mountain Beauty mine, on Bull hill, at Victor, after an idleness of a year. Lessees have opened a streak of ore in the Ogilvie shaft.

The mining town of Anaconda, in Cripple Creek district, was wiped out by fire on the 12th inst.—Machinery has been put in and a gallows-frame erected at the shaft that J. A. O. Carper is sinking on the southwest section of the Free Coinage Co. ground on Bull hill, at Victor. The shaft is to drop to the 200-foot point. It is of two compartments. Ore is being mined by Lessee Carper at several points in the Free Coinage mine.

## IDAHO.

#### Bear Lake County.

W. Hatfield of Salt Lake City, Utah, part owner of the Bear Lake Copper Co., 5 miles out of Paris, has men at work on the Humming Bird mine. The vein averages 4 feet in thickness and the ore carries 5% copper. A shaft has been sunk.

#### Blaire County.

W. N. Pierce, interested in the Revis placer mines in the Little Smoky section, near Hailey, says he will put in 10-inch riveted pipes, giants and other placer mining machinery, also timber for sluice boxes. A reservoir made this year will conserve a supply of water.

#### Boise County.

W. Green of Boise says that at the Payette group of mines on the State road, near Banner, near Boise, machinery is on the ground. The sawmill will be in operation this week and the quartz mill will be running in December. A road has been graded to the millsite. Work in the mine has progressed. A crosscut tunnel has been driven to cut two ledges. The first shows 42 feet of quartz. The mill will be started on ore from the open cut.

G. Z. Edwards, general superintendent of the Lincoln Co.'s mines at Pearl, says a triple-compartment operating shaft has been started and will be sunk 500 feet. Over 30,000 feet of lumber has been ordered to put into surface improvements. A compressor, pumping machinery and drills will be put in and will derive its initial power from an electric station a few miles distant. The mine is opened through a 300-foot incline shaft. The mill, which has a capacity of 125 tons in twenty-four hours, is operated with one shift only pending surface and underground improvements. Tests are being made to determine if better methods of treating the ores can be devised. It is thought a cyaniding addition will be made to the plant.

—Adjoining the Lincoln on the east is a group of eight claims owned by D. Kennedy. A triple-compartment shaft has been started. They propose to equip the mine and open it up.—Adjoining the Lincoln on the south is the property of the South Lincoln Co., controlled by J. H. Stallings and J. T. Hodson of Salt Lake City, Utah. It has been equipped and a three-compartment shaft is being sunk within 50 feet of the Lincoln lines.

#### Elmore County.

R. P. Chattin, principal owner of the Franklin mine at Neal, 35 miles from Boise, says the drift from the tunnel had reached the ledge. The vein matter at the surface showed sulphurets and panned free gold. The mill on the mine is running regularly and making satisfactory output.



**Idaho County.**

W. J. Mattern of Topeka, Kan., manager of the Old Mexico M. Co., which owns two groups, one of nine and one of four claims, on Big and Logan, near the head of Government creek, in Thunder Mountain district, near Roosevelt, says his company has put in machinery, including a drilling machine. Prospect shafts and tunnels have been driven and bodies of ore opened. Mattern says his company has a power site on the property and he intends to put in a water wheel and electric dynamo. He will also put in an electric air compressor and drills.

The Dewey 10-stamp mill at Roosevelt, Thunder Mountain district, running on second-class ore, during the month of October turned out bullion to the value of \$12,000. The entire cost of operation of mine and mill, including all development work, is \$4500 per month. Supplies cost from 8 to 10 cents per pound more than in other districts. Manager Dewey says the report of Superintendent Haug for the quarter ending October 24 shows as follows: Number of tons crushed, 308.84; average battery value, \$12.85; average value of tailings, \$1.49; percentage saved, 88.4.

C. Crawford et al. are organizing a company to develop and operate the Hawkeye & Badger group of mines on Rapid river, near Warren. Crawford has a one-half interest in the Gold Bullion group, in Thunder Mountain district. Development on the Gold Bullion is working ten men for the winter. It is intended to double the number in the spring and a mill will be built. The tunnel on Monumental creek, which is in 200 feet, will be run 100 feet farther, opening the vein at depth of 700 feet. On Botha creek a tunnel will be run 100 feet this winter.

At Roosevelt, in Thunder Mountain district, E. L. Abbott, superintendent of the Sunnyside mine, says the wire cable for the aerial tramway is on hand and the work of stretching it is under way. The mill buildings are completed and machinery is being set up.—The Lucky Joe group of mining claims, at head of Westfork and Snowslide creeks, 12 miles northwest of Roosevelt, is owned by H. Kinsinger and J. B. Martin. Samples show assay values running from \$6 to \$16.50 per ton in gold. Millmore states the deposit is 40 feet wide.

**Kootenai County.**

It is reported a 6-foot ledge, containing 6 inches of carbonate shipping ore, wire and native silver, has been struck on the Black Jack group, 2 miles north of Lane, and owned by T. Gunyet. Assays give average values of \$100 per ton. The ore was struck in the crosscut tunnel at 210 feet, where a 24-foot winze was sunk, and at a depth of 100 feet. Over fifty tons of ore are on the dump.

An 8-foot face of galena has been opened in No. 3 tunnel on the Continental mine, near Porthill, says W. T. Bailey Jr. of Duluth, Minn., manager. The mine is working thirty-five men, including the crew cutting wood for the compressor. They are driving three tunnels. It is a concentrating ore, with streaks of high-grade galena. The lowest tunnel, the Blue Joe, exposed a 400-foot shoot of ore. H. C. Kelly is in charge.

**Nez Perces County.**

The Pittsburg-Idaho M. & M. Co. has resumed development work on its property, 3 miles below Kamiah, on the Clearwater river. The mine is 2000 feet from the Northern Pacific railroad.—The Hawkeye group, owned by Nez Perces people, 2½ miles below Kamiah, on opposite bank of the river, is also being worked.

**Shoshone County.**

A. M. Mundell, in St. Joe district, has been working his eleven claims. The district is 10 miles south of Wallace and 4 miles west of Slate creek. Mundell uncovered two ledges cutting at right angles. Surface assays show 12% lead, 9 ounces in silver and 30 cents in gold.

The tunnel on the Cathella group, near Wallace, is in 400 feet and stringers of galena are out, says Superintendent J. H. Smith. The ore shoot will be tapped at a depth of 200 feet. G. Cunningham of Wallace is manager.

Silver-lead concentrates are being obtained by Safford Bros. from sluicing Mile creek at Wardner. They have been sluicing from the site of the old Last Chance mill down to where they have a Cornish jig. They have rocked out in two weeks twenty tons of concentrates, running 50% in lead. Coins are found among the concentrates. Among the debris are scrap iron, axes, cartridges, revolvers, hammers, wrenches, bits, several gold rings, etc. For several years the Last Chance mill was at the upper part of Wardner and its slimes and tailings were dumped into Mile creek. Not only the waste from the mill, but the waste from the city, was dumped into the creek.

At Mace the Standard and Mammoth

mines of the Federal M. & S. Co. are being worked as one property. Approximately 1000 tons a day will be brought out through the Mammoth tunnel. The ore bins at the Mammoth have doubled in capacity. The old ones were strengthened and new ones built. For several months the two mines have been worked with machinery at the Standard, as the substation that furnishes electric power is there. Electric haulage is being placed in the lower workings of the property and other improvements made.

**KANSAS.**

Independence reports say there was a slight decrease in oil field operations in October, as compared with September. During October, 427 wells were completed in the combined fields, as compared with 472 in September. In September there were 41 gassers and in October 40. September had 71 dusters while October had but 55. The new production in September was 7387 barrels; in October, 7092 barrels. The average production of the wells drilled in October was 21 barrels, as against 20.5 barrels in September. It is believed the Kansas and Indian Territory fields are now capable of producing 30,000 barrels a day, if all the wells were pumping regularly and all the oil being taken. The following summary is given for October:

District.	Drilled.	Gas.	Dry.	Producing.
Independence.....	31	6	7	264
Drum Creek.....	8	1	2	85
Wayside.....	27	1	1	357
Tyro.....	6	2	—	135
Jefferson.....	3	3	—	—
Cherryvale.....	28	1	2	236
Coffeyville.....	28	—	—	400
Longton.....	3	—	—	25
Neodesha.....	21	2	2	198
Chanute.....	45	9	3	287
Humboldt.....	27	—	10	153
Leroy.....	7	1	—	40
Palco.....	33	—	—	261
Erie.....	9	1	1	110
Peru-Chautauqua.....	76	3	14	1,586
Bartlesville.....	2	3	—	200
Chase.....	31	—	3	2,460
Cleveland.....	9	1	6	125
Indian Territory.....	8	1	1	55
Muskogee.....	6	1	1	110
Oklahoma.....	1	—	—	—
Miscellaneous.....	12	4	1	65
Totals.....	421	40	55	7,092

**MICHIGAN.**

Houghton reports show that the copper mines of Michigan have produced 199,580,100 pounds of that metal during the ten months to Nov. 1st of this year. During the entire year 1903 the output was 192,223,855 pounds.

**Houghton County.**

The Centennial management, near Calumet, is increasing work on surface improvements at its Kearsarge shafts. The old stock piles are out of the way and give needed room.—The Champion mine, at Painesdale, is sinking in all shafts. Owing to other work on hand and lack of adequate power for drilling machines, sinking was discontinued for about a year. The Champion now has ample air and can send 2000 tons of rock daily to the mill and do deep work in addition. With the 2-stamp addition to the mill in operation, the Champion will begin crushing 3000 tons daily.

**Keweenaw County.**

Developments at shaft No. 5 of the Mohawk mine, near Allouez, continue to improve. The Mohawk has given smaller returns from its rock than was expected before milling started, notwithstanding which the property is said to be making profit.

**MISSOURI.****Jasper County.**

Near Webb City, W. M. Williams, R. C. Butts et al. have leased ten acres south of the Stevenson & Moore lease and will begin prospecting the same.—J. Scudder, W. Nemrick and G. Parks are opening up the Anderson & Co. mine on the Missouri Zinc Fields. A cave-in stopped operations. The lessees intend to cut a new drift to head of the old drift.—M. Clark, E. L. Flood and W. H. Chew have opened up a lead prospect on the Zinc Fields lease. They are working at 90 feet and think they have extension of the Davey & Co. ore. They are working it with an electric motor hoist and three hand jigs.

E. P. Church, T. Shelton, W. R. Marsh, L. Hamilton and G. Bayless have a three-year lease on the Yale mill and mine on the Old Colony Z. & S. Co. tract, adjoining the Wright M. Co. at Webb City.—A mill is in course of construction at the mine of Forristall & O'Donald of Boston, Mass., northeast of the Mary Louise mill. W. B. Shackelford is superintendent.—The Big Four M. Co. is putting in a 5-inch compound duplex steam pump at its mine. It is expected the pump will drain the ground and open up a run of sheet ore that has been under water for several years. The Star mine will also be effected by the drainage.

The Clover Leaf mine on the Continental tract, near Jasper, has been sold

for \$15,000 to E. H. Mower of the Empire Z. Co. Mower will increase development work and increase the output.

**MONTANA.****Deer Lodge County.**

Anaconda reports say the cave-in at the Southern Cross mine has been repaired and work resumed with full number of men and ore teams. The cave-in did not affect the new workings at the mine. The company has twenty-five ore teams at work.

**Flathead County.**

J. Z. Clark, J. Rouse and H. Hamilton, owning the Selkirk group at head of Cedar creek, 13 miles southwest from Libby, report development work in the shaft is opening up silver ore carrying 300 ounces silver per ton. A tunnel is being driven to cut the ore below the shaft. Ore shipments will be made.

**Jefferson County.**

A. H. S. Bird of Salt Lake City, Utah, is prospecting his mining ground in the Wickes-Corbin district with a diamond drill. The district is between Wickes and Corbin. Surface indications are of deposits of copper. The country rock is granite and porphyry.

**Lewis and Clarke County.**

Work on the properties controlled by A. C. Mason & Co. is being increased. They have properties at Red mountain, near Rimini; at Hassel, Broadwater county, and near Norris, Madison county. The Inter-Ocean tunnel on Red mountain is in 1200 feet and has cut twenty-two veins of ore, all carrying values. It is expected to cut forty producing veins when the tunnel is completed. It is expected to cross the Mammoth vein. Shipments are being made from this vein by lessees west of the tunnel. The best ore is found in the lower workings, where a body of galena is said to run \$50 per ton. Mason's properties in Hassel district are the Park and New Era groups. He is increasing development with sixty men. A concentrator will be built and is expected to be in operation in January. A 1200-foot tunnel will be run and electric power used from water power. The ore shoot has been opened for 1200 feet, with average shipments of \$40 per ton. At the Black Hawk group in Madison, controlled by Mason & Co., a mill is about completed and will be put in operation to handle low-grade ore, the shipping ore running about \$42 per ton.

The Tri-Metal Co., under direction of J. C. Cory, is developing the Telegraph properties on main divide between Rimini and Elliston. There is a porphyry dike, 50 feet wide, carrying values in free gold. The company has men at work and will start up the mill.

The Beatrice M. Co., operating a group in Mike Reinig gulch, 15 miles from Helena, has ore blocked out and will put in a concentrator. The values are in gold, silver and lead.

L. Brown of Helena is working men in development of the Fnebner mines on Red mountain, near Rimini. A concentrator will be placed on the property.

**Madison County.**

L. D. McCall, manager of the Bismark Nugget Gulch Co., operating the Toledo mines near Sheridan, reports a strike of ore at depth of 750 feet in the Toledo No. 1, and the company will start its 150-ton mill this week. For some time past the company has been confining operations to development of its mines.

**Silver Bow County.**

F. W. Link & Co. are building a cyanide plant southwest of the Lexington mill at Butte for treating several thousand tons of tailings from the mill. The plant will be finished this week. It contains eleven 25-ton tanks and other equipment. The tailings from the Lexington contain gold and silver. The plant is said to be the only one of its kind in Silver Bow county. Horses will be used in transporting the material from the gulch to the plant. Chutes have been built from the top of the plant to the vats.

The Montana Zinc Co. has been organized in Butte, as the result of tests made on the zinciferous ores of the Alice M. Co. in Walkerville. The incorporators are: C. W. Leimer, C. B. Wisner, R. H. Crosby, J. E. Fryer and W. A. Moore. Those conducting the tests have been using a portion of the Alice company's 60-stamp mill to crush the ore, but will put in rolls to take the place of the stamps. The Alice mines contain bodies of this class of ore. Besides zinc, it contains values in gold and silver. The output last year aggregated 7316 tons of ore and 1281 tons of tailings. The ore was sold for \$48,684, net earnings of the company being \$4045.

**NEVADA.****Elko County.**

G. L. Moats, of Salt Lake City, Utah, manager of the Latham mine in Spruce Mountain district, south of Wells, says he

will build a dry process concentrating mill at the mine. Some of the equipment for the proposed plant has already been placed. It is expected it will be ready for operation in January. The first unit will have capacity for treatment of 100 tons a day.

G. L. Moats of Salt Lake City, Utah, manager of the Latham M. Co. mines at Spruce mountain, south of Wells, says work will start on the mill with which they are to be equipped.

The mine and stamp mill of the Dexter company at Tuscarora are being operated under lease by P. McKenzie, who is mining from thirty to forty tons of ore daily. Manager S. B. Milner says the company's experiments on treatment of the ore have been successful and the temporary cyanide equipment will be enlarged next spring. It is closed down for the winter. No ore from the mine has been handled, but the slimes ponds were drawn upon to keep the plant supplied. The average of pulp treated was \$6 per ton, one-half the values being in gold. Practically all the gold has been saved and about 70% of the silver.

**Esmeralda County.**

The hoist for the Red Top mine at Goldfield has been set up and sinking the shaft resumed.

The Bullfrog M. Co. has been incorporated at Tonopah by T. L. Oddie, president; G. W. Ladd, L. E. Benson; H. H. Clark, secretary and manager; K. Pittman, R. R. Davis and J. Carter, to develop its twenty-three claims at Bullfrog district, south of Goldfield.

At Goldfield, ten claims and three fractions constitute the Combination group, owned by Winslow, Hubbard et al. of Chicago, Ill., and L. L. Patrick. Development work began Nov. 1, 1903, and the shaft has been sunk 315 feet. Ore to value of \$315,000 has been shipped. There is said to be ore to value of \$250,000, running \$30 to \$100 per ton, on the dump, waiting treatment methods, for which a reduction plant will be built, to consist of ten 1200-pound stamps, plates, concentrators and cyanide tanks of forty tons daily capacity. From the shaft, five levels have been run 150 feet each way. Some stoping was done above 135 feet, but below that the only ore extracted was in development. At that point the ore became sulphides and carried a lesser percentage of free gold. The shaft is equipped with a 14 H. P. gasoline engine, but this will be replaced by a steam hoist. For the use of the mill, water has been developed at Alkali springs, 10 miles west of the mine, and a flow of 75,000 gallons per day secured. Work on the pipe to conduct the water from the spring to the mill will be started next month. The pipe line, with the attendant work, is expected to cost \$33,000. The Combination Co. has been reorganized as the Combinaton Mines Co.

The Nevada Goldfield M. Co. of Reno has bought the mining properties of T. Wilyter, eight in number, in Gold Mountain mining district, Esmeralda county, 40 miles south of Goldfield, 10 miles northwest of Chiatovich's mill and cyanide plant.

The lease of J. X. Jones, L. L. Patrick, Z. Kendall and B. J. Reilly on the January mine at Goldfield expires Jan. 1st, by which time it is estimated the lessees will have taken from the 700 feet of workings opened up \$800,000 in ore. Of this amount one-half will have come from shipments of ore and the balance will come when a reduction process in the district is available to handle the dumps. The January is one of seven claims owned by the Goldfield M. Co. of Nevada. R. L. Johns, president, with M. N. Clark, H. T. Bragdon and A. C. Eisen, are officers. The January is opened up by a vertical shaft to depth of 285 feet. At five levels crosscuts have been run to the levels, of which there are six. The lessees' work on the January has been under superintendency of S. Kemp.

At Columbia in Goldfield district, Hicks & Co.'s sampling mill was put in operation last week. The plant consists of a small crusher, two 100-pound stamps and an 8-foot amalgamating plate. The capacity will be about one ton per day. In addition a rotary grinder has been put in.

The Frisco Gold Field M. Co. has been incorporated by J. H. McGhan, president; E. A. Montgomery, J. W. Skelton, T. E. Edwards and R. B. Wampler, directors. The property of the company consists of five claims, containing ninety-four acres in Goldfield mining district. The Frisco claim adjoins the Cimmeron fraction on the west, the Potlatch M. Co. ground on the north and the Lone Star group on the south. The other four claims of the company compose the Chispa group, in southern part of the district.

The Baltimore G. M. Co. has been incorporated under Arizona laws. The property consists of the Fortune group of four claims and fractions, covering in all



forty acres in Goldfield mining district; and north of the Tonopah Club claim. It also joins the Goldfield Hibernia M. Co. on the north. Its officers are: H. G. McGhan, president; C. D. Mercer, J. W. Skelton, E. N. Davis of Tonopah; M. Averill, A. L. Hudgens and E. R. Shields. Development work will start this week.

C. F. Mau of the Pactolus M. Co., operating 47 miles southwest of Sodaville, reports opening up ore that carries free gold. A 4-foot ledge has been uncovered. He expects to put in additional mining machinery and a mill.

Official announcement has been made that the Taylor & Brunton Sampling Co. of Salt Lake City, Utah, will enter the Goldfield-Tonopah field. It is expected the works will be at the point where the Goldfield railroad is to leave the main line of the Tonopah railway.

At Bullfrog, near Amargosa, south of Goldfield, the Bullfrog M. Co., of which H. H. Clark is manager, is working on the Ladd Mountain, Benson and Indian Springs groups, and sixteen men are employed. On the Ladd Mountain group a shaft is being sunk on the vein, surface assays of which run \$46. The company has three camps with blacksmith shops and other equipment, and is also building an assay office, in charge of W. H. Bryson. At the original Bullfrog mine a shaft is down 10 feet in ore. There are 300 men in the district, most of whom are on location work. At Amargosa, where a postoffice has been established, there are forty tent buildings. At the Goss ranch, 9 miles distant, men are working on the spring, which at a point 300 feet above the townsite, is running from 30 to 50 inches of water, which will be piped to Amargosa. Fuel and mining timbers are obtained 10 miles from the town. Wheeler, Hassel & Lind of Goldfield have bonded the Black Monster, White Monster, Aurora, Wild Cat and Bountiful claims adjoining the Bullfrog mine, and development work will be started this week.

#### Humboldt County.

B. F. Smith, J. P. Fitting and O. C. Black of Colorado Springs, Colo., have bought 200 acres of auriferous mineral land in the Humboldt range, near the Sheba mine, south of Mill City. The group has 4500 feet of surface croppings, and the chief ore vein ranges from 4 to 8 feet in width at 220 feet. A 15-ton stamp mill will be in operation within thirty days.

Superintendent C. D. Morrison of the Sheba mine, south of Mill City, reports the main tunnel completed to 1132 feet, and that the face is in porphyrite. The raise, being made to connect with old workings, is advanced 25 feet per week.

#### Lincoln County.

The Deer Lodge G. M. & M. Co. has been incorporated by President E. D. Trenam, J. J. Trenam and R. G. Andrews at Salt Lake City, Utah. The company owns claims in the Eagle Valley mining district.

#### Nye County.

In the MacNamara mine, at Tonopah, on the 350-foot level a body of high-grade ore has been opened which is being sorted and sacked for shipment. It is 2½ feet wide. On the north dip vein a raise is being put up from the 350 level in milling ore. The group of the Free Gold M. & M. Co., at Gold Reef, is opening up satisfactorily under management of J. M. Meighan. In a drift on the 50-foot level a streak 7 inches wide on the hanging wall assayed twenty-one ounces silver and ten ounces gold. On the 100-foot level the vein is being crosscut. Sinking will be resumed.

At Hannaph, east of Tonopah, Superintendent F. Work reports he has 12 inches of shipping ore in the Hannaph mine. Developments are slow owing to water in the mine, but this is valuable for the mill to be built to treat the second-class ores.

#### Storey County.

Work of draining the middle group of mines on the Comstock lode at Virginia City, preparatory to recovering bodies of ore, is ready to start, says Consulting Engineer and Superintendent L. M. Hall of the Comstock Pumping Association in an official report to the Ward Shaft Association, composed of the Gould & Curry, Savage, Hale & Norcross, Chollar, Potosi, Bullion, Exchequer, Alpha Con. and Julia Con. mining companies, which combined a year ago to put the Ward shaft in repair and equip it with a pumping plant to unwater the mines down to the 3000-foot level. A feature of Hall's report is the statement that for the first few hundred feet the water will be lifted from the shaft by means of compressed air instead of steam, electrical or hydraulic power. The plant to be put in at the bottom of the Ward shaft after that shaft has been unwatered and sunk an additional 500 feet, or to the 3000-foot level, will consist of two direct connected electrically driven pumps, each having

capacity for lifting 1600 gallons of water per minute, against a pressure equivalent to a height of 1050 feet, and each to be driven by an 800 H. P. slow speed induction motor.

#### Washoe County.

E. Olinghouse has started to dropping the stamps on ore from a body of ore opened in the Butte & Gold Center mine of which he is owner, at Olinghouse, near Wadsworth.

#### White Pine County.

The Spring City M. Co. of Utah has been incorporated by President J. Johnson, E. Erickson and S. Beck of Salt Lake City. The company owns two lode mining claims in White Pine County.

### NEW MEXICO.

#### Rio Arriba County.

Las Tusas Peak G. & C. M. Co. has its air compressor in place on the Tampa shaft in the Bromide district, 12 miles west of Tres Piedras, and has been steadily sinking and cutting to the vein at each level. The air compressor will furnish air to machine drills in the bottom of the shaft and also to drills in the 300-foot level to block out ore. The vein is said to carry values in copper and platinum. The Keystone Bromide M. Co. is sinking in the Boston shaft in Bromide district, and ore is being taken out. Young & Co. are deepening the Red Jacket shaft at Hopewell, to open up ore shoots that have produced gold and lead ores from levels above. It is said the Jaw Bone group and the Santa Fe tunnel will be worked with larger force this winter. G. F. Hall has resumed work in the 16 to 1 shaft. Buildings at the Dillon Dev. Co. tunnel are completed, machine drills put in and work resumed in the face of the tunnel.

### OREGON.

#### Baker County.

In the Greenhorn mountains near Greenhorn, the Morris mine has been sold to Iowa men, with offices at Webster, Ia. Development work will be under superintendence of H. O. Hyatt. The mine is in the Vinegar Hill section of the Greenhorns and is patented. Development is by tunnels and shafts.

At the Snow Creek mine near Sumpter the shaft is being sunk to 225-foot level, says Manager Smith. Next week he expects to have the station cut and drifting in progress on that level. The mill has ten stamps dropping. Shipments of concentrates will be made to the smelter.

Development work on the mines of the Hidden Treasure M. Co., near Greenhorn, is increased, and it is intended to work the Hidden Treasure and I X L veins from the ore shaft by connecting the Hidden Treasure vein with a crosscut from the I X L vein. Sinking the shaft and drifting under the ore shoots at each successive 100-foot level will also be continued. The Hidden Treasure G. M. Co.'s group consists of eleven claims, covering 154 acres, and is accessible by wagon roads for 7 miles from the Sumpter Valley Railroad station at Tipton. It is 12 miles from Whitney and 23 miles from Sumpter. There are five known veins traversing the group, on two of which development work has been done. The property is equipped with hoisting plant with a capacity for sinking to a depth of 1000 feet. Two steam stamp batteries are in. These have a crushing capacity of fifteen tons daily. In connection with this is a 20-ton cyanide plant, both plants being in operation.

#### Douglas County.

The Mayflower M. Co. is increasing development work on its properties near Bohemia. W. P. Ely of Kelso, Wash., is part owner. The company has been opening up ores of promising values and intends to put up a stamp mill.

#### Grant County.

The Buffalo mine, 5 miles from Granite, is owned by the Buffalo-Monitor M. Co. There are two claims in the group—the Buffalo and Monitor. The Buffalo claim contains three ledges. The Monitor shows one ledge, the Monitor, being 24 feet wide. The four ledges show free milling ore on surface. The Buffalo ore is principally gray copper and galena carrying silver and gold. N. Berkeley is manager of the Buffalo and has men driving a crosscut under contract.

#### Jackson County.

The Oregon Belle mine being developed by the New York & Western M. Co. under supervision of H. Foster, near Jacksonville, is working fifteen men at the mine and is cutting wood for the steam plant. He has put in a 40 H. P. boiler and an eight-ton compressor and two drills. Two tunnels are being driven and ledges opened up. It is free milling ore handled in a Huntington mill. Foster says the company will put in a 10-stamp mill next spring.

The Gold Hill & Bohemia G. M. Co. re-

ports success in development of its Red Oak group of quartz claims near Gold Hill. There are five claims in the group. The first work to be done is driving a tunnel from the gulch, which will tap the ledge at depth of 350 feet. The Gold Hill & Bohemia expects to have the Oak group sufficiently developed by next summer to put in a mill. The Millionaire mine of Gold Hill district, in which Portland men are interested, reports good showing with development. The company intends to have the Millionaire opened up and developed by next spring so as to put in a 10-stamp mill.

#### Josephine County.

It is reported the 10-stamp mill of the Eureka mine, near Grants Pass, which has been idle, will resume this week. Development has been increased.

The Champlin gold dredger on Foote creek, near Grants Pass, is operating steadily with thirty men.

J. C. Lewis & Co. of Portland have bought the Benton mine, on Mount Reuben, near Grant's Pass. Superintendent Jones will be retained in that capacity. A 1300-foot tunnel has been driven on the vein, and there are also several hundred feet of other workings. A 40-stamp mill will be put in next spring.

Grants Pass reports say the Gold Bug mine, of Mount Reuben, is held by option by McQueen & Burkhardt, of Portland. They have 25 men at work. New ore bodies are being opened, drifts and tunnels driven, and the old ones retimbered. Ore supply is blocked out, and the 5-stamp mill is in operation. The Gold Bug ledge is a contact vein, and carries values in free gold and concentrates.

Among the larger southern Oregon hydraulic mines overhauled and repaired the past summer is the Sturgis of Forest creek, near Grant's Pass, sold to Los Angeles, Cal., mining men, L. A. Vance president. The main ditch has been widened from 3 to 5 feet and the head works strengthened to increase the capacity of the reservoir. Another giant has been set, making a battery of three No. 3 monitors. The large boulders will be handled by a steam power derrick. The mine is electric lighted, says Manager Olmstead.

Progress is reported by the Bradshaw M. Co. in its development of the Blue Ledge copper mine of the Upper Applegate district, south of Grant's Pass. Three tunnels are being driven on the vein. The Bradshaw Co. is also putting in a compressor and machine drills.

#### Linn County.

W. B. Lawler, of the Lawler Mines, Ltd., says operations will be resumed on the company's properties at Quartzville, in Linn County. He reports plenty of ore in sight, with 9000 to 11,000 feet of tunnels, shafts and winzes. Quartzville is on the middle fork of the Santiam river and is reached from Gates Station.

#### Wallowa County.

A strike of a gold-bearing ledge has been made on the group of the Tenderfoot M. Co., near Innaha. The ledge is 27 feet in width and shows values of \$70 per ton in gold. The ledge is in the Blue mountains, at an elevation of 8000 feet, near the headwaters of the Innaha river.

### SOUTH DAKOTA.

#### Lawrence County.

The Aurizone M. Co. is determining water available for milling and other purposes on its ground, with a view to building a plant. Development work continues in progress in tunnels and drifts, and it is said a body of payable ore has been opened. The ore is low grade, but is claimed to be suited to cyaniding. The company owns 200 acres in one group near head of Butcher gulch, in Bear Butte mining district, near Galena. Several springs rise on the ground, and it is proposed to impound their water. The Bear Gulch M. & M. Co. and the Bear Gulch G. M. Co., owning properties in Bear gulch section, west of Lead, are reported negotiating for a consolidation of their properties.

Two carloads of silver-lead ore, which will run \$60 per ton, have been shipped from the Shamrock mine, on Big Strawberry creek, near Lead, to the Omaha smelter. Two shifts of miners are working in the mine, getting out ore and sinking through quartzite. The drift which is being run on the quartzite has struck an ore shoot. The Shamrock adjoins the Puritan. Besides the smelting ores, which occur on the quartzite, coming up through the quartzite are several verticals, one of which has developed into a vein of about 3 feet, which carries gold values of \$8 per ton.

### UTAH.

#### Beaver County.

Operations at the Wild Bill mine, near Shauntie, near Frisco, have been revived. Work has resumed at direction of M. Culen & Co. of Salt Lake City, with J. Kelly in charge. It is intended to put down a new

shaft, which will connect with a body of ore previously opened up through the incline and a winze below it. A 12-foot ledge carrying silver and lead values is opened up.

L. A. Amaden of Salt Lake of the Blackbird M. Co. says it is intended to begin development work next spring on the Blackbird, which adjoins the Cactus, at Frisco.

#### Juab County.

The main shaft of the Grand Central mine of Tintic, at Eureka, is down 1325 feet. A sump is being cut and a station will be made and a drift started to open up the ore bodies. It will take 600 feet of drifting.

The dump at the Joe Bowers mine, near Eureka, is being jiggered by Kaufman & Doyle. The capacity of the ore bins at the Grand Central mine has been doubled. Other improvements are proposed. Work is being pushed on sinking the shaft, which is nearing the 1300-foot level. The gallows-frame is in place and the smokestacks are up at the Uncle Sam mine. The engine and boilers have been overhauled and retimbering the shaft is completed. Miners are working on the ore body on the 400-foot level. G. Paxman and T. Short have a lease on the Shoebridge mine and will begin operations this week.

#### Salt Lake County.

At Alta, on the Bryan group, Chambers & Craig have an option and will start work on ore body hitherto exposed. High-grade ore has come from the Bryan group. Connection between the Howland and the Columbus mines will be completed this week, facilitating extraction of Columbus ore. The ore bins at the mines and mill are filled. At the Miller mine teams are being loaded with ore. The Pittsburg has completed its crosscut, showing 12 feet of shipping ore.

#### Summit County.

The air compressor at the Kearns-Keith mine at Park City is in place and working two sets of power drills. Manager Rood of the Ontario, Daly and Nalldriver properties says at the Nalldriver ore is being taken out. At the Federal tunnel work is being increased, though work is slow on account of the hard formation which is being driven through. At the Ontario work progresses and the capacity of the mill will be increased.

#### Tooele County.

The Honerine drain tunnel at Stockton is completed to the length of 7000 feet.

Operations have been started by the Sharp M. Co., which owns four patented claims covering forty-eight acres, including the Little Havana, Bryan, Cecile and Havana No. 1 claims, near Stockton, and adjoining the side lines on the south of the Honerine Co. ground. A. L. Jacobs, H. Dinwoodey et al. of Salt Lake City are owners. The Little Havana is the principal developed claim of the group. It has been opened by a 500-foot tunnel and a shaft sunk from that, says Manager Jacobs.

### WASHINGTON.

#### Kittitas County.

The Summit coal mines, near Cle-Elum, on the main line of the Northern Pacific Railway, have been sold to R. J. Linden and D. Goodsell of Portland, Or. The deal involves half a section of coal land covering a vein of high-grade bituminous coal with average thickness of 5 feet. The plant has a capacity for shipping 200 tons a day. It is said the owners intend to double the capacity and to build bunkers at Portland, Seattle and Spokane.

#### Okanogan County.

T. J. Thorp says the mill of the Crystal Butte Co., operated by the Interstate M. Co., near Chesaw, will start up again this week. The stoppage was caused by defect in the electric light plant. The mine is working twelve men and the mill ten. The Grant is preparing for working during the winter months. It is reported it will be equipped with a steam hoist. M. Smalley is still operating the Oregon. The ore is high grade, and shipments have been made. It is intended not to take out more ore than will be sufficient to pay expenses until there is rail transportation, as the cost of hauling 18 miles from the mine to the railroad at Midway, B. C., is heavy. The Bodie mill is running regularly. The mine is putting out fifty tons per day, with twenty-five men at work.

#### Pierce County.

Tacoma reports say to make pig iron on Puget Sound, Wisconsin and local men have bought the coal and coke properties of the Montezuma M. Co. and Washington Co-operative M. Syndicate near Fairfax. J. W. Ladd and T. O'Connor are principal owners and are organizing the Western Iron, Coal & Coke Co. The new company also acquires iron properties on Barclay Sound, Vancouver Island, B. C.

#### Snohomish County.

P. D. Peck of Colesburg, Ia., has bought



LeRoy and Vesuvius mining claims on Silver Tip mountain, near Monte Cristo, and will drive 100 feet of tunnel.

The Bornite G. M. Co. near Darrington has its tram line completed, which is 12 miles long, and a power plant in operation with compressed air to drive the drills. A contract will be let for 1800 feet of tunnel to be driven this winter. — Croppings on Gold mountain, near Darrington, opened up by C. Burns, after drilling through dolomite, exposed 2 feet of ore. The ore is charged with bornite, gold, silver and lead. The lode is opened 10 feet above low water mark of the Sauk river.

#### Stevens County.

F. W. Buchholz, manager of the Yellow Jacket mine, between Kettle river and the Columbia river, 6 miles from Marcus, reports the face of the tunnel is showing 21 feet of ore. The tunnel is in 150 feet. The ore carries values in gold and silver.

Placer mining operations have been begun on west bank of the Columbia river, 2 miles below Waterloo, by H. Craven of Rossland, B. C. He has a 100-ton plant; the average value of the gravel is 40 cents, costing 15 cents for hauling. Craven intends to increase his plant, which will reduce cost of handling. His method of working is to pump water against the gravel, bringing the material directly into the boxes. Much of the values are in flour gold.

### WYOMING.

#### Big Horn County.

The Shoshone Mountain M. Co., operating mines at Kirwin, is putting in electrical machinery, says Superintendent R. J. Brown. The company is composed of Lead, S. D., men.

#### Carbon County.

Dillon reports say the Pluto tunnel has broken through the quartz into a diorite contact with a shoot of several inches of copper and iron sulphides. This ore had been sprinkled through the quartz for 25 feet. The drift from the tunnel at the Congo is opening ore. F. E. Brown, secretary and manager of the Northwestern company, has the steam plant moved from the Eclipse, near Bridger Peak, to the Batchelder mine. E. W. Honchen and J. Glazier have started developing the Sandstone, adjoining the Pluto No. 2. It has a vein running in copper sulphide. A shaft has been started.

#### Fremont County.

Lander reports say the Belgo-American Oil D. T. has made final payment on the Murphy oil wells (the Henderson properties) at Lander. Contract for construction of the Wyoming Central Railroad from Casper to Lander has been let.

#### Laramie County.

At Silver Crown, near Hecla, 20 miles west of Cheyenne, F. S. Swartz, president of the Hecla M. Co. of Denver, Colo., has bought four copper claims adjoining the Louise mine. The properties are said to carry a continuation of the vein in the Louise. The company has men at work.

## FOREIGN.

### AFRICA.

#### Transvaal.

The Transvaal Chamber of Mines at Johannesburg reports that on Oct. 26th there were 13,000 Chinese coolies on the Witwatersrand, and 6438 in transit and expected to arrive Nov. 30th.

### AUSTRALIA.

#### New South Wales.

Sydney reports say the mineral exports for the first nine months of 1904 are valued as follows: Silver, £91,956; silver-lead, £1,386,611; copper, £359,775; tin, £217,226; coal, £1,048,281; total, £3,103,849—being an increase of £239,949 as compared with the corresponding period of 1903.

#### Queensland.

Gold returns for Queensland for month of September were:

	Tons	Yield in
	Crushed.	Ounces.
Charters Towers .....	22,400	22,400
Croydon .....	3,500	1,900
Gympie .....	21,300	12,200
Mount Morgan .....	20,700	9,400
Ravenswood .....	2,700	2,900
Other fields .....	3,500	2,000
Alluvial .....	.....	1,200
Totals .....	74,100	52,000

Total yield for first nine months of 1904 was 466,400 ounces.

Charters Towers reports of Oct. 17th say the Brilliant mine is on fire and seven deaths have resulted. Owing to the presence of carbonic acid gas, the following mines ceased operations: Brilliant & St. George, Brilliant Block and Brilliant Central.

### BRAZIL.

The Ouro Preto G. M. Co., at Ouro Preto, reports, during September, 6004 tons of ore produced 1589 ounces of gold, valued at £6250.

## BRITISH COLUMBIA.

### Boundary District.

Grand Forks reports say 100,000 feet of lumber have been ordered for the tramway and other work at the Rawhide mine. This does not include that used for the ore bins, which are completed. Developing work has disclosed ore bodies which can be quarried at comparatively small cost.

Shipping ore on the dump of the Stem-winder mine in Phoenix has started to the smelter at Boundary Falls by the Dominion C. Co. The new converters at the Mother Lode smelter are treating copper matte from the Montreal & Boston and Trail smelters in addition to their own product. — On the Skylark, 2 miles below Phoenix, finds of ore are being made. Twelve men are employed. — The Granby smelter is using coke from the International Coal & Coke Co. collieries at Coleman, Alberta, as well as from Fernie. L. E. Shields, of St. Paul, Minn., says he will increase development work on claims in Franklin camp.

At Grand Forks, J. F. Hill is securing options on ore tonnage and says that, in consequence of building of the Kettle Valley Line railway, he will start a customs smelter at Grand Forks. Hill says the McKinley mine, in Franklin camp, and the Congress property, near Republic, Wash., will supply high-grade ore.

### East Kootenay District.

A. R. Wilson, mine superintendent of the Crow's Nest Pass Coal Co.'s collieries at Michel, says there are 600 men working in the mines and the town has a population of about 2000. Output is 1800 tons of coal daily. About 700 tons are shipped and the balance goes to the coke ovens, of which they have 464.

### Lillooet District.

R. T. Ward, of San Francisco, Cal., says at Clinton arrangements are completed for operation of his and the Ward-Horsefly Co.'s property with a gold dredge. Work will begin by Dec. 1st.

### Rossland District.

The management of the Velvet-Portland, near Rossland, will start shipment of concentrates when sleighing is good. The concentrating mill is running steadily, and the output is five tons of sulphurates a day. There are 400 tons of concentrates on hand ready to be sent to the smelter. The roof is up on the new concentrator building, and the sides are closed in. The machinery is being set up, and will increase the capacity of the plant to 100 tons per day. The mine will not be reopened until the mill is completed and in operation. All the ore now being put through the concentrator comes from the dumps. — The roads continue in good shape, and the Jumbo, at Rossland, during last week shipped 540 tons. Besides the breaking down of ore, development continues on the intermediate and winze levels, says M. R. Galusha, manager.

Development on the Centre Star mine, at Rossland, continues on the second, seventh and ninth levels. Diamond drill explorations are proceeding on the eighth level. Eight carloads of second-class ore are being sent from the two mines daily to the Rossland Power Co. works at Trail. The company figures on sending out 250 tons of second-class ore a day. Shipments of first-class ore from the mine continue. In the War Eagle development is proceeding on the sixth, seventh and eighth levels. On the seventh level it is said a shoot of ore of good grade has been opened.

The Diamond Drill C. Co. of Spokane, Wash., has contracts to make explorations in several parts of Le Roi deep levels, at Rossland. Work is making progress on the several levels of the mine. Shipments for last week were 2700 tons. Shipments aggregated for October 10,300 tons. Water is so short that there is barely enough for the compressor, and as a result the concentration plant of Le Roi No. 2 cannot be operated steadily. Outlook for Le Roi mine at Rossland is reported improving. It is producing 400 tons of ore a day, which is going to its Northport smelter, and will continue to ship at that rate. Smelting costs have been reduced. The Northport plant is being operated on a two-furnace basis instead of a six-furnace plant, as formerly. There has been talk about consolidation of Le Roi with the Snowshoe mine in the Boundary country, as advocated by A. J. McMillan, manager of Le Roi. Le Roi and the Snowshoe are both siliceous properties. When the Snowshoe was shipping to the Boundary smelters it got a combined freight and treatment rate as low as \$2.12½ a ton. It is thought the increased cost of freight to Newport would be more than compensated by reduced costs of handling Le Roi and Snowshoe ores together.

### Slocan District.

Work on the Cork concentrator on

South Fork, near Slocan City, is progressing and machinery is being set up.

The frame work of the zinc works in Kaslo is completed and the building closed in. Manager C. Fernau has a bond on two claims up Coffee creek, 7 miles from Kootenay lake. The claims are called the Black Jack and Old Timer. There is a 2-foot lead of ore which carries 40% zinc and 95 ounces of silver. J. E. Bigham of Kaslo is superintendent and will run a tunnel and do other development work.

### Vancouver Island.

(Special Correspondence).—The Tye Copper Co., Ltd., at Duncan Station, reports that during October the smelter ran twenty-seven days, 5979 tons of Tye ore smelted giving a return after deduction of freight and refining charges of \$83,547.

### Duncan Station, Nov. 12.

#### West Kootenay District.

At Trout Lake, Forbes & Morton of Minnesota, interested in the Triune, have taken bonds on the Union Jack and other properties in same belt. They will start a long tunnel on the Union Jack, about 1½ miles above the Five Mile, and drive on the lead, crosscutting at several points.

In Lardeau section, near Camborne, rawhiding of ore from the Mammoth group at Goat mountain to the timber line has started. — Work is progressing at the Eva mine for reconstruction of tram, building boarding-house and getting the mine in shape for continuous ore production. Timbers for the new aerial tram terminal are out. It is expected by Dec. 10 the terminal will be completed and the tram in running order.

## COLOMBIA.

The Darien Gold Co., at Cana, reports thirty stamps dropping on low-grade ore. During September the new shaft was sunk 18 feet. The mill and Maisounabe shaft were stopped part of the month for want of water.

## MEXICO.

### Agua Calientes.

Under management of O. Westlund, the smelters of the American S. & R. Co., at Agua Calientes, is treating 3000 long tons of ore per day. The ore comes from mines along the line of the Mexican Central, and some of the copper ore from Sonora. It is claimed that the smelter paid \$1,000,000, Mexican, in freights last year.

### Chihuahua.

The Palmarejo & Mexican Goldfields Co., near Chinipas, reports for September: Zapote works crushed 2900 tons, treated 1700 tons, producing \$18,380 gold, \$37,670 silver. Expenses, \$43,150; expenditure on new development, \$970. Abnormal rains are reported cause of reduced returns during last two months.

It is said that the American S. & R. Co. proposes driving a tunnel 1½ mile long between its Santo Domingo mine (the Gasolina) and the Mina Vieja mines, in Santa Eulalia district. The projected tunnel is to run from the 1250-foot level of the Santo Domingo mine to the Velardena mine, a distance of 1 mile, and a tunnel started at the Mina Vieja to the first in the Velardena ground. The greatest depth to be gained is about 1500 feet. One of the objects in running through the Buena Tierra is to follow a fissure which, it is said, allow easier and more economical work. This fissure is believed to run through to the Mina Vieja.

W. Mitchell, in charge of the hoisting and shipping of ore from the American S. & R. Co.'s Mina Vieja mine, in Santa Eulalia camp, reports that during the month of October he hoisted with a 22 H. P. gasoline engine from a depth of 800 feet 2217 tons of ore and consumed 870 gallons of gasoline. He shipped by burros, 2 miles to Santa Eulalia, 2080 tons during the month, and was delayed two days by heavy rains. On Oct. 29th he shipped 110 tons and 440 kilos of ore to Santa Eulalia by 1004 burro loads.

The work at the Candelaria mine of the Mexican Standard M. Co. at Farral, under the supervision of J. Bonham, is progressing. The main shaft has reached the 250-foot level and started crosscutting, which will put them into a body of shipping ore. A mill will be built.

J. E. Carse of Chihuahua says that at Bachimba he has, with J. Quick and J. Collins, taken up forty pertenencias. The district is about 40 miles south of Chihuahua, and the group will be known as the Railroad Men's mine. Gold and silver values are obtained.

C. O'Calahan, of Torreon, has bought the Nueva Chihuahua mine in Santa Eulalia camp. The group consists of forty pertenencias and is near the Santa Rita, El Carmen, Negrita and other producing mines.

### Durango.

The Torreon S. Co. of Torreon will build an electric-magnetic separating mill at its San Diego mine.

## Mexico.

El Oro M. & R. Co. at El Oro reports for month of September, mill ran twenty-eight days, crushing 9826 tons, producing from 100-stamp mill \$120,138; producing from cyanide plant \$3949; total production, \$124,087. Working expenses and development, \$66,225; profit from railway for month was \$7366. Total profit, \$65,228. There has been expended on permanent improvements \$25,586, including \$24,748 on new mill.

The duty of \$240 per ton on imported dynamite and explosives which was to go into effect in October has been postponed until Jan. 1, 1905, reports say, as the factory near Torreon is moving slowly in accumulating a stock for the Mexican market. It is said that the factory now has on hand 40,000 cases of dynamite, equal to about a ten days' supply for the Mexican market.

### Oaxaca.

J. L. Grandison et al. of Oaxaca have begun development of the oil field at Puerto Angel, and are drilling several wells.

### San Luis Potosi.

The Santa Maria de la Paz M. Co. has in full operation the narrow gauge railroad from its mines, 6 miles from Matehuala. The road runs from its mines to La Cobra station, on the National Railroad.

### Sonora.

At Caborca the San Blas M. Co. will build a stamp mill.

W. C. Greene, president of the Greene Con. C. Co., at La Cananea, says he has bought the Rio Grande, Sierra Madre & Pacific Railway, together with the El Paso Southern T. & B. Co. and Sierra Madre C. Co., allied corporations. The Sierra Madre will be extended down through Chihuahua for approximately 109 miles from present terminus. A branch line will also be built from a point near Guzman to La Cananea. Engineers have been surveying the route. The line will be built from Terrazas to Mulatos. Greene has also closed a deal for the Mulatos gold mines and will take charge of them next week.

In digging a well at Los Angeles mine, near Llano Colorado, a blind ledge of gold ore was struck at depth of 30 feet. In the same group, the Bonanza de Oro has a 5-foot ledge, which goes \$30 per ton in gold. The owners, M. P. Wright & F. Smith, are increasing development. — F. J. Ochoa of Ures is developing mines at Copete. One, the Providencia, has 18 pertenencias, through which is said to run the ledge developed by the shafts on the Sultana and San Jose mines. The latter shaft is near the Providencia ground. On the Sultana the shaft is 1000 feet deep, in ore all the way.

## Trade Treatises.

In a brochure entitled "Driving the New York Subway," the part played by the Ingersoll-Sergeant machinery is sumptuously set forth. The booklet can be had upon application to the Ingersoll-Sergeant Drill Co., 26 Cortlandt street, New York.

The following illustrates a phase of publicity herein. It is from a large manufacturing concern: "Kindly omit notice of the catalogue sent you by this mail. The former notice occasioned so widespread a request for the book that we were not able to supply the demand."

Graphite Lubricants" are described in a catalogue of the Jos. Dixon Crucible Co., Jersey City, N. J., showing their general use and advantage and giving considerable interesting information about graphite. A copy will be sent on request to any address.

A typographic gem is the miniature catalogue from the A. S. Cameron Steam Pump Works, daintily describing difficult pumping problems and appliances to successfully solve them. The booklet will be furnished on request by the A. S. Cameron Steam Pump Co., foot of E. 23rd St., New York City.

The special catalogue of the Columbus Machine Co., Columbus, Ohio, portrays and describes the firm's makes of gas and gasoline engines in a variety of styles, including geared pumping engines and hoisting engines. The company is also making a traction engine that is attracting deserved attention.

"Modern Practice in Air Compression" is the subject of Catalogue No. 53, issued by the Sullivan Machinery Co., containing much in its 128 pages of interest to any one engaged in rock work. Detailed descriptions, general suggestions for operation, and numerous tables are among the contents. The treatise will be sent on application to the Sullivan Machinery Co., Railway Exchange Building, Chicago, Ill.



Personal.

E. D. BOYLE is manager of the Schwab mines at Goldfield, Nev.

J. L. NELSON is superintendent of the Geyser-Marion mill at Mercur, Utah.

W. C. RALSTON has returned from Tonopah, Nev., to San Francisco, Cal.

J. S. KUNS is superintendent of the Los Angeles G. M. Co., operating near Tuolumne, Cal.

H. N. MERWIN is with the Black Rock M. Co., near Wickenburg, Ariz., on mill construction.

W. H. ROUTLEDGE is superintendent of the New England-Tonopah M. Co., at Tonopah, Nev.

WM. TRURAN is manager of the Ada Smiddle G. M. Co., Ltd., near Libertad, Nicaragua, C. A.

G. B. WILSON has resigned as assistant superintendent of the Quartette M. Co. at Searchlight, Nev.

A. H. FLOETER is manager of the Sheba mine, south of Mill City, in Humboldt county, Nev.

J. LOSBAUGH is superintendent for a New York company operating at Gillett, Teller county, Colo.

J. KELLY is superintendent of the Wild Bill mines near Shautie, near Frisco, Beaver county, Utah.

J. C. HARTZELL has been appointed professor of geology at the University of the Pacific, San Jose, Cal.

R. S. BILLINGS is manager of the Independent S. & R. Co., at Denver, Colo., with smelter at Golden, Colo.

J. M. CARTER is superintendent of the Fletcher M., M. & S. Co. mines at Stockton Hill, near Kingman, Ariz.

GREGORY DOVETON of Doveton & Purrlington, Denver, Colo., is making metallurgical examinations at Reno, Nev.

E. C. ENGELHARDT has returned to Denver, Colo., from a two months' prospecting trip to Gilpin county, Colo.

W. H. BRYSON is superintendent of the Bullfrog M. Co. mines in Bullfrog district, near Amargosa, south of Goldfield, Nev.

T. WATSON, formerly underground superintendent of the Calumet & Hecla C. Co. at Calumet, Mich., is at Bisbee, Ariz.

H. H. CLARK is manager of the Bullfrog M. Co., operating in Bullfrog district, near Amargosa, south of Goldfield, Nev.

F. CLARK of Chihuahua, Mexico, formerly manager of the Hearst properties in Mexico, has gone to Cerro de Pasco, Peru.

F. L. NASON of New Haven, Conn., is at Chivela, Oaxaca, Mexico, examining placer mines, where he expects to remain for three months.

F. C. ARMSTRONG of Washington, D. C., is manager of the Hidalgo M. Co., operating mines northwest of Parral, Chihuahua, Mexico.

P. J. DERMODY, for several years foreman at the Granby mines at Phoenix, B. C., is foreman of the Providence M. Co. at Providence, B. C.

A. C. AIKEN has returned to San Francisco, Cal., from the San Juan mines at Santa Eulalia, Chihuahua, Mexico, of which he is manager.

J. E. SPURR of the United States Geological Survey is in Tonopah, Nev., preparatory to making his final report on the geology of that district.

W. L. HOLMES of the Engineering Company of Mexico, S. A., is at Torres, Sonora, investigating the treatment of ores in that district by cyanide.

W. A. HEWITT, president of the Compressed Air & Machinery Co., has returned to San Francisco, Cal., from a business visit to Arizona and Mexico.

H. C. KELLY, formerly superintendent of the Chandler iron mine at Ely, Minn., is superintendent of the Continental mine near Porthill, Kootenai county, Idaho.

E. B. KIRBY, manager of the War Eagle, Center Star mines and Roseland Power Co. at Roseland, B. C., has returned there from a several weeks' trip East.

E. D. GRANT, for some time past instructor in the department of mathematics and physics of the Michigan College of Mines, has been made assistant professor in the same department.

W. H. O'BRIEN has resigned as superintendent of the H. Y. mines at Roosevelt, Idaho, to devote his time to his own properties on Monumental Summit, also in Thunder Mountain district.

Commercial Paragraphs.

THE international jury of awards at the Louisiana Purchase Exposition in St. Louis have awarded gold medals to the Weber Gas & Gasoline Engine Co. of Kansas City, Mo., on their Weber gas engines and Weber suction gas producers.

COLORADO IRON WORKS CO., Denver, Colo., report sales of one set of 36x36-inch improved standard wide faced crushing rolls to the Traylor Engineering Co., New York, and of five of their impact screens to Caird & Hawksworth, Helena, Mont.

THE Portland G. M. Co. have placed contracts with the Link-Belt Machinery Co. for a large inclined pan conveyor, which will be the heaviest of its type in Colorado, and is to handle waste rock from the mine. Designs were made by their Denver representatives, A. E. Lindrooth, Shubart & Co.

A. E. LINDROOTH, SHUBART & CO. of Denver, Colo., are supplying the mill equipment for the new sand-lime brick plant of the Colorado Brick & Artificial Stone Co. of Colorado Springs. This is the first plant in Colorado to use this process, which has met with success in the East, where sand-lime brick is supplanting the clay product.

AMONG accessions to the Allis-Chalmers personnel is noted the names of W. A. Nelson, who is appointed superintendent of equipment; R. C. Wright in charge of the design of special tools and fixtures used in the manufacture of steam turbines; C. F. Barth, foreman of the steam turbine department at the West Allis Works, and C. A. Derby, who joins the selling staff of the Allis-Chalmers Co. in its sawmill department.

THE S. H. Supply Co. of Denver, Colo., reports sales of a 50-ton concentrating plant to Vancouver, B. C., and a 75-ton concentrating plant placed at Hailey, Idaho; a 10 and 20-stamp mill to Mexico and a 25-ton cyanide plant to Lordsburg, N. M.; a 20x60 Fraser & Chalmers double reel Corliss hoist to Merrellos, Mexico; a copper leaching plant to Salida, Colo.; ten stamps to Breckenridge and a 20-stamp mill complete to Boulder county; also a 50-ton stamp concentrating plant for concentration of tungsten ores in Boulder county; a complete copper smelting plant, 36x140, to Arizona, and a 5-drill compressor plant to Leadville, Colo.

THE Wellman-Seaver-Morgan Co. of Cleveland, O., was recently awarded contract to construct two large coal handling machines for the Boston Coal Dock & Wharf Co., Duluth, Minn. This is one of the docks under the management of the St. Paul & Western Coal Co., of which M. J. Patton is superintendent. The machines will consist of two conveyor bridges, each about 350 feet long, including front and rear cantilevers. The machines will be designed so that coal may be screened and loaded into box cars, as well as unloaded from vessels, and will be built to be operated by steam. They will be equipped with 2-ton Hulett patent excavating buckets, and machinery designed to give maximum speeds of operation. The structural work will be of steel throughout, and the machines will be self-propelling along the dock.

Obituary.

R. S. GAMMON, a pioneer of Nevada, died at Reno, Nev., on the 9th inst. Deceased was 80 years old and a native of Maine. He went to the Pacific coast during the gold excitement in California in 1849 and engaged in mining, and to Nevada in 1860.

M. J. FARRELL, a pioneer mining man of California and Nevada, died at Nevada City, Cal., on the 9th inst. Deceased was a native of New Jersey, born March, 1832. He was for several years connected with the Manhattan M. Co. in Nevada, and served two terms as State Senator for Lander county, Nev.

Books Received.

Under title of "Mineral Resources of the United States for 1903," the U. S. Geological Survey has issued: "Production of Natural Gas" and "Production of Petroleum."

Latest Market Reports.

SAN FRANCISCO, November 18, 1904.

METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c, refined (1000 fine); San Francisco, 58½c; Mexican dollars, 47c San Francisco, 46½c New York.

COPPER.—New York: Standard, \$14.87½; Lake, 1 to 3 casks, \$14.50@14.87½; Electrolytic, 1 to 3 casks, \$14.75; Casting, 1 to 3 casks, \$14.62½; San Francisco: \$16.00. Mill copper plates, \$17.00; bars, 18@24c. London: £65 15s spot per ton.

Following are the figures of the German consumption of foreign copper for the months January–September, 1904, compared with the same period of time for 1903–1902:

	1904.	1903.	1902.
Imports .....	83,845	63,527	62,091
Exports .....	6,379	7,797	6,718
Consumption .....	77,466	55,730	55,373

Out of the above 70,052 tons were imported from the United States, against 46,573 tons for 1903.

LEAD.—New York, \$4.70; Salt Lake City, \$3.50; St. Louis, \$4.12½. San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £13 ½ long ton.

SPELTER.—New York, \$5.55; St. Louis, \$5.00; London, £25 ½ ton. San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$28.87½@29.17½; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, \$32½@35c. London, £132 5s spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100 lb. lots, 16c.

ZINC.—Metallic, chemically pure, 3½ lb., 50c; dust, 3½ lb., 10c; sulphate, 3½ lb., .04c.

NICKEL.—Sheet, New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$13.50 @13.50; gray forge, \$12.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$19.50; open hearth billets, \$19.50; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer .....	\$15 50@16 00
Charcoal .....	16 00@17 00
Foundry Northern 1 .....	15 50@16 50
Northern 2 .....	15 00@16 00
Northern 3 .....	14 50@15 50
Southern 1 .....	16 15@17 15
Southern 2 .....	16 65@16 65
Southern 3 .....	15 15@16 15
Forge .....	14 65@15 65
Billets, Bessemer .....	22 50@24 50
Bars, iron .....	1 40@1 45
Bars, steel .....	— @ 1 47
Rails, standard .....	28 00@28 00
Rails, light .....	21 00@23 00
Plates, boiler .....	1 72@—
Tank .....	1 57@—
Sheets, 27 store .....	2 22@ 2 27
Angles .....	1 57@—
Beams .....	1 57@—
Tees .....	1 57@—
Zees .....	1 57@—
Channels .....	1 57@—
No. 1 railroad wrought .....	14 00@15 00
No. 1 cast, net ton .....	12 00@13 00
Iron rails .....	19 00@19 50
Car wheels .....	13 50@14 50
Cast borings .....	6 00@ 6 50
Turnings .....	8 00@ 9 00

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, 7c per lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, 7c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35;

Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 23@24c per lb.; carloads, 23@24½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 24@24½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, \$2.00@2.25; California refined, 13@12c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1¼@2c per lb.; nitric acid, carboys, 8c per lb.

OILS.—Linsed, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Ecocene, 23c; Elaine, 23c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

MOLYBDENUM.—Best, \$2.75 per lb.

CHROMIUM.—90% and over, per lb., 80c.

PHOSPHORUS.—American, per lb., 70c.

SILVER.—Chloride, per oz., 90c@1.00; nitrate, 55c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—per lb., \$2.75.

SODIUM.—Metal, per lb., 50c.

BISMUTH.—Subnitrate, per lb., \$2.10.

URANIUM.—Oxide, per lb., \$3.50.

MERCURY.—Bichloride, per lb., 77c.

FIRE BRICK.—Domestic, carload per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)



## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING NOVEMBER 8, 1904.

774,144.—SPIKE—J. B. Anderson, Portland, Or.  
774,641.—SHADE FIXTURE—R. Barkhurst, S. F.  
774,373.—RAILWAY SWITCH—W. J. Bell, Los Angeles, Cal.  
774,222.—DOOR CATCH—C. A. Borein, Oakland, Cal.  
774,304.—METALLURGICAL PROCESS—M. P. Boss, S. F.  
774,232.—FURNACE—A. C. Calkins, Los Angeles, Cal.  
774,465.—STEAM TRAP—J. Campbell, Port Blakeley, Wash.  
774,414.—PHOTO MOUNT—E. S. Cheney, Oakland, Cal.  
774,466.—GAS MACHINE—E. F. and E. P. Clough, San Jose, Cal.  
774,564.—BOILER—J. M. Colman, Port Townsend, Wash.  
774,167.—ARMOR PLATES—W. E. Everette, Tacoma, Wash.  
774,364.—WATER PIPES—P. E. Fisher, Spokane, Wash.  
774,470.—FIRE ESCAPE—Hamilton & Lewis, Seattle, Wash.  
774,725.—CLEANING COFFEE—Hastings & Harrington, Sacramento, Cal.  
774,476.—CONVEYOR—D. E. Hughes, San Diego, Cal.  
774,389.—BUTTER CUTTER—A. C. Hummer, Seattle, Wash.  
774,431.—EXCAVATING BUCKET—F. M. Ireland, Portland, Or.  
774,390.—ILLUMINATING TILE—P. H. Jackson, S. F.  
774,729.—AUTOMATIC TAP—C. Lewin, S. F.  
774,463.—CAN SOLDERING MACHINE—A. Lotz, S. F.  
774,442.—WAVE MOTOR—G. M. Lynch, Los Angeles, Cal.  
774,592.—CURRENT MOTOR—J. S. Mathews, Pendleton, Or.  
774,527.—DIRECTORY—G. W. Maxwell, Los Angeles, Cal.  
774,323.—EDGE RUNNER—W. A. Merralls, S. F.  
774,446.—PREVENTING SNORING—S. A. Moulton, Campbell, Cal.  
774,489.—GLOVE—O. W. Noll, S. F.  
774,273.—ORE MILL—C. C. Pratt, Portland, Or.  
774,398.—STAMP STEM—W. Reine, Quartz Mountain, Cal.  
774,206.—SASH FASTENER—C. G. Seaman, Spokane, Wash.  
774,539.—BASS DRUM AND CYMBAL—J. P. Stanton, S. F.  
774,392.—SAW HANDLE—A. E. Townsend, Centralia, Wash.  
774,315.—BANK CHECKS—S. M. & L. M. Trapp, Seattle, Wash.  
774,408.—CAR SEAL—Williams & Hinson, S. F.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FRUIT PITTER.—No. 773,885. Nov. 1, 1904. J. A. McCune, Santa Cruz, Cal. This invention is designed to split and remove the stones from peaches, apricots and like fruit, without injury to the meat portions, spread the stoned fruit upon trays preparatory to drying and deliver the trays automatically when filled. It consists of such mechanism and combination of parts as will accomplish the desired result.

ILLUMINATING TILES.—No. 774,390. Nov. 8, 1904. P. H. Jackson, San Francisco, Cal. This invention

consists in an illuminating tile structure, transversely united metal bars forming rectangular openings with surfaces of support in different planes, transparent tiles fitting said openings and having the exterior edges conforming to and resting upon the surrounding bars, and the central portion formed to deflect light into the space below, and a plastic material in which the tiles are embedded upon the bars.

PHOTOGRAPHIC MOUNT.—No. 774,414. Nov. 8, 1904. E. S. Cheney, Oakland, Cal. The object of this invention is to provide an artistic mount whereby a mat or passe-partout effect may be produced without cutting the mat portion proper and to furnish a machine-made mount which will have any kind of a border desired, plain or embossed, which will have a central countersunk portion to receive the print, with wide or narrow colored or uncolored inside bevel, and which will have a flat back. This mount can be made very cheap and in a great variety of shades, sizes and styles and carried in stock.

STAMP STEM AND TAPPET ATTACHMENT.—No. 774,398. Nov. 8, 1904. Wm. Reine, Quartz Mountain, Cal. In securing tappets to stamp stems which are used in crushing and other mills of this class it is difficult to fix the tappets upon the smooth cylindrical stems so firmly as to prevent their shifting, and the keys which are usually employed for this purpose soon become battered and useless on account of the severe blows that are necessary to properly drive them into locking position. It is the object of this invention to provide for easily and firmly locking the tappet to the stem and at the same time providing a means whereby it is easily disengaged or adjusted when desired.

ACETYLENE GAS MACHINE.—No. 774,466. Nov. 8, 1904. E. F. Clough and E. P. Clough, San Jose, Cal. This invention comprises in a gas machine the combination of a generator tank and a gasometer tank, a bell in each, stand pipes in said tanks and connections between the stand pipes in the gasometer and the corresponding stand pipes in the generator. There is a carbide receiver in the gasometer bell, telescoping connections between said receiver and one of said stand pipes in the generator, a valve mechanism in the corresponding stand pipe in the gasometer and governable by the gasometer bell and the other of the generator stand pipes, and an equalizing check valve as 28 in the carbide receiver.

SHADE FIXTURES FOR WINDOWS CURVED TRANSVERSELY.—No. 774,641. Nov. 8, 1904. R. Barkhurst, San Francisco, Cal. This invention relates to a fixture for circular windows, which fixture is especially adapted to give the shades or curtains a curvature corresponding with that of the windows to which they are applied. It consists of one or more curved guides between which the shade is caused to pass from the straight roller by which it is suspended from fixtures at the top, a correspondingly curved bottom bar for the shade, means for regulating the tension of the guides between which the shade passes, and means for hanging lace or other curtains with the curvature corresponding to that of the shade.

WATER PURIFYING APPARATUS FOR STEAM BOILERS.—No. 773,915. Nov. 1, 1904. Daniel Best, San Leandro, Cal. This device consists of an attachment having retaining surfaces, means for supplying water to pass over said surfaces under the influence of heat from the boiler, and means for delivering the purified water into the boiler. The object of the invention is to provide a device forming an essential part of the boiler whereby the water may be substantially freed from all or the greater portion of such impurities before it is admitted to the main portion of the boiler. This apparatus may be applied to any well-known or ordinary form of fire or water tube boiler, either vertically inclined or horizontal.

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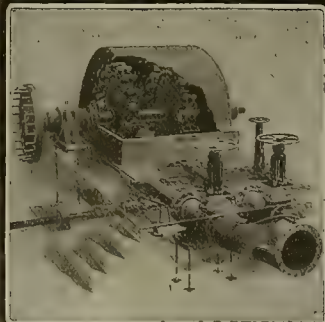
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# MINING AND SCIENTIFIC PRESS

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SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 26, 1904.

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## Incidental Damages.

Wherever a great industry is built up, based on mining, there, it seems, are always those who hope to gain something by combatting these successful enterprises. One fruitful source of trouble of this kind is tailings from amalgamating and concentrating mills; another is tailings from hydraulic and dredge mining operations; a third is the fumes from the stacks of the smelters, and in other cases it is the slag from the furnaces. In every case a good, healthy, profitable mining enterprise is promptly surrounded by an active population. Merchants bring in their stores of goods; the adjacent lands—previously worthless and unclaimed in most instances—are cultivated and crops are grown to sell to the community, which is growing up about the mill or smelter or mine. Soon some one fancies he can derive more profit from harassing the mining or reduction company than by raising agricultural products or stock, and he accordingly brings suit for damages alleged to have been sustained. Several years since some vegetable gardeners in the Black Hills of South Dakota conceived the idea of making an "honest dollar" by bringing suits for damage from mill tailings against the Homestake company. They in some manner suddenly discovered that these mill tailings contained gold which could profitably be recovered by the cyanide process and then their fear was that the Homestake Co. might

claim the tailings as their own and the damaged gardeners promptly filed location notices, claiming the tailings as theirs "by right of discovery and location." The differences between the hydraulic and dredge miners and the farmers in California is an old story. The battle over the fumes at Butte, Montana, has been waged for years, off and on, but what would become of Butte and the surrounding country

if the smelters were to close down is not a difficult problem to solve. In southwestern Colorado the stockmen find that cyanide of potassium is a deadly poison, and their stock, it is now claimed, are exposed to great danger. In the desert region of Arizona there has as yet been no complaint of fumes from the copper furnaces, but the farmers below Clifton claim to have found a just cause for complaint in the tailings from concentrators. For nearly forty years smelters have been operated in the Jordan valley, near Salt Lake, Utah, and it has only recently been discovered that the fumes from the stacks are detrimental to vegetation. There are numerous other similar instances which might be cited, and in almost every case if the industry complained of were to cease all activity in the district about it would cease with it, and where are to-day thriving and prosperous communities, would be found only deserted streets, vacant stores, and the desolation which quickly overtakes a played-out mining camp. The complaining farmer would probably be last to leave, but he would only leave to go to another place where the mining industry was in full activity, and he would get as near the smelter as it were possible for him to get that he might be spared a long haul to a prompt and profitable market. There are occasions when mills and smelters do material damage, and then steps should be taken to minimize as far as possible the damage by taking the necessary precautions to prevent it, but in the majority of cases the actual damage is slight as compared with the benefits derived from the industry, and furthermore the damaged property has usually been built up as a result of this industry upon the success of which its value wholly depends.



The Discovery Claim at Bullfrog, Nevada. (See Page 361).



6000 Logs for Utica Stopes, Angels, Cal. (See Page 358.)



The Lightner Mine, Angels, Cal. (See Page 358).

LEADVILLE, Colorado, still continues to attract unusual attention by the rich strikes of large ore bodies in unexpected places. The bonanzas found there within the past two months have stimulated mining and prospecting in that district to a remarkable degree. One of the most recent strikes is in the Iron Silver mine on Iron Hill, one of the oldest and most thoroughly developed mines in the district. The recent discoveries in the Iron Silver mine were made by diamond drills at a depth of 1160 feet from the surface and the indications are that the ore body is both large and rich. It is presumed that this ore shoot is a continuation of the Rock Hill ore bodies. Statistics show that the mines of Leadville have produced since 1879 to the beginning of 1904, a period of twenty-six years, \$310,000,000 in silver, lead, gold, zinc, iron, manganese and other minerals. Notwithstanding this large output, it now begins to look as though in many instances only the superficial portions of the ore bodies had been thoroughly explored and worked, and that in the deeper region beneath the carbonate cap remains many untouched bonanzas.



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SAN FRANCISCO, NOVEMBER 26, 1904.

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FOR years the Coalinga oil field in California has been producing petroleum, but it is only within a very recent date that the development of oil in that district has taken on anything like a boom. It is at present one of the most active oil districts in the West. From a few scattering producing districts in various portions of the State, California has become the largest producer of petroleum of any State in the Union.

AT a convention of mine operators held recently in Cleveland, Ohio, the marked increase in the number of accidents in mines was taken up and discussed, and it is very evident from the recommendations and rules agreed upon by the convention, composed largely of representative mining men, inspectors, miners and others actively engaged in the mining industry, indicates that it was the opinion of those present that the greater number of accidents are due to carelessness on the part of the men injured. Many of the common practices about mines which result in accidents are prohibited.

GRAVE fears are expressed for the health of miners working in a tunnel at 9000 feet above the sea in the Swiss Alps. In the United States some of the largest mining districts are at an altitude of more than 10,000 feet and one seldom hears of any illness directly attributable to the altitude except in a few isolated cases. In Colorado are many mines at altitudes ranging between 10,000 and 13,000 feet above the sea, and in Peru are mines at 14,000 to 15,000 feet, and many men from Italy, Austria and other portions of Europe are employed in these mines, but no report of their physical unfitness is ever heard from any of these American camps.

## Pumping Water for Milling on the Desert.

In the great Southwest there are many thousands of square miles of arid territory, regions where water is scarce or not obtainable at all, and still, in these deserts are vast undeveloped mineral resources, the existence of which is scarcely more than known. There are numerous places where mining districts have been established and where a greater or less success is being achieved in the operation of mines under the difficulties inherent to a desert country, and it has been shown repeatedly that water can be pumped many miles to supply the mines of the desert, at a surprisingly low cost per ton of ore treated. One of the first, if not the first pumping installation on the deserts of California was that which supplied the Paymaster mine. The pipe line was 18 miles in length, the water being pumped from the Colorado river. The next important installation was that at Carga Muchacha mine, 20 miles northwest of Fort Yuma. This line was 14 miles in length, and the cost of pumping was stated to be less than 50 cents per ton of ore treated.

In 1893 a pipe line 12 miles in length was laid from the Colorado river to the Golden Cross mines, in the Carga Muchacha mountains. This line supplied 100,000 gallons of water daily, lifting it 500 feet at a cost of 18 cents per ton of ore crushed. Steam power was used, the fuel being wood. Elsewhere herein is described a plant supplying water to mines near Virginia Dale, in the middle of the Colorado desert, 35 miles from the railroad. The water is raised 183 feet from a well sunk in a dry lake. The pipe line is 7½ miles long, of 2 inch and 1½ inch pipe, and the water is lifted 1200 feet. The cost of pumping water at this plant is stated to be 25 cents per ton of ore crushed. The water is settled and reused. This is probably a fair average cost for supplying water under such conditions as usually obtain on the desert. The work is done by gasoline engines. In some cases a larger volume of water is available and the tonnage treated is large, consequently the cost should be somewhat diminished, while in other places the conditions may be more disadvantageous, with an increased cost of supplying water to the mines, but it is evident that the mines must be very badly situated indeed, if water cannot be supplied within a cost of 50 cents per ton of ore treated.

In Western Australia is the largest water pumping plant in the world, constructed for mining use only, but there it was imperative that a large supply of fresh water be made available, as all the water obtainable in the neighborhood of the mines was heavily charged with salt, and no fresh water could be had without distilling the salt water, which was very expensive. There are few mining districts which would justify the expenditure of \$15,000,000—the cost of the Australian installation—and it is doubtful if that would have been built by private enterprise, but the Government came to the rescue and built the plant, and the cost of water per ton of ore treated is greater in Western Australia than it is on the small individual plants on the deserts of the southwestern United States. These figures show approximately what the cost of water is likely to be and form an item of interest in the contemplation of equipping and operating mines in that arid region of the southwestern United States, no portion of which is probably more than 50 miles from a water supply of greater or less volume.

THE end of the year is approaching and those who are behind on assessment work now have but thirty-five days within which to complete the same. This is, however, abundant time in most instances within which to do the work if more than one person be employed. Those who, at the end of the year, find themselves unable to complete it, need feel no fear of losing their claims if they are at work during the last days of December and finish the work for 1904 by continuing the work after January 1, 1905. It will not suffice to stop with the \$100 worth of work uncompleted. Claims located during 1904 do not require assessment work for this year, except in those States where the State or Territorial laws and regulations demand it, but all claims located during 1904 must be "represented" in 1905 by the performance of \$100 worth of work, or the installation of substantial im-

provements to that amount. Where a locator fails to do the work required by the Federal, State and local laws he cannot take advantage of his own negligence and relocate the claim, as he might continue to do this on any number of claims for an indefinite number of years, thus defeating the purpose of the law, which is to develop the mineral resources of the country. The mining laws relative to location of claims and assessment work are liberal, and the safest way is to comply with their requirements. This secures a good title and develops a prospect into a mine, which is what the prospector now requires, as the day is past when he can sell a worthless hole in the ground for more than a month's grubstake.

THE development of a bonanza ore body within 200 feet of the surface in the W. P. H. mine on Iron Clad Hill in Cripple Creek district of Colorado is an illustration of the peculiarly fortuitous results of the miners' labor. For fourteen years that district has been one of the most actively prospected mining regions in the world, and no one will claim that such ore as has recently been found in the W. P. H. mine was too poor to work in the early days of the camp, and thus neglected, for ore running \$100 to over \$500 per ton was as eagerly sought in the first year of the camp as it is now. Within the past two years a number of rich strikes have been made in the Cripple Creek district, but none of them as extensive as that on the mine mentioned. It is clearly illustrative of the possibilities which still lie undeveloped in that district. As many shoots of ore found in that camp are known not to reach the surface, and in some instances natural surface debris covers the outcrop of veins, the only way in which prospecting lessees can hope to find new ore bodies is by taking the chance—always open to the prospector—that of sinking a shaft blindly at any point which affords the desired opportunity in the mineralized area and trusting to luck to make a strike. That luck favors many of those who try is clearly evident, but without trial no "luck" need be expected. It also indicates the value of the leasing system in opening up a mining region like Cripple Creek where the ore deposits are often blind and usually erratic in size and form. Another district which illustrates the benefits of leasing, and the many fortunate strikes resulting from taking this prospector's chance, is in the Southwest Missouri zinc fields. Within the past few years thousands of acres of farming land previously supposed to be non-mineral have been proven to have valuable deposits of zinc and lead beneath the surface and often within a few feet of it. The greater number of strikes in the zinc lead field of Missouri are made by means of churn drills or small well-drilling outfits, and the marked success attending these operations suggests the advisability of their more extended employment for similar purposes elsewhere.

IN the early days in mining in the West almost every mining State and district saw smelters built on all sorts of mines. In the majority of cases mills, and not smelters, were what were required. The mountains of Montana, Colorado, Idaho and Utah were filled with these monuments of mistaken enterprise and ignorance of metallurgical requirements. This was thirty years ago, but to-day there is still a disposition on the part of those ignorant of the conditions essential to success in smelting operations to build smelters in place of mills where it would be impossible to successfully operate a smelter on the material available. A smelter requires not only abundance of ore, but also usually a large amount of iron oxide and limestone for flux and unfortunately the flux is generally devoid of other values than those of a chemical nature which make it suitable as flux. It is a serious mistake to equip a mine with a reduction plant before the mine is prepared to supply a sufficient amount of ore to keep the plant in steady operation, but it is a much more serious—an inexcusable—mistake, in this day, to build a smelter when a mill is required, or vice versa, and worse still to put in a reduction plant of any kind where none at all is needed. Still these things are being done constantly; each year sees chronicled the usual number of failures where a competent management may have made success. There is an old saying to the effect that "a little knowledge is dangerous," and it is fully exemplified in the man who builds a smelter on a mine which should have a mill.



## CONCENTRATES.

THE boiling point of gasoline depends upon its specific gravity. Gasoline will boil at from 140° to 148° F., atmospheric pressure.

THE principles and difficulties in leaching ores are much the same whether with the cyanide or chlorination or other leaching process.

SULPHIDES OF GOLD are prepared in the form of brown or black precipitates by passing sulphuretted hydrogen through a solution of gold chloride.

SURCHARGE is the algebraical sum of the losses of gold sustained during the various operations, and the amount of foreign substance—chiefly silver—left in the gold cornet when weighed.

IN barrel chlorination, at ordinary temperatures, water will absorb two and one-third volumes of chlorine gas. Sufficient lime is added to have the solution in the barrel saturated.

BIXBYITE is a compound of iron and manganese oxide and occurs in black isometric crystals (cubes or octahedrons or modifications of these forms). It has a hardness of 6 to 6.5. Not valuable except as an ore of iron and manganese.

IN the fall of 1892 in the Con. May mine at Johannesburg, South Africa, gold ore was crushed in the cyanide solution in the battery, but the practice there was discontinued, because the coarser particles of gold remained unattacked for so long a time.

A "SKEET" is an automatically dumped skip, having two sides parallel and two sides at an angle of about 15° from the vertical and with a flat bottom. They were first introduced by I. Requa at the Combination shaft on the Comstock. They had a capacity of four to five tons each.

EVERY hoisting engineer should carefully place sharp side marks on the reels of his engine, that he may know within an inch where his skip or cage is in the shaft. Automatic indicators show approximately the whereabouts of the skip, but can not be depended upon for nice adjustment.

THE pressure of the atmosphere increases on going below the level of the sea in mines, and this condition is indicated by a barometer in the same way that a decreasing temperature is indicated on going above the level of the sea. The atmospheric pressure at sea level is about fifteen pounds per square inch.

"CUT HOLES" in either drift or shaft work are an advantage if blasted first as it relieves the "burden" upon the remaining holes of the series, and thus gives the powder an opportunity to break the ground. It is an easy matter to place so great a burden on a drill hole so that a blast fails to break the rock.

SLOTTED LINERS for stamp batteries were introduced several years ago, but the idea did not meet with great favor among millmen and are seldom seen now. The slots or grooves were placed horizontally and were supplied with quicksilver. Amalgamation did not appear to be materially promoted by their use.

IT is not uncommon for the miner to mistake a fault plane for his vein, particularly when a vein is faulted by a fissure having approximately the same strike and dip as the vein proper. Movement in a fault of this character sometimes results in doubling up a vein, making it appear for a short distance to be twice the width it is.

MEN can work in caissons under a pressure of 40 to 45 pounds per square inch without apparent discomfort, but experience has demonstrated that the life of men employed in caissons is remarkably shortened. Some men can stand a higher pressure than others, just as some men can climb to higher altitudes than others.

THE Mosquito range, between Park and Lake counties, Colorado, might be tunneled from the east side to work ore bodies in the Leadville district, but it cannot be done advantageously for the reason that the east slope is less abrupt, and the elevation at the base of the range in Park county is higher than it is on the other side.

THE mixture of sulphide mineral supposed to be galena and sphalerite (lead and zinc sulphides) may be tested with a drop of hydrochloric acid. If zinc blende is present, the odor of sulphuretted hydrogen will be given off. Zinc blende often has a metallic luster resembling galena and is then difficult to distinguish from the lead sulphide by the eye.

ONE TON OF WATER, containing twenty pounds of potassium cyanide, is generally considered a 1% solution of KCy, though actually somewhat less than that amount, but it is so nearly exact that this method of stating the strength of cyanide solutions has been gen-

erally adopted. A 0.25% solution of KCy contains five pounds of potassium cyanide in a ton of water.

IN 1840 a United States patent specification by a man named Elkington called attention to the power of a solution of cyanide of potassium to dissolve finely divided gold. Since that date numerous scientific investigators have published references to this solvent power of solutions of potassium cyanide on fine gold. Metallic silver is also slightly soluble in potassium cyanide solutions.

UNDOUBTEDLY leaks in a compressed air line admit a small amount of fresh air to mine workings, but it is an expensive way to ventilate a mine. It is more economical to run a fan. A good ventilating plant—engine, fan and 1000 feet of 12-inch pipe—should be installed for about \$700 to \$800, depending somewhat on situation and rate of wages. This should supply air to 2500 feet of workings.

PINE TIMBERS 14 inches square and 100 feet in length were used in the construction of the pump rod of the Combination (Requa) shaft on the Comstock lode. These were spliced together and strengthened by strong straps of iron firmly bolted to the timber. In the event of a rod breaking it was usually quickly repaired by bolting these straps on the four sides of the timber, making it stronger than before the break.

THE parting of gold and silver when alloyed may be effected in a number of ways, but that by means of nitric acid is that commonly in use. This latter method has been in use since at least the thirteenth century, and was probably known long before that time. It first came into use in the sixteenth century, but at that time was still a secret process, and did not come into general use until about the middle of the eighteenth century.

STAGE WINDING was in use on the Comstock over twenty years ago. The winding engines were all located at the surface. One engine hoisted the "graffe" up the incline from the bottom of the mine and another hoisted the cage vertically from the head of the incline to the surface. Automatically operated skips are now hoisted by a single winding from as great a depth (3300 feet) on the Rand, the lower portion being an incline and the upper portion vertical.

WHERE A and B own adjoining quartz locations, and on A's claim is a ditch, A has no legal right to discharge his waste water over B's claim, though B's claim is subject to pre-existing right of way for A's ditch. If A turns his waste water across B's claim, B may use it if he choose. A is responsible for any damage which may result to B's claim from the passage of this waste water over the land and A has no right to fence up the ditch on B's claim without B's consent.

FERROUS SULPHATE is the usual precipitant employed to recover gold from its chloride solutions; but many organic substances also precipitate gold from chlorine solutions, among them being oxalic acid, formic acid, ether, etc., but none of these are suitable as commercial precipitants of gold, owing to the slowness of their action and excessive cost, and also to the extremely fine state of division in which the gold is thrown down. To such an extent is this latter possible that it is almost impossible to collect the gold.

THERE are instances where the Supreme Court has decided that, where a vein crosses the side lines of a claim instead of the end lines, the end lines become the "side lines" viewed legally, and the extralateral right is confined to the width of the claim and is defined by a projection of the side lines on the downward course of the ore body. Where a vein crosses one end line and one side line, the end line crossed by the vein defines one limit of the extralateral right, and a line parallel to the end line which crosses a point on the side line through the center of the vein, where intersected by the side line, defines the other limit.

AT Deloro, Canada, sulphuretted hydrogen was at one time employed as a precipitant for gold from chlorine solutions. The H<sub>2</sub>S was made by heating paraffine and sulphur together. This gas was diluted with air and forced through the solution under pressure. The air kept the solution agitated and at the same time expelled a portion of the chlorine mechanically, thus economizing H<sub>2</sub>S, which is decomposed by chlorine. For the purpose of precipitating gold from chlorine solutions now, sulphurous acid is used in some works instead of sulphuretted hydrogen, as with the latter some sulphur is always precipitated with the gold.

IN the bessemerizing of copper mattes, a much larger percentage of materials has to be oxidized than in the similar treatment of iron. In the latter usually not more than 5% to 10% of the material treated must be oxidized, but in bessemerizing a 40% matte at least 60% of the material charged into the converter must be oxidized. In the first copper converters the blast was introduced at the bottom, but, it being unsatisfactory, the tuyeres were raised above a crucible at the bottom. The separated metallic copper collected at the bottom below the level of the tuyeres, and remained molten throughout the blow.

THE original spitzkasten of Rittenger consisted of a

hopper-shaped (pointed) box in which the material to be classified was introduced at the top. Within the box was a partition placed parallel with the side on which the pulp entered. The heavy and coarse material settling, passed out through an aperture in the bottom, and the fine silt or slimes, slow in settling, flowed out through a launder near the top. To more effectually separate the sand and slimes, an upward current of water under slight pressure was introduced (spitzluten). These two devices in a great variety of form and size are now used more extensively than ever before in the fine sizing of ore particles before and during the process of concentration.

UNDOUBTEDLY open-cut mining is the most inexpensive of the various methods of breaking and handling of ore, particularly if the ore be passed down through mill holes to be loaded into cars from chutes; but it is inadvisable to open large surface excavations on a vein in a rainy country, if there is extensive underground development, unless the surface water can be kept from entering the underground workings by properly arranged drainage channels. The large open pits of the South African diamond mines at Kimberly receive an enormous amount of water during the rainy season. This is prevented from reaching the lower workings by having a circular drift run in the solid rock and entirely surrounding the diamond-bearing pipe. It is graded from one side in each direction, so that all water is collected and flows to a rock tank, from which it is pumped to the surface. Comparatively little water is encountered in the mine workings below the level of the drainage drift.

HARDPAN is an indurated earth, usually cemented by clay, iron or lime, any or all of these. It usually lies within a short distance of the surface, and sometimes outcrops there. In some gold-bearing regions this stratum of indurated subsoil is gold bearing, or gold is found lying concentrated upon its upper surface and in the layer of alluvial above. The caliche of the desert regions is an example. In southern California and in some parts of Arizona and New Mexico these occurrences of gold-bearing hardpan are not uncommon. The gravel beneath, however, is usually very poor in gold. The reason for this probably is, that the gold occurring on and above the hardpan possibly represents an enrichment or concentration of the material, which is often found to be coarser than the gravel beneath the hardpan, due to the fact that the finer and lighter particles have been washed and blown away by the rains and winds, thus enriching the gold-bearing stratum, the gold being too heavy to be either washed or blown away. The distinguishing line between earth and rock is that material which may not be plowed. Hardpan may be considered as a sort of a rock, but is distinguished from other rocks by its position in the earth, with reference to other material above and below it.

THE dimensions of a lead smelting furnace at the tuyeres is not considered as having any important significance excepting the capacity of the furnace, but the height of the furnace above the zone of the tuyeres has an important bearing on the losses in lead. If a lead furnace has too great a distance between the tuyere level and the feed floor level the result will be the furnace will get hot at the top, and while the zone of the tuyeres becomes black the fire will reach upward, and although an abundance of slag may be produced little or no lead will come down. Under such conditions if pigs of solid lead are fed they will disappear and no lead will reach the tap hole. Experiments with lead furnaces have proved that a furnace closed in on top will quickly show "over fire," that is fire ascending the ore column above the tuyeres, and that a lead furnace having too great a distance between the tuyere level and the feed floor level has the same effect as if the furnace is closed in at the top. The result of a closed top or too high an ore column is the volatilization of lead, owing to the inability of the cold air to reach the top portion of the charge. The proper height of an ore column in a lead furnace is about 12 or 13 feet and 22 or 23 feet from the furnace floor to the charge floor.

THE passage of a vein from one sort of formation to another is not always accompanied by a material change in the character of the deposit, though this is sometimes the case. On the mother lode of California veins striking and dipping with the slates have uniformly a banded or ribbon structure. Those occurring in greenstone (either the massive dikes, the more or less massive tuffs or in the schistose rocks) have a massive structure, often enclosing fragments of the wall rocks, which are usually much altered and silicified. Where slate occurs on one wall and some type of greenstone on the other, that portion of the vein adjacent to the slate has a ribbon structure, and that portion next the greenstone is more massive. The banded portion of these veins is usually richer than the massive part, though there are exceptions, and some of the typical ribbon veins are destitute of values. At the Rosario mine at San Juancito, Honduras, the vein—a fissure—cuts through black metamorphic shale, hard and dense, with many veinlets of calcite, and leaving the shale enters an eruptive rock, but the vein is not materially influenced by this change in country rock, as the ore is equally rich in shale or eruptive rock. In many other localities the character of the walls apparently have a direct influence on the metal value of the vein and its base contents. There is no rule by which to be guided,



## Operations at Dry Desert Mines.

TO THE EDITOR:—It is possible that in our efforts in the Dale mining district to overcome some of the difficulties of mining and milling ore in a country where wood is scarce and water difficult to obtain, we have gained experience, both useful and entertaining, to the mining fraternity in general. Dale is in San Bernardino county, Cal., on the Mojave desert, about midway between the Santa Fe and Southern Pacific Railroads, and about 35 miles south of Amboy, on the Santa Fe.

That we have been to a degree successful is attested by the fact that in this district there are at present a well equipped, up-to-date, 10-stamp mill, with cyanide plant, in continuous operation, two other mills crushing dry with rolls for direct cyaniding—one having a 30-ton capacity and the other 60 tons—and also several smaller mills.

Water is furnished to these mills for \$2.50 per 1000 gallons. The stamp mills use the most water per ton of ore crushed. The 10-stamp mill running twenty-four hours per day, and crushing from thirty to forty tons per twenty-four hours, uses about 20,000 gallons of water per week, or to be more exact, the actual amount reported for September, 1904, was 74,060 gallons. This includes all the water used for domestic and other purposes about the mine, as well as in the mill, which was in nearly continuous operation during this month.

The cost of water at the O. K. mine operating the above mill, where the methods used are typical of the best practice in wet crushing, is after all not a large item, approximating something less than 25 cents per ton of ore crushed. This expense is nearly, or quite, counterbalanced by the advantage of dry mines, minimum use of timbers and convenience and comfort in working underground.

The pumping plant which furnishes the district with water was installed by the writer for the Brooklyn M. Co. in the spring of 1901. The water is pumped to the surface from a well 183 feet deep by an ordinary plunger pump, thence is forced by means of a 1½x4-inch Dow triplex single acting pump through 7½ miles of pipe. The pipe line consists of 2 miles of 1½-inch standard pipe adjacent to the pump, the remaining 5½ miles being 1-inch pipe. For the greater part of the distance the line is laid over an extremely rough and rocky country.

The Supply mine, upon which there is nearly completed a 60-ton cyanide plant, takes its supply of water from the pipe line at a distance of 3½ miles from the pump, and at an elevation of 800 feet above it. The town of Dale is supplied 1 mile farther on at the same elevation. The O. K. mine, owned by the Seal of Gold M. Co., and the property upon which the 10-stamp mill is in operation, takes its water from the highest point on the line. The elevation here is 1200 feet above the pumping station, the distance 5½ miles. From this point the water flows by gravity 2 miles farther on to the Brooklyn and Los Angeles mines owned by the Brooklyn M. Co. The Ivanhoe M. Co. take their supply of water for their 30-ton cyanide plant at a point 5 miles from the pump, and at nearly the same elevation as that of the O. K. mine.

The pumping plant has a capacity of 7000 gallons per day. The power is furnished by a 10 H. P. Weber gasoline engine. The engine operates both the well pump and the Dow pump, and for the past six months has been in nearly constant operation night and day.

This pumping plant has made possible the development and operation of the various mines of the district on an economical basis as regards their water supply, and has shown what can be accomplished with a very moderate amount of capital in furnishing our desert mines with water.

Dale, Cal., Nov. 19.

H. H. A.

ONE of the most important problems which the mining engineer has presented to him is that of hoisting. In considering it, there must be taken into consideration the underground and the surface conditions, the probable requirements both at present and in the future and the cost of plant and expense of operation.

## Metallurgy at Deadwood, South Dakota.

Written for the MINING AND SCIENTIFIC PRESS.

Within the Black Hills of South Dakota are found many varieties of ore, carrying gold, lead, silver, copper, zinc, tin, etc., but there are two kinds which constitute the principal ore output of that region—a siliceous schist or white vein quartz, carrying gold and auriferous iron sulphides, and a highly siliceous ore, largely the result of replacement of sedimentary

Archæan terrane rest the sedimentary beds representing every important large division known to geological science, from Silurian to Tertiary. In the Cambrian and Carboniferous beds, and in part also possibly the Devonian, occur the so-called siliceous ores, though these are really no more siliceous than the pure quartz ores of the Archæan. The presence of these ores in the sedimentary beds near Galena, Bald Mountain, Green Mountain and Terry's Peak was recognized early in the history of mining in the Hills, and a large number of claims were then located on



Cyanide Mills, Deadwood, S. D. Golden Reward Left, Imperial in Foreground and Dakota Mill Just Beyond.



Golden Reward Cyanide Plant, Deadwood, S. D.

rock, which contains payable values in gold associated with tellurium. The gold ore occurring in the schists and slates does not differ greatly from gold quartz elsewhere. Usually the ore is, to a great extent, free milling, readily yielding its contained gold to amalgamation, with the subsequent concentration of the sulphides, and in some cases treatment of tailings by the cyanide process. At the Homestake no concentration is practiced, but the slimes and sands are leached by cyanide solutions separately.

All of the schistose ores occur in the Archæan, which forms the basement series of rocks of the Black Hills region. On the upturned edges of this

these beds, particularly in the districts named. A few hundred tons of ore were shipped out of the Hills from Galena, rich in silver, lead and gold, and later several hundred tons from the other districts were shipped to Omaha, Denver and other smelters. For years repeated efforts were made to treat these ores at the mines, but without success. Up to 1886 it was not determined positively that the gold was associated with tellurium in these ores. The pioneers in the school of experimental metallurgy were the Portland Mining Co., near Portland; the Welcome Mining Co., at the eastern base of Terry's peak, near Terry; the Snowstorm Mining Co., near Terry, and the Sitting Bull Co., at Galena. The latter company



was really an exception, as their ore was either a lead-silver ore, which was smelted at the mine, or a siliceous chloride silver ore, which was milled (after roasting in various types of rotary furnaces) by amalgamation in pans with salt, bluestone, etc. The Portland, Welcome and Snowstorm companies expended large sums in building mills and trying various methods of treatment, but without success, viewed either chemically, mechanically or commercially. The next company to take up the still unsolved problem was the Buxton, near Terry. Here the first steps toward the real solution of the problem were taken. Leaching by means of bromine solutions was the process tried, but, although it gave results superior to any others that had been attempted, it was not a

the most important plants at Deadwood, in which city the cyanide and chlorination plants were first installed in the Black Hills. The Imperial Co.'s mill and that of the Golden Reward Co., near it (both illustrated), are the only ones where the ore is crushed dry, the solutions being subsequently introduced. In the Dakota mill (also herewith illustrated) the ore is crushed in the solution, the battery water containing 0.1% of potassium cyanide, and four pounds of lime are added at the battery to each ton of ore fed. This is to aid in the settling of the slimes, as the ore is not noticeably acid.

In addition to the numerous cyanide mills now treating these tellurium ores in various portions of the Hills, the Golden Reward smelter also has

age of values, while decreasing the cost, and if the past may be considered an index of what the future has in store, these efforts will meet with success.

Lead Statistics for 1902-03.

The following figures give the latest authoritative statement of the statistics of lead production, etc., for the years 1902-03. The world's production for these is given in long tons as follows:

	1902.	1903.		1902.	1903.
United States.	259,780	266,691	Austria-Hung'ry	13,307	13,953
Spain	174,936	172,521	Turkey	3,622	7,493
Germany	136,703	141,558	Canada	8,335	8,121
Australia	101,000	93,500	Japan	4,000	4,000
Mexico	95,000	95,000	Sweden	828	681
England	25,341	30,654	Russia	300	400
Italy	25,350	22,250	South America	225	150
France	18,522	19,500	Africa, E. India	100	165
Belgium	18,630	20,015			
Greece	13,840	13,075	Totals	903,000	910,000

Following is given the production of lead in various countries:

UNITED STATES (SHORT TONS).			
	1902.	1903.	
	Tons.	†Tons.	
From domestic ores, desilverized lead	202,405	206,750	
From domestic ores, soft lead	74,050	83,444	
From domestic ores together	276,455	290,194	
From foreign ores	14,500	8,500	
Totals*	290,955	298,694	
*Exclusive of foreign lead refined in bond abt.	86,000	80,000	
†Inclusive hard lead, domestic and foreign origin.	9,169	9,579	
SPAIN (METRIC TONS).			
Soft lead	103,190	118,422	
Silver lead	74,370	56,687	
Totals	177,560	175,109	
GERMANY (METRIC TONS).			
Germany	138,754	143,682	
ENGLAND (ENGLISH TONS).			
From domestic ores	17,704	19,958	
From foreign ores	7,800	11,000	
Totals	25,504	30,958	
CANADA (ENGLISH TONS).			
Silver lead	7,459	7,933	
Soft lead	876	188	
Totals	8,335	8,121	
ITALY (METRIC TONS).			
Italy	21,685	18,073	
Sardinia	4,047	4,500	
Totals	25,732	22,573	
AUSTRIA (METRIC TONS).			
Austria	11,264	12,162	
Hungary	2,243	2,000	
Totals	13,507	14,162	
BELGIUM* (METRIC TONS).			
Almost entirely from foreign ores	18,930	20,315	
*Exclusive of foreign lead desilverized in Belgium	58,290	48,385	

IMPORTS.			
ENGLAND (ENGLISH TONS).			
	1902.	1903.	
	Tons.	Tons.	
From Australia	58,778	58,318	
From United States	50,821	39,612	
From Spain	104,328	108,580	
Totals from three principal countries	213,927	207,510	
Totals from all sources	231,818	229,271	

EXPORTS.			
ENGLAND (ENGLISH TONS).			
	Tons.	Tons.	
English lead	33,070	35,664	
Foreign lead	8,809	11,002	
Totals	41,879	46,666	
UNITED STATES (ENGLISH TONS).			
To England	49,133	36,125	
To Continent	31,999	30,913	
Totals to Europe	81,132	67,038	
SPAIN (METRIC TONS).			
Silver lead	79,691	56,172	
Soft lead	91,296	106,481	
Totals	170,987	162,653	

MONTHLY AVERAGE PRICES OF "SOFT LEAD," 1903.				
	London per Ton.			New York per Pound.
	£	s.	d.	Cents.
January	11	6	2	4 12½
February	11	14	2	4 12½
March	13	4	7	4 48
April	12	8	2	4 62
May	11	16	0	4 37½
June	11	8	0	4 26
July	11	7	7	4 21
August	11	2	11	4 23
September	11	3	4	4 41½
October	11	2	3	4 50
November	11	2	3	4 37
December	11	3	8	4 32½
For the year	11	11	8	4 33½

THE PROSPECTOR.

In order to be able to identify rocks as he finds them in the hills, the prospector should have a knowledge of the most important rock-forming minerals, and this requires study and the careful discriminating power and habit of observation.

The most essential minerals are quartz, mica, hornblende, augite, the feldspars, magnetite, garnet, etc. Quartz is usually easy of identification if it can be readily seen by the eye or by aid of a magnifying glass. The micas are several in number, the most common in rocks being muscovite, the colorless kind, and biotite, the brown to black kind. Other micas are also more or less abundant, but are not essential constituents of rocks. Mica is often the result of alteration of other minerals, particularly of feldspar. Hornblende (amphibole) assumes many forms, colors, shapes and conditions and must be studied. Ord-



Golden Reward Smelter, Deadwood, S. D.



Imperial Company's Cyanide Mill, Deadwood, S. D.

financial success, and was eventually abandoned. All of these expensive operations were carried on in a new country, from 200 to 300 miles distant from the railroads.

In July, 1886, the first railroad reached Rapid City, at the eastern gateway of the Hills, and within four years following that date the barrel chlorination process was in operation and doing much to simplify the vexed problem of the metallurgy of these ores. In 1892 the cyanide process was introduced in the treatment of these same ores, and was found to yield as satisfactory a result as, if not better than, the chlorination process. Many experiments were made—and for that matter are still being made—in the treatment of these ores by wet process.

The accompanying engravings illustrate several of

treated a large tonnage of this ore successfully. This enterprise, owned by the Golden Reward Mining Co., was originally known as the Deadwood & Delaware pyritic smelter. It was the outcome of a long series of experiments made along the line of pyritic or partial pyritic smelting by Dr. F. R. Carpenter. The first plant built had a capacity of 400 tons daily. This plant burned several years ago and was rebuilt by the Deadwood & Delaware Co., the new plant having 800 tons daily capacity. It was subsequently bought by the Golden Reward Co. (See accompanying illustration.)

Notwithstanding that the metallurgy of these telluride ores has reached a high degree of perfection, the energetic metallurgists of the Black Hills are constantly striving to extract a still higher percent-



narly, when fresh and unaltered, it is almost black (green in thin section under the microscope usually, but brown in basaltic rocks). The white variety is fibrous and silky, and is called tremolite; the light green, also fibrous, is actinolite; the blue variety (uncommon) is glaucophane. Augite resembles hornblende, being normally dark green, almost black, but is in short stumpy crystals. Both hornblende and augite alter to chlorite and epidote, and the rocks containing these minerals are often altered to schist when probably the greater portion of either the hornblende or augite is no longer recognizable as such, but appears as scales of chlorite. The identification of the feldspars, of which there are about a dozen varieties, will be found difficult, and often it is impossible for expert petrographers to tell to what variety a certain feldspar belongs without microscopic investigation. There are, however, two important divisions of feldspar: First, the potash variety (orthoclase), so named from its crystallization. This feldspar is often pink in color, but as this is not always the case this means of identification cannot positively be depended upon. This is the essential feldspar of granite, trachyte and other acid rocks. It has several other varieties—microcline and sanidine being most important; the latter is usually clear and glassy, and is common in trachyte and its quartz-bearing variety, rhyolite; also occurs in phonolite. The feldspars may be distinguished from quartz by their cleavage, the latter never showing this property, while the feldspars have smooth faces which reflect the light. The second division in the feldspars is grouped under the general term "plagioclase," and includes all of those feldspars in which lime and soda are present. The several varieties are albite, oligoclase albite, oligoclase, andesine, labradorite, bytownite and anorthite. Albite has a minimum of lime and maximum of soda, and anorthite has a maximum of lime and a minimum of soda. Between these extremes the several varieties contain variable (but always definite in each species) amounts of lime and soda. The feldspars high in soda are associated with the more acid rocks, granitic dikes, quartz porphyry, etc., and those high in lime with the more basic rocks, diabase, basalt, etc.

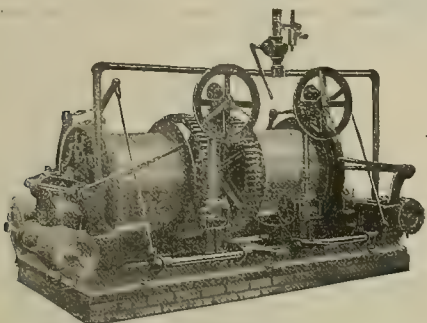
As a matter of course, those wishing to take up rock study so that they may be able to identify, even approximately, the rocks in the field, must become acquainted with the various combinations which form the typical rocks, the general appearance and manner of occurrence. When the prospector has become familiar with the various minerals he must then learn what mineral combinations are grouped to form the various rocks. Granite is composed of quartz, feldspar (orthoclase) and mica. Hornblende is also often present, but should the feldspar be oligoclase instead of orthoclase, the rock would be diorite, and the presence of mica would make it quartz-mica diorite. If it were a combination of orthoclase and hornblende without quartz or mica it would be syenite (quartz may also be present in syenite). So it is throughout the entire series of eruptive rocks that largely make up the mountain masses in the regions where the prospector is most likely to be found. The rocks graduate from one to another, by addition or omission of some important mineral. Still the intelligent prospector desires knowledge of these things, and the merest outline has been given, as suggestive of what those who care to take up the study should do.

In addition to the intrusive and volcanic rocks, there are many sedimentary rocks with which the prospector should become familiar. Among these are limestone, sandstone and shale and their metamorphosed products, marble, quartzite and slate. In mining regions the sedimentary rocks are usually metamorphosed, and we find marbles, quartzites, slates, schists, gneiss, etc., but as these depend largely upon their physical characteristics they are usually much easier of identification than the igneous rocks.

The mineral sample from Fraser, Colo., is a compound of potash, iron and aluminum. It contains no uranium. It is the result of decomposition of some mineral, probably feldspar.

### Hoisting Engine.

Herewith is illustrated a double cylinder, double independent band friction hoist engine manufactured



by the Ottumwa Iron Works Co., Ottumwa, Iowa. The friction mechanism is operated by a hand lever

placed conveniently near the throttle valve and the position of the operator. Each drum is equipped with a compound indicator, driven by sprocket chain direct from the drum hub, and with cut gearing that drives the fingers. One indicator finger moves rapidly around the dial to assist the operator in making his landings, while the other fingers travel slowly and record the distance, which is a great convenience in long hauls and inclines.

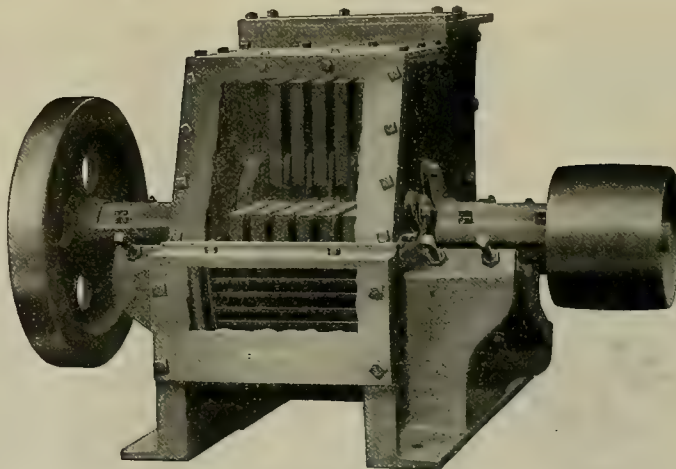
The drums of this engine are self oiling, and the bearings are bushed with brass. Post brakes are used, and either foot treadle or hand lever with ratchet quadrant will be furnished, as the condition may require. This engine is especially designed for long hauls or incline planes, or for double compartment shafts where adjustment of the cage is required, or where one cage is to be operated separately from the other. It may also be used as an ordinary hoisting engine.

The manufacturers or their Western agents will furnish full information and catalogue on request.

### Jeffrey Hammer Pulverizer.

The manufacture of this type of pulverizer has recently been taken up by the Jeffrey Manufacturing Company of Columbus, Ohio, being made under the Schoellhorn-Allbrecht patents acquired by it.

The one illustration shows the pulverizer with its interior or crushing parts; the others show the sec-



Jeffrey Hammer Pulverizer.

tional screen frame which is one of the special features in this machine.

It is designed for crushing and pulverizing material such as coal, clay, shale, rock and other materials. The manufacturers claim it to be the simplest of its kind made. Strong features are its simple beater hammer, "V" shape bar screening surface, adjustment of the beater arms to accommodate wear, adjustable dust-proof pillow blocks, top feed hopper while in suspension. The accessibility of its inner parts is also mentioned as one of its strong features. The taking off of the rear plate and the hand hole plates on the side of the machine make it possible to change the beater arms as well as the screening surface when necessary. The screening surface is made up in sections, so that it is the work of but a few moments to take out or change from one size mesh to another.

The manufacturers say that many of these machines are in use, and hence there is no experimental period to be gone through with.

It is made in many sizes to suit the various requirements. For instance in coal the capacity varies from 50 to 100 tons of coal per hour, depending upon the degree of fineness. In pulverizing material, such as rock, its capacity is stated to be from ten to twenty-five tons per hour.

The Jeffrey Company make free crushing tests for interested parties, thus demonstrating before sale what the machine is capable of doing. A complete catalogue on this subject can be had by addressing the manufacturers.

### Determination of Silver in Ores in the Wet Way.

Written for the MINING AND SCIENTIFIC PRESS by F. ALTNEDER.

In commercial chemical laboratories there often arises the necessity to make only one or two silver determinations from ores. For these determinations the chemist gets only \$1 to \$2 (50 cents to \$1 for one silver assay), yet he has to make his determinations immediately, and is not permitted to wait until more samples accumulate. In such cases he is bound to fire his furnace and to expend more money for fuel alone than he gets for his assays. In this case the chemist would naturally prefer to do his assays in the wet way.

Prospectors generally would like to know the assay of their ores immediately after finding it, but they have to send it from the mountains to the city for assay and often have to wait one or two weeks, perhaps, before they get their assays. The prospectors could carry with them a light assay furnace (for example a gasoline furnace) and their balances, but this is attended with difficulties, and they would be glad to know some assay method by which they could dispense with the heavy assay outfit and necessary accessories and with the expensive and delicate assay balances. For such cases I recommend the following method. This method is based upon the following fact: If into a silver solution containing 1% to 4% free nitric acid and some starch solution potassium iodide is added, this precipitates the silver in the form of silver iodide (AgI), and as soon as all of the silver is precipitated the free nitric acid liberates I from the KI, which reacts upon the starch, turning the solution blue.

PROCEDURE.—Dissolve one-half A. T. (1) ore in 40 to 50 c.c. nitric acid (2); evaporate nearly to dryness (3); take up residue with hot water; filter (4); wash with hot water; dilute to 100 c.c.; add 5 c.c. strong nitric acid (5); cool (6); add some starch solution and titrate with KI (7).

(1). From poor ores you may take more, from rich ores less than one-half A. T. For ores or furnace products containing 200 ounces or more silver and much copper, I specially recommend to take only 5 to 10 grams for the assay in order to make the assay quicker and to get less intensive bluish solution.

(2). If you are afraid that the ore will not be thoroughly decomposed by nitric acid alone, you may use

the mixture of nitric and sulphuric acid for decomposition, but this is generally not necessary.

(3). Avoid the baking of the residue—better leave some acid in solution and neutralize it with ammonia. This neutralizing is necessary only in order that a fixed percentage of free HNO<sub>3</sub> (nitric acid) be in the solution.

(4). If the insoluble residue is white and not in great amount, you may omit the filtering, thereby saving a great deal of time.

(5). The right amount of the free nitric acid in solution is the most delicate point of this assay. If there is not enough free nitric acid in solution, the reaction of the nitric acid upon the KI is so slow that the blue coloring is retarded. You use more KI than necessary and your results will be too high.

Again, if there is too much nitric acid in the solution, this decomposes the blue iodide of starch. In this case the solution turns blue, but this blue coloring soon disappears. In this case you have to add some alkali (I always used NaOH solution) and the blue coloring reappears. Now you may add a measured quantity of silver solution to your assay and proceed with your titration. To get the right acidity and, therefore, a prompt and decisive reaction, is made difficult by the presence of much iron salts.

The ferri-salts react upon the KI and starch solution similarly to the free nitric acid, and you do not know exactly how much nitric acid to use. This is the reason why this method does not give as close results as the fire assay.

I made some experiments to eliminate the iron



from the solution, thus rendering this method an exact one also for ores containing much iron, but as yet I did not succeed.

First, I tried to precipitate the iron with ammonia, wash with ammonia water, acidulate the filtrate with the right amount of  $\text{HNO}_3$  and titrate as usual, but to wash out the bulky  $\text{Fe}_2\text{O}_3\cdot\text{H}_2\text{O}$  precipitate resulting from the treatment of one-half A.T. ore takes too much time and dilutes the filtrate so that I found the method practically useless.

Then I tried to precipitate the silver with test lead, decant the solution from the precipitate, dissolve the precipitate with nitric acid, neutralize and again acidify with 5 c.c. of strong nitric acid. With this procedure I got better results, but it would be necessary to make more experiments before recommending this method. However, this procedure, or the precipitating with aluminum, deserves further experimenting.

(6). It is necessary to cool the liquid before titration, because in the hot solution the iodide of starch is decomposed rapidly.

(7). I found the most practicable to use was KI solution containing 1.535 grams KI in a liter. One c.c. of this solution precipitates 0.001 gram silver, so that treating one-half A.T. ore every 0.1 c.c. KI solution corresponds to 0.2 ounce Ag per ton of 2000 pounds. This solution is near to the  $\frac{1}{100}$  N.KI solution— $\frac{1}{100}$  N.KI solution contains 1.658 grams KI.

It is necessary, however, to standardize your KI solution with silver nitrate solution containing 0.02 to 0.05 gram silver. At the standardizing take care that your standard silver solution be of the same volume and contain the same percentage of free nitric acid as your ore solution contains. As very dilute K.I. solution is used for the titration, we must always add 0.2 to 0.3 c.c. more KI solution to get the blue reaction. The amount of the KI solution is to be taken into account. At present my laboratory notes are not at my disposal, therefore I am only able to state that I got very good results with pure galena ores, and also pure quartzose, and calcareous silver ores, but not as good results with cupriferous iron sulphide ores, and still less satisfactory results with oxidized iron ores. For ores containing chlorides or where the silver is alloyed with more than one-third part gold to the silver, my method is not applicable.

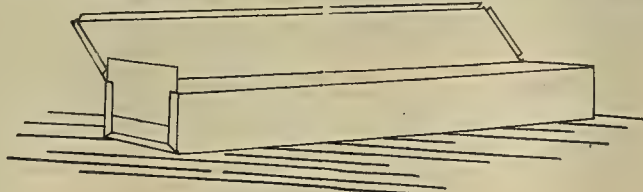
I am sorry that I cannot give here an accurate method applicable to every kind of ores, and methods worked out in detail, but other professional duties prevent me from further experimenting, and I thought it better to publish now this somewhat crude but quick wet method rather than publish a more accurate and precise method based on further experiments made at some uncertain time in the future.

I hope my colleagues will experiment with this method, perfect it, and publish the results of their investigations along this line.

I made my experiments in the laboratory of Dr. I. R. Moeschel in Kansas City, Mo., and I think it my pleasant duty to thank him for affording his laboratory and chemicals to make these experiments.

### Saxon Ore Sample Box.

Mining men realize the value of system in conducting their business, the advantage of having everything in its place, and a place for everything being apparent in every line of work. There is no reason why, in taking samples of ore either by diamond drill borings or other methods, the samples so obtained should be mixed up or dumped in boxes, and it is not always convenient to have uniform boxes or



Saxon Ore Sample Box.

bags in which to keep such samples. The Saxon ore sample box, illustrated herewith, is manufactured by Greenleaf & Bacon, 42-Michigan street, Chicago, and is a great convenience. It is manufactured of tin, with hinge cover, and the regular stock size is as follows: 2 inches wide,  $1\frac{1}{2}$  inch deep and 12 inches long.

One strong feature of this box is an arrangement on the outside of each end whereby a card can be slipped in on which records can be kept. This card is then locked in place when the cover is closed. In this way one can tell at a glance what samples are contained therein, and when and where they were taken. The manufacturers have been making these boxes for mining companies for some time, and are therefore in position to give just what is wanting. They would be pleased to furnish further details, with prices, upon application.

Most valuable ore deposits are accompanied by igneous dikes, or occur within eruptive areas. There are some important exceptions where the mines occur in metamorphic rocks.

### The Gold Mines of Angels, Cal.\*

Written for the MINING AND SCIENTIFIC PRESS.

One of the oldest and most noted mining districts in California is that about Angels, in Calaveras county. Originally a placer camp, the large outcrops of gold-bearing quartz and zones of auriferous schist soon attracted attention, and shallow workings resulted in the discovery of numerous pockets of gold along these outcrops, which in the aggregate produced many thousands of dollars. The most important mines of the place are the Stickle, Utica, Light-

into this mine, which in size vary from 8 inches for sprags, etc., to 24 inches for posts, caps and ties. All of these logs are 16 feet in length (see engraving, front page, Lightner mine). The cost of timbering in this mine is stated by Superintendent Chalmers to be 65 cents per ton of ore extracted, based on the cost of removing 70,000 tons of ore and securing the stopes, which is somewhat higher than would otherwise be the case, owing to the conditions obtaining at this property, as above mentioned. The total cost of mining, milling, concentration and chlorination, together with general expenses, is stated to be but \$2.25 per ton. There are said to be six years' ore



Gold Cliff Cut and Hoist, Angels, Cal.

ner, Angels, Bovee and Gold Cliff. All of these are on one zone, or series of veins, except the Gold Cliff, which lies several hundred feet to the westward. Probably no mines in California have had a more varied history than some of these at Angels. In its early history the Utica mine was superficially developed, and on the showing then made a 9-stamp mill was built, but as it did not pay the mill was removed and taken elsewhere. Several owners in succession, during a period of twenty years, operated this mine, each in turn failing to make the venture profitable, until C. D. Lane struck the pay shoot in 1886, since which time this mine and the Stickle, adjoining it on the south, and owned by the Utica Co., have been largely profitable.

The Stickle mine was an early producer, and the

supply in sight in the Lightner mine, which has been credited with a production of \$1,250,000 during the past four years. The equipment consists of hoist, 40-stamp mill, chlorination works, etc. The present depth of the Lightner mine is 850 feet.

The Angels mine, adjoining the Lightner mine on the north, is in operation, and is said to have found recently three new veins, or zone of ore, in depth, beneath a fault plane, which has previously been considered the foot wall of the upper mine. In the early history of the Angels mine it was worked steadily for ten years, and at that time the barren quartz vein outcropping west of the main pay vein was recognized as likely to either join the pay vein or to cut it off at a depth of 300 to 400 feet, but when the intersection was reached the heavy talc zone underlying the quartz of the west vein was mistaken for the foot wall of the nearly vertical pay zone, and for years no work was attempted below that level. The recent finding of the pay shoots below the talc zone shows how nearly the oldtimers guessed right. It is reported that these same pay zones have been cut also in the Lightner and Utica-Stickle mines, as well as in the Bovee mine, lying immediately north of the Angels mine. In the Bovee are several nearly parallel veins, some of which carry pay rock, and some are barren. Recent exploitation in this property indicates the discovery of pay rock in the mineralized zones beneath the fault plane above referred to.

About  $\frac{1}{2}$  mile west of the above-mentioned mines is the Gold Cliff mine, owned by the Utica-Stickle Co. A heavy outcrop originally marked the surface of the Gold Cliff, but this was removed years ago by the mining operations carried on in a large open cut. (See accompanying engraving.) The ore in this mine occurs in several zones, which overlap in the foot wall going northward. On the 400 level, drifting northerly, the vein was found to be split by an intrusion of diabase. In depth the Gold Cliff ore bodies have proven to be large and contain better values than those at the surface.

The ores of the Angels district are, as a whole, easily treated by amalgamation and concentration, and the chlorinating of the sulphides for the gold. Some successful experiments have also been made in cyaniding the fine sulphide slimes produced in milling.

A few miles northwest of Angels is the Demarest mine, at which some interesting metallurgical experiments were made in the early history of mining in this county. The rock treated was a banded or "ribbon" rock characteristic of veins having slate walls in the mother lode. The experiment of roast-

\* See illustrations on front page.



ing the ore with superheated steam was tried for the purpose of rendering the quartz more readily amenable to amalgamation. A furnace was built 20 feet in height and having a diameter of 16 feet externally, with an ore chamber 7 feet wide at the bottom and 9 feet wide at the top and 16 feet high. The fire boxes were on the sides of the ore chamber, near the bottom, something like those of a quicksilver furnace. Over the grate at the bottom of the chamber was arranged a perforated iron pipe, through which steam could escape. The ore as it came from the mine was charged into this furnace and for fifty to seventy hours was roasted in the presence of superheated steam. It was the practice to heat the rock to redness, and to vary the temperature somewhat by turning in more or less steam. It was claimed that the sulphides were completely desulphurized by this process, and that the capacity of the stamps to crush the ore was doubled by it, but the strangest thing is that, though it was claimed that the gold now amalgamated readily, the quicksilver was lost. This experiment is said to have cost \$25,000, and was declared a failure.

## Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 15, 1904.

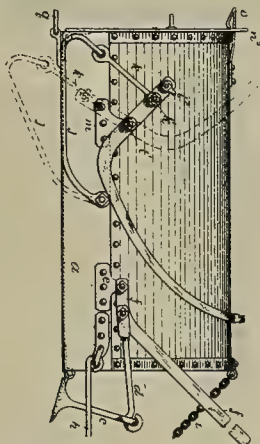
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

MINER'S SQUIB.—No. 774,269; E. C. Owens, Priceburg, Pa.



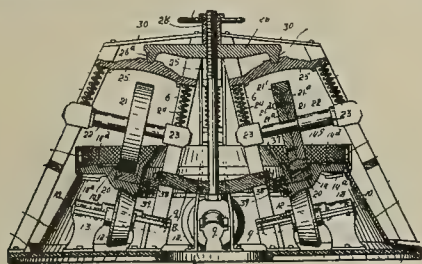
Blank for miners' squibs, consisting of strip of paper having unequally tapered edges at one end of same, whereby strip may be rolled into tube having tapering end, slits formed in and arranged at acute angle to one edge of strip, and means whereby tapered end blank may be unrolled and rolled again without disturbing tubular end of same.

EXCAVATING BUCKET.—No. 774,431; F. M. Ireland, Portland, Oregon.



Excavating bucket comprising semi-cylindrical body having flat bottom, plow plate b hinged to front edge of bottom, lever f pivoted to one side of body, rigid arm c on plow plate, link d connecting arm with lever f, so that plow plate may be suitably positioned and controlled by lever f, runners j pivoted to two sides of rear end of body, yoke-like lever l pivoted to body, links k connecting ends of lever l with movable ends of runners, and hooks or stops l<sup>2</sup> on lever ends, so that runners may be dropped, to tilt body on its front end by operating lever l, hinged door n, closing rear open end of body, latch therefor and bail h, and stay-chain i for perpendicularly suspending body from tackle.

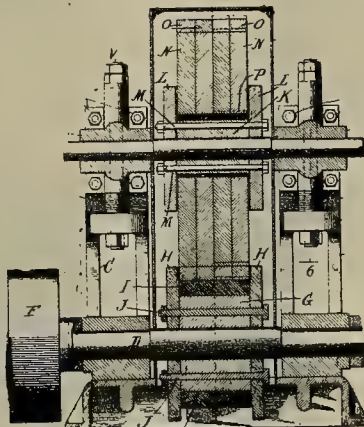
PULVERIZING MILL.—No. 775,130; J. H. Elspass, Los Angeles, Cal.



In pulverizing mill, combination with suitable frame, of circular rotary mortar whose pulverizing

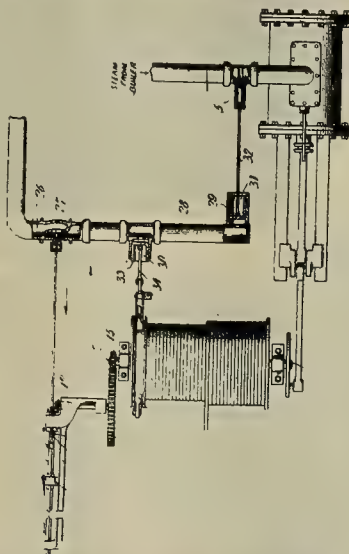
face is highest at its outer edge and inclined downwardly to its inner edge, and pulverizing rollers whose faces and axes are parallel with pulverizing face of mortar.

PULVERIZER.—No. 775,068; A. Raymond, Chicago, Ill.



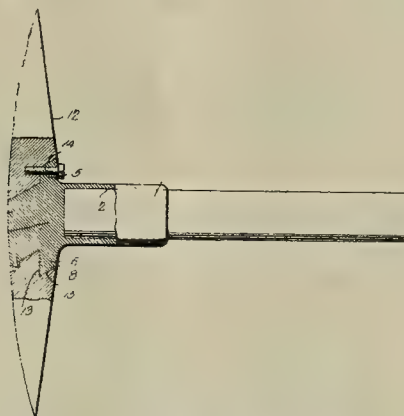
In pulverizer, the combination with a driving roller, of driven roller normally resting upon and rotated by frictional contact with driving roller, rollers being out of vertical alignment, driven rollers comprising plurality of disks each having central bore, hub of less diameter than bore of disks on which disks are mounted and have independent radial movement, hub having longitudinally arranged bolt openings, disks of smaller diameter than disks forming roller arranged at opposite sides of latter, and bolts passed through smaller diameter disks and bolt openings in hub.

SAFETY ATTACHMENT FOR HOISTING ENGINES.—No. 774,767; F. W. Lyon, Grand Junction, Colo.



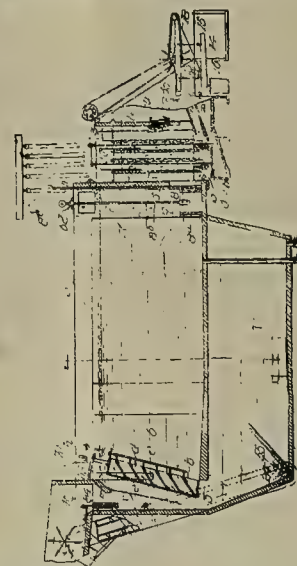
Combination with hoisting mechanism, including operating device, of screw shaft revoluble with hoisting mechanism, nut disposed on shaft and movable longitudinally thereof, means for holding nut from revoluble movement, pair of rods serving partly as guides for nut, tappet blocks disposed in path of movement of nut, and means connected to tappet blocks for cutting off actuating medium of operating device.

MINER'S PICK.—No. 774,748; W. H. Foley, Mapleton, Ill.



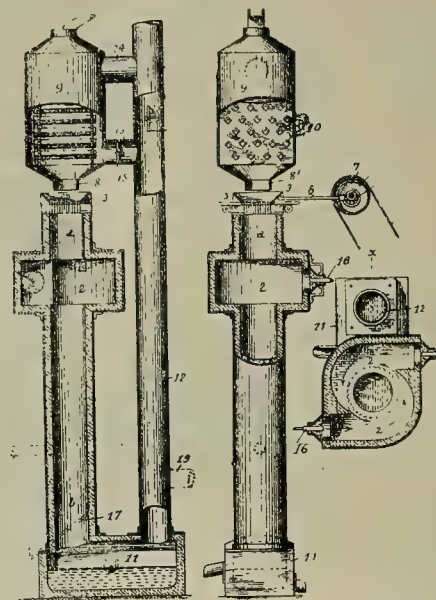
A handle socket for tools comprising a member having a slot and seat, of handle socket provided with tongue in slot, projection in seat and fastening device projecting through projection connecting socket and tool.

GOLD-SAVING APPARATUS.—No. 774,786; L. Sachse, Oroville, Cal.



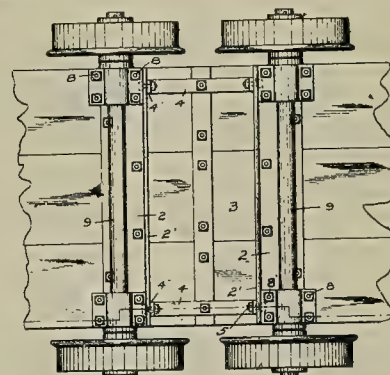
In gold-saving apparatus, combination, with tank having upper and lower compartments arranged one above other and having floor between them, compartments intercommunicating through an opening in floor, means restricting outflow from upper compartment; means vertically over opening adapted and arranged to intercept precipitates from such liquid through opening into lower compartment, and means for supplying current of water in opposition to downward current of water above opening in floor.

PROCESS OF REDUCING ORES.—No. 774,930; H. F. Brown, Oakland, Cal.



Process of reducing ores as continuous operation which consists in first passing ore in finely crushed or pulverized condition through non-whirling atmosphere, and subjecting highly heated ore to action of whirling heated atmosphere moving in same direction as travel of falling body of ore.

MINE CAR.—No. 775,007; F. C. Hockensmith, Pittsburgh, Pa.



In mine car, combination of car bottom, and truck, one of parts having openings closed on all sides, and other part having integral projections which interlock with such openings, whereby bottom and truck are held against lateral movement or displacement in any direction.



## The Extralateral Right Law.

TO THE EDITOR:—Having read the article on the above, together with other references on the same head, it may be permitted to say a few words.

That article would appear to state that while this law permitting the following of a vein through all dips, spurs and angles was undoubtedly fruitful of much litigation—in fact, more so than any other feature pertaining to the mining code—yet, despite all that can be said against such a law, those countries enjoying this harassing and disturbing element were undoubtedly in a far more vigorous state than other countries, where the blessed peace-assuring vertical side lines prevailed.

"It is a noticeable fact that in those countries where the extralateral right is not in force that there is less activity in mining." It is safe, then, to assume as a natural inference that this state of activity is, in a measure, due to this law, and is not merely a coincidence from the fact of its happening to prevail in those countries that are said to be in such a flourishing condition.

"As a rule, where the extralateral right is not in vogue mining is less active than in those regions where the law is in force." And yet, as a matter of fact, in those two districts mentioned—Michigan and the Transvaal—as being eminently suited to the extralateral right law, both are prospering under the beneficent sway of the vertical side lines. If this is the intended line of argument, backed with the flourishing mining industry of the United States as an example, it would doubtless admit of practical application elsewhere.

Looking for these flourishing communities of the extralateral right, where do we find them? Nowhere, in the writer's knowledge, amongst the leading mining countries outside of the United States and possessions, and in Rhodesia, an exception amongst British colonies. In South Africa, therefore, where we have in the Rand the vertical side and end lines, with a magnificent prosperity of the gold mining industry, the greatest the world has ever seen; and, in Rhodesia, where the industry never has assumed any magnitude, nor ever may, it would appear as if this argument were not thoroughly sustained.

We may be told next that what the mining industry requires at present in the Transvaal is not so much an increased labor supply, Kafir or Chinese, as the adoption of that inestimable elixir, the extralateral right law. Doubtless, such a ruling would have been welcomed in former days by the outcrop companies. But with what result to the mining industry of the Rand? Such is not difficult to foresee, for, with the right to follow these conglomerate beds to illimitable depth, it is inconceivable these companies would have showed the extreme vigor of the deep-deep companies in putting down shafts, half a mile in depth or over, in order to work these deeper deposits, in places several miles from the outcrop itself.

Look again at Australia, that great mining colony, also an excellent example of the working results of the vertical plane quadrilateral. Take, for example, the colony of Western Australia, where the writer remembers the days of 1895, when many thousands of hardy prospectors risked even their lives in their haste to prospect the waste places of that inhospitable colony, in the face of the most stringent labor regulations, which necessitated the continuous working of one man to six acres, and after approval one man to three acres, each man costing about \$15 to \$20 per week. Should such conditions be unfilled even for one day the claim was jumpable. Patents, even, were never procurable, the only title being the leasing from the Government for a term of twenty-one years. What was the consequence in spite of these severe conditions? The country was opened up; prospects were located by the thousand; and if more ground were required to protect the dip of the vein the depths of such claims were taken up; for, in that country, there is no such unpractical requisition as ore in place essential to mineral location, which at the most can but be regarded as a farce in the application of the mining regulations of the United States. Without doubt, every country has special requirements calling for special regulations; but, for universal application, it would be hard to devise a more unsatisfactory code of laws than those containing the law of the apex, and extralateral right, ore in place, side lines 300 feet on either side of the vein, for such in no way conforms with nature's provisions as typically illustrated world wide.

Are not Mexico, the Transvaal, Australia, Canada, all examples of prosperous mining communities; and are not all, to-day at least, examples of that just and equitable law of the vertical end and side line?

How, then, can that statement be maintained with regard to the evident prosperity of extralateral right countries being due to the stimulating influence of that law? Nay, rather, may it not be contended from a more comprehensive outlook that these few and unfortunately regulated countries with regard to their mining laws have flourished not by virtue, but actually despite such handicapping regulations.

Scientifically speaking, it is doubtful whether there exists always adequate data for formulating any

such law as that of the apex, for the simple reason that in a number of cases there is no readily ascertainable and incontrovertible apex. How then can there be formulated into a hard-and-fast law that which does not exist?

The writer has had experience in all these countries mentioned in mining, and has no hesitation in saying, in his opinion at least, that the vertical plane extension is a law uniformly equitable and just, and worthy of adoption by all mining countries.

The question is not one confined to the prospector; he has his rights undoubtedly, but the whole mining industry, infinitely greater, and the law that conduces to the benefit of that industry most should be that adopted by such a progressive and essentially practical people as those of the United States.

The writer well remembers attending the Mining Congress at Butte, two summers ago, as a delegate. At this Congress the Kearns bill, supported by Mr. Dignowity of Salt Lake City, was made a prominent feature, which bill aimed at the abolition of the extralateral right and the adoption of vertical side lines. The bill, as it stood, was not a complete remedy for the suggested defects of the present mining regulation, it is admitted; but certainly deserving of support until such a time as by amendment it is made more suited to the alleged needs and requirements.

That bill was hopelessly killed, although there must have been many of the mining men present in favor of it. The writer was amongst one of the largest delegations present, from a great Western mining State, whose chairman, in summing up the pros and cons of the bill influencing the attitude of that particular State thereto, spoke in some such discriminating words as these: "Here, boys, is a new bill; come, let's kill it." That State voted solidly against the bill and assisted in its general slaughter.

Surely such an important measure warranted a more enlightened discernment than was afforded it in this instance. Whilst doing a little lobbying previously in favor of the bill, the general objection seemed to be a want of fairness against the worthy prospector, doing him out of his just rights by cutting off the extension of his vein at depth. It never seemed to occur to these individuals that other features of the present law would need altering as well—necessarily that referring to ore in place; and that, therefore, not only in length but in width also, the blocks obtainable by any one man could be unlimited; so that there would not necessarily be any occasion for the prospector to ever part with his beloved vein, even at depth.

The most painfully grotesque feature of the situation lay in the fact that there in the city of Butte—than which there is no more stupendous monument to the harassing effects of the existing law of the apex, in a mining district where most, if not all, the principal mines were then tied up by long and bitter legal controversy directly resultant from this law, and where geologists were ranged on either hand in serried ranks, prepared to construct and destroy apices to order—there, then, was this assembly of the mining interests of America in solemn conclave sitting, actually found engaged in killing that measure that would have rendered such another painful and disgraceful episode as that of Butte absolutely impossible; and they killed it—killed it as dead as the proverbial door-nail.

It is to be hoped that coming mining Congresses will take a more comprehensive view—and also the American miner—so that the many defective features in the present mining regulations may be amended, and be brought at least up to the standard of other advanced and progressive mining communities.

H. E. WEST.

Matagalpa, Nicaragua, Central America, Oct. 10.

TO THE EDITOR:—On the subject of extralateral mining rights, I am so impressed with the advantages of the American law on this point, and so certain that disaster to the industry would follow if it were altered, that I will trespass on your space briefly to state the arguments as they appear to me, for the consideration of Mr. Boss and others who think with him.

A mining law, to be of the greatest benefit to those who operate under it and to the country in general, must be construed with regard to the nature of metal mining as an industry. This seems to be self-evident. Let us now examine the inherent nature of the business. The first step, of course, is to find the mine. This is done by a special class of men—prospectors. They are not scientists, engineers, capitalists, merchants, nor even miners. We all know that the average prospector rarely sinks a 50-foot shaft without having it cave in, for shaft sinking is not his business. His forte is traveling over the surface, observing the outcroppings rocks, and looking up particles of float. He is usually a man of nomadic habits, but full to the eyes with hope, optimism, and curiosity as to minerals. He is a wanderer and theorist, and it is these very temperamental characteristics that keeps him in the open, that sends him into vacant and unexplored lands where no one will go but himself, and his self-appointed function is to find the indications or outcroppings of lodes and deposits. Having found one, his next desire is usually

to sell it and start on the search of another. He rarely cares to settle down and mine, or even open his discovery. A 10-foot shaft or a shallow trench displaying the ore sufficiently to enable him to get out a good line of specimens, represents about the limits of his working tendencies.

Now this man is at the very foundation of the industry. Without him the mines will not be discovered. Neither you nor I have the time nor inclination to do his work, but, after he has found his mine, if he shows us a lot of fine specimens from it, how ready we are to go and examine it. And if on inspection our experience in mining leads us to believe that money can be made out of it, either by working or by developing for a sale, how eager we are to buy. A good mining law then must primarily and above all things afford encouragement to this kind of a man, which means:

First, that when he makes a discovery, he shall be able to acquire enough of it to have something that you and I will care to buy, and

Second, that the acts of location, and of initiating a title, shall be simple and inexpensive.

Now the American mining law—for which we can not as a nation be too grateful—does just these two things. It gives the prospector his vein indefinitely as it goes down into the earth, thus including all those pleasing possibilities that satisfy his optimistic temperament, and excite in others all sorts of beliefs as to what may be found by development. Moreover, the costs of location are a mere bagatelle, and the process of marking the boundaries extremely simple.

But observe the different conditions under a vertical boundary law. If the vein turns out to be a flat one, or to dip at an angle of even 45°, the discoverer has only a few hundred feet of its downward extension to offer you, and you rarely care to buy such a small thing, even though there be several claims along the strike. Or, if the prospector finds out these physical peculiarities himself, his only safeguard is in the location of one or more side line claims, involving increased expense in first cost and title maintenance. And, if these precautions are postponed or neglected, others quickly step in and locate alongside of him, and get the benefit of his discovery except as to the little piece of ore in the apex claim. In each event the prospector is discouraged; he loses his fair reward, and soon disappears. This means that the country goes unprospected, which is the greatest possible misfortune.

The second step in mining is the development of the lode or deposit. When this operation is thoughtfully done the strike is carefully traced out the first thing, and if necessary the corner stakes are moved so as to make sure of covering the apex. Or, if that is not possible by reason of adjoining claimants, attempts are made to bond or buy the latter. In other words, if the miner or mine operator is an average good business man, and exercises ordinary prudence at the inception of his mining operations, there is nothing in the system of extralateral rights that need cause him serious trouble.

The legal difficulties attendant on a definition of such rights, when preliminary precautions are neglected, are numerous and need not be minimized. The results in the past have at times been most aggravating and unfortunate, but, in extenuation, the following may be said:

There are always two sides to a mining litigation—a winner as well as a loser.

There is nothing that advertises a mining district so well, scatters money so freely, attracts new population so briskly, and creates such general local good times as a first-class mining lawsuit.

After a quarter of a century of litigation, nearly all the legal points that can arise under the dogma of extralateral rights have been carried to the higher courts and decided. Thus American mining law is now a body of well established precedents, under which litigation is rapidly decreasing. We cannot expect that legal causes of action will ever disappear, or that questions of fact will not continue to arise, but now that the laws of the industry are on as good a foundation as those of any other line of activity, all possible reasons for a change to a vertical boundary law seem to me to have disappeared.

Whoever impartially examines into the condition of metal mining in all parts of the world will, I am confident, be compelled to admit that nowhere does the progress of discovery begin to compare with that in our own land. It is only necessary to cross the boundary lines a mile into Mexico on one side, and Canada on the other, to note the astonishing difference. Of course some of this is due also to other causes not necessary to go into at this time. In Australia, New Zealand and South Africa, though production is large, it is confined mainly to gold, and the great bulk of the metal comes from a few rich spots, proclaiming the fact that the country is not well prospected. There are no prospectors in South Africa, and very few in Australasia, in spite of the bounties offered by the governments. The Mexican laws in point of liberality come next to those of America, but it is difficult to find the real prospector across the southern line. Many of those who have gone over have degenerated into company claim locators. There is little individual prospecting and mining in Mexico in spite of the fact that it is one of the richest mineral regions on the globe. Compare



the brisk status of the industry in California, Arizona and New Mexico with the situation in Baja California, Sonora and Chihuahua. Though these latter are quite as rich in mineral resources, and are living under an otherwise good law, many of the mines in operation are but reopenings of old Spanish discoveries, and are being run by foreign corporations.

THEO. F. VAN WAGENEN.

Bulawayo, Rhodesia, South Africa, Oct. 14.

The above, received this week from Central America and South Africa, illustrate the widespread interest continuously manifested in the question under discussion; a question of interest to every mining man the world over.

## The New Gold Camps of Southern Nevada.\*

[FROM A STAFF CORRESPONDENT].

**GOLDFIELD.**—Goldfield district, as developed to date, may be best described as lying in the form of a horseshoe, or arc of a circle, a possible cause being that this mineralization may mark the rim of an ancient crater. This zone is little more than a mile wide and has a diameter of about 3 miles, with the open side to the east. The northern point begins at Diamondfield with the Black butte, which is what its name signifies. The zone swings from here westward, marked by such properties as the Quartzite, Vernal, Daisy, Palace, Great Bend, Goldfield Tonopah, Tonopah Club and Adams to the Sandstorm, thence south to Columbia mountain, and the January, Combination, Jumbo, Florence, St. Ives, Velvet and hundreds of lesser note, and easterly to the Blue Bull, Lone Star and Tin Horn with many other properties being prospected. Almost anywhere within this magic circle surface values can be found and the great puzzle is to determine where to sink—no small consideration in a large territory of erupted country, where a few feet may miss the ledge.

Inside the circle are Vindicator and Banner mountains. Every square foot of country on every side is located and surface indications are almost equally good throughout the district, being even less promising on some of the phenomenally rich strikes than at other places. The country rock in general is rhy-

the surface, and it is stated that its development will be regularly taken up shortly. On the Spokane a shaft is being sunk in which considerable water has been encountered at 80 feet. The Palace Co. has several prospect shafts in which good ore has been struck and the work is being carried on under direction of T. W. Webb. The property is owned by H. D. Allert of Langdon, N. D. The greatest depth attained is 65 feet, and enough has been developed to insure that it is at least a good low-grade proposition. On the hill west of the Palace is the property of the Goldfield-Great Bend M. Co., in charge of V. P. Strange. It has immense surface croppings of iron, and consists of five claims and two fractions. No leasing is done on the property but ten men are employed on development. There are two shafts, one 75 feet, the other 40 feet, with about 150 feet of



Columnar Andesite Near Tonopah, Nevada.

The Sandstorm group occupies the saddle between the two hills lying just north of Columbia mountain and overlooking the dry wash that extends from Goldfield northerly to Tonopah and beyond. The northernmost claim of the group is now the property of the Kendall M. Co., 300 feet of which is under lease to T. L. Oddie and M. C. Gardner, Jr., known as the Sandstorm lease, which runs until the 5th of September, 1905. A one fourth interest in the lease is held jointly by J. Duffield, George W. Richard and M. E. Ish. The rich deposit on this lease was found within 50 feet of its south end line. Soil gathered on the surface netted \$8800. One shipment of fifteen tons of ore netted \$80,000, and another of ten tons netted \$15,000. Nothing has been shipped under \$250 per ton, and about 100 tons of this is now on the dump. At present twelve men are employed. A gasoline hoist is on the ground and will soon be in operation. A shaft, now 60 feet in depth, is being sunk by contract. The ledge crops along the entire ridge and dips to the east at an angle of about 75°. The shaft is being sunk over this with a purpose of crosscutting to it from the several levels and encountering the ledge directly at 400 to 500 feet, opening enough ground to work during the life of the lease. A blind ledge has been encountered in this shaft carrying from \$50 to \$80 values. The ledge matter is an altered rhyolite, through which run quartz veins carrying free gold in an iron oxide matrix.

On the Sandstorm proper are several leasers, and while, as yet, nothing has been encountered in shipping quantities, there is reason to believe that other strikes may be made. The entire ledge for 300 feet wide carries fair values in milling ore.

M. C. Gardner, Jr., Percy Gardner and other leasers have machinery for a 10-stamp mill now in transit which will be installed at Columbia as a custom mill. It will be equipped with plates and vanners and will be ready to operate within sixty days. Water for this will be supplied by a company of Eastern capitalists, who are developing water 10 miles north of Columbia. This plant will involve an outlay of about \$200,000 and will have a capacity of 500,000 to 750,000 gallons per day. Storage tanks will be erected at both ends of the line. A 14-inch pipe line will be laid and it will have an 850-foot lift from the pumps to the mill.

On the south slope of Columbia mountain Curtis & Ridge are installing a gasoline hoist on the Midnight property. Active development is under way by the



Fault Scarp at Goldfield, Nevada.



Jumbo Mine, Goldfield, Nevada.

lite. There is a general silicification of vein matter with much fissuring and faulting, which continued, has brought about a secondary silicification with deposition of values. The ore is unique for Nevada, being almost entirely gold bearing, while Tonopah and Nevada in general produce mostly silver.

In giving a detailed account of the district it will probably permit of a better grasp of the situation to again begin at Black butte and follow the circle around.

The Goldfield-Black Butte M. Co. covers the butte proper. It is developed by tunnel and shaft, a large body of milling ore, which is improving with depth, offering the hope that it may also be a shipping proposition.

On the north slope of Black butte the Diamondfield G. M. Co. has three claims. It is an incorporated company, of which G. Nixon of Winnemucca, Nev., is president. A lease on the property was taken in June by B. J. Riley, A. J. Poak, C. Krise and M. Robinson and a strike of ore was made in August. Fifty tons have been shipped to date, of a value of \$400 to \$500 per ton. Work is being carried on under Superintendent F. Chapman and, while only a horse whim is in use, development shows up large bodies of milling ore.

The Daisy Fracture and Vernal are doing development work, with encouraging prospects. The Daisy has been trenced and more or less prospected on

crosscutting and drifting. Some shipping ore is developed and prospecting both by surface trenching and underground is being carried on.

The Goldfield-Tonopah M. Co. is sinking a shaft in the dry wash under which the Great Bend ledge dips to come up again on the other side where it is covered by the Red Butte group, owned by W. H. Rouse, and farther west the Conqueror M. Co., on the Tonopah Club claim, a rich strike has been made. The Goldfield-Tonopah M. Co., owned by K. M. Jackson, J. B. Lindsay and Superintendent S. F. Lindsay, has a shaft down 60 feet and is going on to 100 feet, at the same time crosscutting on the 50-foot level. Values up to \$80 have been found.

Superintendent E. Heuback, of the Adams & Conqueror Cos., is carrying on development by surface trenching and sinking. On the Conqueror some ore is being sacked. A shaft (now down 25 feet) is being sunk on the hanging wall. The ledge is about 40 feet wide, paralleling the Sandstorm, and also dipping east. The property consists of two claims, the Tonopah Club and Bonanza, on the former of which the rich strike was made. It is owned by J. R. Duffield, M. E. Ish, H. Weber, E. Heuback, J. P. Hennessey and G. Wingfield. The above partially covers the Diamondfield district, in which there have as yet been no discoveries of phenomenal values, but throughout which there seems to have been less volcanic disturbance than in any other part of the district. The ledges are more in place, better defined and values apparently more uniform.

Red Top M. Co., the Silver Pick M. Co. and the Mohawk M. Co.; on the first named by the company and by leasers on the others.

This brings us to the property of the Goldfield M. Co. made famous by the strike on the January. Owners are R. L. Johns, H. T. Bragdon, A. C. Eisen, J. R. Duffield and M. N. Clark. A lease was taken on the January claim the 7th of last January by L. L. Patrick and John Jones, one-third each, the remaining third being held by B. J. Riley and Z. Kendall. January 22d ore was struck and there has been shipped to date ore to a net value of \$310,000, with 8000 to 9000 tons of milling on the dump of an average value of \$40 per ton. Nothing is shipped carrying less than \$100 per ton, and that shipped has averaged \$200 per ton. There are two shafts, one 200 feet, the other 240 feet deep, and about 350 feet of drifting. Stopping and shipping will be rushed until the expiration of the lease, January 10th, next. A 30 H. P. steam hoist is now employed. Freight, shipping, treatment and costs average about \$35 per ton. An assay office is connected with the mine and shipments are closely checked. In addition to this lease the Goldfield M. Co. owns two claims adjoining the Adams group and three, the September, October and St. Paul, adjoining the Portland group.

Next to the January is the property of the Combination Mines Co., an incorporated company of which J. D. Hubbard of Chicago is president. The company is working its own property sinking a shaft, now down about 300 feet, on which is installed a gaso-

\* See illustration on front page.



line hoist. It is stated that the mine to date has produced about \$400,000. The company is building a 10-stamp mill at the mine, which is being constructed in two 5-stamp sections, one to be used in treating ore from the mine, the other to work on custom ore. The construction is under superintendence of Ira Bess, for Harron, Richard & McCone of San Francisco, Cal. It employs the cantilever construction of stamps the same as installed in the Midway mill at Tonopah last year. Amalgamation, including the Huntington, concentration and grinding will be method of extraction. The stamps weigh 1500 pounds, mortar buckets are of concrete. Water is being piped from a small spring 11 miles northwest. The construction has been much delayed by lack of building material, but it is expected that the mill will be in operation by next February.

The mine on the Fortune held by J. P. Sweeney, F. F. Athan, W. W. Haines and G. W. Dargan, has been one of the most productive of the district. Ore was discovered by Mr. Sweeney on the property last November and after an ineffectual attempt to buy the property it was finally leased last January. Work began in February and shipping ore was extracted from the start. The ore is at first to about a point within 15 feet of surface and at each level below it has lengthened uniformly until on the 200 level it is about 50 feet long with a strong vein 4 feet to 6 feet wide. To date about \$250,000 has been extracted, with \$100,000 sacked and ready for shipment, while production goes on at the rate of 200 to 300 sacks per day, and all so far from the 200 level and above. The shaft is now down 250 feet and will permit another 50 feet of drifting and stowing. In the sulphide zone, which comes in between the 150 and 200 foot levels, the vein shows a very uniform enrichment and is all good mining ore. No effort has been made to stay closely with the main ore shoot. The 200-foot level was drifted 60 feet and there interrupted by another shoot, which, while not yet exploited, is believed to be about the size of the present one and as rich. The ore shipped averages about \$300 per ton, though one shipment of 928 sacks averaged \$724 per ton. About sixty men are now employed in three shifts. The ore is shipped to the Western Ore Purchasing Co. at Reno, Nev., and to Salt Lake, Utah.

The Junco M. Co., owned by J. McKane, C. D. Taylor, H. Taylor, Geo. McCollan and Geo. Kernick, has been exploited entirely by leasers, and has in the aggregate produced more than any other property at Goldfield. The Bowers-McKane lease is credited with a gross production of \$550,000, the Fuller McDonald, \$200,000, the Richard, \$40,000, the Vermilyea, \$40,000, the Curtis & Ridge, \$150,000. The last three are approximate, not official, and figures for the Zion lease cannot be stated exactly, but will run the production of this wonderful property well along into the second million.

The Richard, Vermilyea and Curtis & Ridge leases have expired. The Fuller McDonald is tied up with an injunction owing to internal disagreement, leaving only the Bowers-McKane and the Zion leases working. The former runs to January, the latter to April 30, 1905.

The Bowers lease has a 250-foot shaft, from which a drift will be run to the vein, opening new ground. From the 200 foot level to the surface it has been stowed out with exception of some pillars of ore. In this, as throughout the district, little or no timbering has been done, it being impossible to procure timbers. From one pocket, approximately 7x13 feet, \$30,000 was extracted.

The Fuller lease has a shaft 175 feet deep, with 125 feet of crosscutting and 150 feet of drifting. The vein varies from a few inches to 20 feet in width and dips to the east at an angle of 30°. Veins of the district run approximately north and south.

The Zion lease has sent fifty-four tons to Seloa. During October 115 tons were shipped that yielded \$50,000, and the shipments bring \$500 to \$400 per ton regularly. On it is a 100-foot shaft, with about 400 feet of crosscutting and drifting. Considerable milling ore is on the dump.

The St. Ives is another property of immense surface showing. It has been in the hands of various leasers and some ore has been shipped from it.

G. R. L. L. and G. W. Richards, G. Lewis, W. J. Douglass and K. Jackson have a lease of 300 feet on the Yankee Doodle claim, on which is an 80-foot shaft and 5 feet of drifting. The pay streak is from 3 inches to 6 inches wide. Ten tons of ore now sacked on the dump average about \$500 per ton. The lease expires January 15th next. Seven men are employed in two shifts. Production of the St. Ives is probably conservatively \$25,000.

From the St. Ives is a short step to the Velvet M. Co., on which are several leases. No. 1 lease is being worked by Messrs. Rickert, Shea and Charles Taylor. It was here that the strike was made in the Puma, and a heap of surface soil on the spot is said to be worth \$10,000. Other leases on the property are being developed, but no shipping ore yet encountered.

Farther east on the Lazy George Lemley & Hughey leasers, recently had a \$29,000 assay at the bottom of a 35-foot shaft. As yet they have failed to locate the pay streak.

East of this the Lone Star, which recently changed hands, has had some good showings. Several leasers are working it.

South of the Lone Star, on the Base But, a strike was made in 1901, about 1/2 mile as the line goes from the fraction. This fraction was bought by the miners who made the find. The Base But M. Co. is now operating off on the H. Ramsey, C. Peters, H. C. Moore, G. Niles and T. F. Dunsay. The property consists of eight acres. Eight men are working it in places and the company has a 30-foot shaft and 100 feet of crosscutting with H. C. Moore's superintendent. It has most of the Goldfield properties it has been mining and prospected by surface tracking, that is to say the first economic way of locating ledges which is to map across the surface.

The Empire M. Co., adjoining the Lone Star on the north, has one shaft and three fractions. It is owned by Weber, I. O'Brien & Mitchell. Two leasers are working. The company is also surface-tracking and sinking a shaft. The ledge, as opened, shows good values.

The Kanganee M. Co. owns a claim and fraction between Winchester and Banner mountains, on which a ledge 6 feet wide has been developed.

On the north end of Mediator the Black Ant M. Co. has two claims and a 40-foot shaft. The same company owns three claims adjoining the Vernal at Diamondfield, on which is a 35-foot shaft. Owners are Ish. Dougherty, D. H. Reynolds & Weber.

Between Goldfield and Columbia is a group of 12 claims owned by G. S. Phoenix. With a 150-foot shaft and 400 feet of crosscutting he has developed some of the ledges and opened up some mining ore. The property is deeply covered with wash which may overlie an extension of the January or other power ledges. The property is known as the Esmeralda M. Co.

All of this territory is in a highly disturbed state, and while phenomenally rich ore has been taken from the surface over a large area, nothing can yet be stated as to what may be expected with depth. The development has been extremely rapid in spite of the obstacles, but almost co-systematic, methodical mining has been done.

Goldfield itself has sprung from a camp of a few tents to a town of 1000 or 2000 people within the year, with Columbia as a thriving suburb, and smaller centers at Diamondfield, Junco and Milltown. Lumber has been had to get out wherever possible, the improvements have been of a substantial nature, in some cases stone and adobe being utilized. Almost every class of business is well represented, and, considering its isolation, living is fairly good and rates not exorbitant. The town water, supplied by springs near town, and a few wells in town, is very good. There is comparatively little sickness as yet outside of an epidemic of colds. The outbreak of an epidemic would mean great hardship, as there would be scant accommodations for the sick. Also, there is the ever-present danger of fire, with which there is no water to combat, and no insurance protection can be had.

Therefore, the winter at Goldfield resolves itself largely into a matter of luck. There is no work for the crowds that are now there, and there will probably be even less as the leases expire. The production is liable to fall very low during the first months of the year.

With proper equipment the country south offers a great field for the prospector, but too much stress cannot be laid on its dangers and difficulties with the return of hot weather.

The miner at Goldfield receives \$4 per day, as also does the laborer, when work can be obtained.

An electric light plant is being installed; also a brewery is being built, and some good rooming and apartment houses, but at present accommodations are not good. There are few rooms to be had, and these are worth \$1.50 per day. There are many tent lodging-houses, some having only a common room, some partitioned off, seating for 75 cents to \$1 per day. Owing to the scarcity of lumber this state of things cannot be remedied altogether this winter. With another year of prosperity Goldfield will be the metropolis of this Nevada desert, especially should the proposed railroads be built—one, the extension from Tonopah, the other the branch from Borate, 16 miles from Daguerre, through Bullfrog to Goldfield and Tonopah.

BANNER DISTRICT.—Early possibilities of Goldfield have now passed largely into permanent hands. Its story is already ancient history, and the later romances are rushing through it with marvellous rapidity. The name to conjure with now is Bullfrog. Nobody knows just what Bullfrog has to offer, and this rather hazy story has more power of attraction than a more definite knowledge would exert. This state of affairs is a reflection of the meteoric rise of Goldfield, and is speedily fostered by real estate dealers, who already have plotted four towns in the shifting sands of the Amargosa desert and are booming choice corner lots with as much gusto as if they located in the heart of Los Angeles or San Francisco.

It is needless to say that they have a speculative value, or, also, that the district has great prospective value. Good mines undoubtedly will be discovered and developed, but the desert is not yet entirely robbed of its terrors, and to prospect it thoroughly requires forethought, preparation and plenty of money. The prospector who goes in with a rush is likely to come out the same way.

On the eastern slope of Death valley rises a chain

of hills cut by a canyon through which flows Funeral creek. South of this the range is known as Funeral mountains. North of it are the Grapentine mountains.

Last June a strike was made in the Funeral range, known as Kears's Window, which is a promising development and gives promise of being a good low-grade proposition—just what value and quantity it is not safe to say, perhaps large quantities of \$15 to \$25 rock may be found.

This is near the mouth of Funeral creek, where it rises from Death valley. On the 24th of last August E. Cross and F. Harris found and located Bullfrog, 20 miles north of Kears's Window, in the Grapentine range. This link in the mineral chain which apparently extends from Tonopah and stretched to second light across the Colorado down through Arizona has caused widespread interest in this hitherto almost inaccessible region.

Cross's San Jose road at Tonopah is within 50 miles of Bullfrog, and that is probably the best way in, but the crowd is growing into numbers and continuing southward to it, stopping very long en route to buy an outfit. Another way is by way of Mesquite and Kears, but this is the most tedious of the three.

From Goldfield this is 10 miles in the town where water may be had. Just beyond this the road forks, one branch continuing south to Copper Hills, 20 miles, and 20 miles farther on it again connects with the other fork, which has made a detour to the west to Thorpe's quartz mine. This detour is 6 miles longer than the direct road, but the water at Thorpe's is better than at the Hills. Continuing a short distance is Indian Camp, from which it is only 2 miles to Howell's farm, 4 miles to Davis farm, 3 miles to Beatty's farm, 3 miles to Good Center—a townsite laid out on the Amargosa river—5 miles to Amargosa townsite and 2 miles to Bullfrog, a total distance of 45 or 51 miles, depending on the route taken. Recently a new route has been opened directly to Bullfrog. Leaving the main road just after the two forks come together the cutoff bears to the right, reaching Bullfrog within 20 miles. This is said to be a shorter and easier route.

The Bullfrog Mines Syndicate owns Bullfrog No. 1 and No. 2 and a water claim. The company is incorporated under the laws of Arizona, with 1,000,000 shares—300,000 in the treasury. It is owned by J. W. McGalliard, M. Dech, W. Fray, E. Cross, R. Lanka and P. E. O'Brien, each holding a one-sixth interest. A contract has been let for a 300-foot shaft and it is now being sunk. The ledge cropping is 50 feet long and of unknown width. Assays from the surface have run from a few dollars to \$625, \$800, \$1100, and one \$2085. The owners expect a low-grade, milling ore proposition to be developed from it.

Four and one-half miles east of Bullfrog is the Bullfrog Mining Co., the original Beatty & Ladd strike, which is now reported to be prospecting its large ledge with fifteen men. So far as prospecting the ledge carries values throughout. H. H. Carr of the January mine is a large stockholder.

The Bell & Jones strike, 3 miles northwest of Bullfrog, is assaying well and has a strong ledge 12 to 14 feet wide.

A bond has recently been taken on a group of claims adjoining the Bullfrog mine by Goldfield parties, who will proceed immediately with development work.

There are a store and tents at Bullfrog, and also at Beatty's farm, and about 500 men are estimated to be now on the ground, with the number daily increasing.

Three springs have been developed about 3 miles above the town and pipe will soon be laid to convey the water. It will have a fall of 575 feet and be in quantity sufficient for domestic purposes of the camp.

The ore of the district carries some silver and copper, with gold predominating. It is a grayish-white quartz. A general characteristic of the ledges of the district is their large size and strength, and it is the general opinion that large low-grade, milling propositions will be the outcome of their development.

GOLD CHARTER.—The business of another mining camp has been termed at Good Center, 20 miles southeast of Goldfield. Curtis & Ridge have several claims and on one side have a 40-foot shaft with considerable crosscutting and drifting and are preparing to sink one. They have a 1-foot vein and one foot runs from \$40 to \$240. In this district Wright & Marshall recently made a strike on their property and are developing.

I. P. Sanders and O. C. Inman have six claims, on which they have sunk a 40-foot shaft and are crosscutting. They have a 30-foot vein of ore which shows up well at the bottom of the shaft, and have recently six sacks of ore on the dump that averages \$240 per ton.

The Crater is eight miles in diameter, the rim rock rises on three sides, but occasionally by deepness and has been eroded on one south. Trend of the veins of the district is northwest and southeast. Considerable prospecting is being done at the neighborhood and the surface indications are promising for the existence of good ore bodies.

SEASONABLE CAME.—As is natural the excitement about Goldfield has infused itself into the other surrounding camps. Elmore east and north of Goldfield, about 15 miles, has several good prospects



on which more or less work is being done. Gold Hill, a few miles south of Tonopah is receiving considerable attention also.

**LIBERTY DISTRICT.**—This is 17 miles north of Tonopah, and has several excellent properties. Among them The Tonopah-Utica M. Co., owned by Salt Lake parties, is now being surveyed and patented, and some development work is being done. There is a 35-foot shaft on the property and considerable cross-cutting on the surface for leads is being done.

The Tonopah Liberty Co., under Superintendent W. C. Wynkoop is doing some work. It is owned by Cramp & Sons of Philadelphia. About \$60,000 has been spent in developing the property on which there is a shaft 485 feet deep and a carload of ore was shipped netting \$219 per ton. The ledge is 6 feet to 8 feet wide, pay streak 48 inches wide. Ore carries gold and silver and averages \$40 to \$60 per ton.

The Tonopah-Independence, consisting of six claims, is owned by D. G. Doubleday, C. F. Maunder, Mr. Kramer, and others. On it is a contact ledge, with three ore shoots that assay \$15 to \$35 per ton on the surface. As yet only assessment work has been done on it. There is water within a mile, and plenty of wood for timbering and domestic uses. It is 15 miles from the Tonopah railroad.

**TONOPAH.**—Tonopah is receiving little attention just now more than as a point of departure for the south. Nevertheless a great deal of quiet work is being done that will put the silver camp in the front rank of producers as soon as the railroad is able to handle the freight. Spurs are being built to all the old dumps to facilitate loading, and ore is being blocked out under ground against the time when it can be hoisted and handled. The Tonopah M. Co., owning the Mizpah and Valley View ledges, is thus far the most important of the district. The ledges parallel and trend east and west, the Mizpah dipping 70° to the north and the Valley View with a dip of 45°. These are believed to come together, and from the 926-foot shaft on the Mizpah it is expected the point of junction will soon be cut. The Mizpah ledge is 20 feet wide and carries high values in silver. On the eastern extension of the Mizpah is the Belmont which, under Superintendent J. J. Jordan, is hoisting some high-grade ore. Recently a spur has been built to the dump and shipping will be carried on as fast as the railroad can handle the ore.

On the western extension of the Mizpah ledge is the Tonopah extension M. Co., owned by Charles Schwab and managed by John McKane. Just now it is sacking and shipping the highest grade ore the district has yet produced.

The McNamara, adjoining it on the south, is also getting some good ore.

North of the Mizpah and a little higher up the slope of Mt. Oddie, the Montana Tonopah M. Co. is operating on the Montana ledges, which parallel the Mizpah and are strong ledges carrying good silver values. Above the Montana is the North Star on which a great deal of work has been done, but the property is now tied up by litigation.

North of Tonopah the Golden Anchor Co. and the Pittsburg Tonopah M. Co., both Schwab properties, are being developed, being down in shafts between 500 and 600 feet.

The Little Tonopah (officially the Electro-Geodetic M. Co.) is also operating on the outskirts of the field, with a shaft now down over 600 feet, and a larger hoist is soon to be installed, which will carry it deeper. Considerable water is being developed in the shaft. The Midway mine, near the Mizpah, is being developed and its 10-stamp mill is now working on custom ore.

South of Tonopah a strike was recently reported in the California Tonopah M. Co.'s shaft, but its truth is not yet assured.

The Rescue M. Co., southeast of town, is doing development work. The shaft is now down 375 feet. A mile southeast of this the Halifax Co. is doing considerable development work.

Tonopah has substantial, developed ore bodies that assure her prosperity for years to come, but the greatest need of the district is a reduction works to handle this ore at home and save the heavy transportation charges. If this is supplied the excitement that carries the crowds on to the south will not in the least affect her steady-going prosperity. Even with the heavy freight charges, there are large quantities of ore that will net a handsome profit to the owners.

### New Timber Seasoning Stations.

The extensive experiments which have been made and which are to be made under direction of Government experts in the preservation of timber, are of more than passing interest to miners in consideration of the vast amount of timber which goes underground into mines annually.

The Bureau of Forestry has recently signed an agreement to make extensive timber seasoning tests in two Western States in co-operation with two telegraph and telephone companies. Experimental stations will be located at Marinette, Wis., and Escanaba, Mich., and probably a third station will be established at Ashland, Wis. The expense of the experiments will be borne jointly by the Bureau and the companies. Cedar and tamarack telephone and

telegraph poles will be furnished by the State of Wisconsin free of cost, and two railroad companies have agreed to haul them to the experiment stations without charge for freight.

The object of the experiments is to determine how many years can be added to the life of each pole by proper seasoning. Since millions upon millions of poles are used along telegraph and telephone lines, even one year's extra service for each pole will amount to a tremendous saving in expense. Unseasoned cedar poles last from twelve to fifteen years. Seasoning experiments have shown how to increase this time by three or four years, and it is now expected to improve on this increase. Past methods of seasoning have effected a drying out of 20% of the original weight of the poles. The better seasoned the pole, the less chance there is for decay, which is promoted by moisture.

Such experiments are of large importance not only to telegraph and telephone companies, but to all users of heavy timbers which come in contact with the ground, at which line decay gets in its most deadly work. It is believed that still greater economies can be secured by the use of proper methods of preservative treatment. The latter is a subject which the Bureau of Forestry has for some time been investigating, as set forth in its Bulletin No. 41, "Seasoning of Timber," and other publications. Further bulletins dealing with different aspects of the same problem will be issued later.

### A Dredging Wagon.

The Soo Nome Mining Co. of Alaska has had a machine built by the Quincy, Ill., Electric Wheel Works which is the only one of its kind in existence. It might be termed a dredging wagon, as it is mounted upon and is moved by wheels. The plan is to use the machine for beach dredging, it being designed to stand stationary among the breakers. The iron wheels are 8 feet in diameter, 64 spokes to the wheels,



A Dredger on Wheels.

which have tires 24 inches wide,  $\frac{3}{4}$ -inch thick; forward wheels track 16 feet; the rear wheels 14 feet. The difference in trackage is to provide room for two carriages which work in front, one running lengthwise, which projects 7 feet out from the wheels, and the other running crosswise, requiring a 7-foot projecting distance each way for its movements. The machine is presumed to have a capacity of sixty yards per hour. It will be run by a 35 H. P. gasoline engine and will have one 6-inch centrifugal pump to draw sand and gravel through 30 feet of suction hose, the discharge pump to be made in a cone or gold separator 16 feet in front of the pump. The cone is vertical, 6x6 at the top, 3 feet 10 inches deep. It is arranged so that most of the sand and gravel will overflow from the top; at a depth of 18 inches there are valves on either side. This cone is the only invention of its kind now in existence and is patented by the inventor, R. J. McKoene of Sault Ste. Marie, Mich. The nozzle of the hose is held by a stiff leg. The calculations are to cut holes in the beach 7 feet square and down to bedrock with the machine. The machine is 10 feet in width and on either side has 6-inch I-beams 30 feet in length. Its entire construction is of iron; it weighs ten tons.

### Separation of Blende From Pyrite.

A new zinc process was recently devised by C. V. Potter, and now in use on one of the Broken Hill mines, which is described as follows by the Australian Mining Standard: Dry ore in a fine state of division

is fed in a thin stream into a hot dilute acid solution contained in a shallow vessel which forms the body of the machine. The ore is drawn along the bottom of this vessel and discharged by rakes formed of wire attached to suitable chains. The bottom of the machine is covered by deflector plates arising from a short distance above it. Some of the plates are joined together at the bottom, forming troughs, while the adjacent plates overlap them, leaving a small space between at the top. As the ore passes along, the action of the acid upon it generates gas, the bubbles of which attach themselves to the zinc-blende and raise the particles to the surface, the gas there disperses and the blende falls into the trough, along which it is drawn to the discharge end by suitable scrapers attached to a chain, and is thus recovered in a very clean state.

### Production of Petroleum in 1903.

F. H. Oliphant's annual report to the United States Geological Survey, entitled "The Production of Petroleum in 1903," contains in part the following:

The total production of crude petroleum in the United States in 1903 was 100,461,337 barrels, a gain of 11,694,421 barrels, or 13.17% over the production of 1902. The great increase was mainly due to the remarkable output in California, which is now larger than that of any other State. California produced 24.27%, or nearly one-fourth of the entire production.

Next to California the largest gain in production was in Indiana, which was 1,705,515 barrels, an amount that represents a gain of 22.80% over the State's production in 1902. Kansas showed a remarkable gain in production—600,465 barrels, or 181%; Kentucky and Louisiana showed gains of about 369,000 barrels each; Indian Territory gained 101,811 barrels, or 274.4%; and New York gained 43,248 barrels, or 3.86%.

On the other hand there was a slight decrease of production, 128,086 barrels, or 0.708% in Texas; and

Ohio, Pennsylvania and West Virginia all showed decreased production, amounting to a total of 1,856,619 barrels, or 3.98%, in 1903 as compared with 1902. The largest decrease in production in 1903 was in Pennsylvania, and amounted to 708,724 barrels.

The increased production in the States of Texas, Louisiana and California of large quantities of an inferior grade of petroleum made necessary new markets and new conditions of transportation that were unknown to the older fields. Demand was also made for a large amount of capital to be invested in tanks, pipe lines, tank cars and tank vessels. The markets and transportation for this new product have been secured to a very large extent. During the year 1903 the consumption of petroleum as fuel and as an enricher of gas has been very largely increased.

A considerable quantity of Texas petroleum has been refined with satisfactory results, but the percentage of the yield is much smaller than from the Eastern petroleum.

The general average price paid for crude petroleum was greater by 14.07 cents per barrel than the average price for 1902. The average price paid for Pennsylvania petroleum showed an increase of 35.25 cents; and the average price in the Lima-Indiana field was about 27 cents a barrel more in 1903 than in 1902.

Mr. Oliphant's report is an extract from the Survey's forthcoming volume, "Mineral Resources of the United States, 1903." It is published also as a separate pamphlet and may be obtained on application to the Director of the United States Geological Survey, Washington, D. C.



# Mining Summary.

SPECIALY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

## ALASKA.

The Alaska-Mexican G. M. Co., on Douglas Island, reports for month of October that the 120-stamp mill ran 29½ days; crushed 18,210 tons ore; value of bullion, \$27,665. Saved 445 tons sulphurets of value of \$30,571. Working expenses, \$32,326.—Alaska-Treadwell G. Co. for October reports that the 240-stamp mill ran 28½ days; crushed 78,746 tons ore; value of bullion, \$89,357; saved 1850 tons sulphurets of value of \$97,000. Working expenses for month, \$83,918.—Alaska United G. M. Co. for October reports the Ready Bullion claim, 120-stamp mill, ran 29½ days; crushed 18,410 tons ore; value of bullion, \$19,257. Saved 390 tons sulphurets of value of \$13,233. Working expenses, \$28,521.

At Windham bay the California-Alaska M. Co. has let a contract to drive 100 feet extension to the tunnel on the Doctor claim. The Yellow Jacket M. Co. has men driving a tunnel on its mine, and the Missouri M. Co., whose claims are at the south side of the basin, will have electric plant set up this week and will keep men at work during the winter with machine drills. J. P. Bartels and E. H. Patten have started driving a tunnel on their claim, the Dark Horse, about ½ mile south of the basin. All of the claims show free gold on the surface.

At Eagle the Eagle River M. Co. has a group of thirteen claims on Eagle river, 7 miles from salt water, with B. L. Thane in charge. From the beach a tram has been built for 3½ miles, and the remaining 3½ miles to the workings is covered by a wagon road. A 20-stamp mill is in operation. The mine is 260 feet up the hill from the mill. Ore is brought from the mine to the mill by a cable tram. Work has been done in thirteen stopes. The ground is loose and requires careful timbering. In the "long tunnel" they have struck a 4-foot lead of ore. A mill test of the ore shows \$40 per ton. During the fifteen months since the first ten stamps were started \$70,000 has been taken out. About fifty men are on the payroll.

## ARIZONA.

### Maricopa County.

(Special Correspondence).—Work will be resumed at the Gold Coin mine by Dec. 1st.—J. A. Moore reports several properties working in Cave Creek district.—Preparations are being made to resume work at the Union mine in Union district.—J. Lambeye is working a promising copper prospect west of Morristown. Phoenix, Nov. 20.

### Mohave County.

Superintendent Featherstone of the Cedar Valley M. Co. will put in a hoisting plant on the Doyle mine, near Cedar.—J. N. Cohenour reports having struck 10-ounce gold ore in his mine in the Gold Road country, near Acme.

G. W. Jonas has bought the 15 H. P. hoist of the Cedar Valley M. Co., and will remove it to the mines of the Standard G. M. Co. in Mohave wash, near Kingman. The mines are said to carry gold and copper values.

### Pinal County.

Manager Sieboth of the Superior Co., near Florence, says the tunnel he has been driving on the Boman mine, near the Superior group, has crossed the vein at 100 feet below surface outcroppings and shows width of 10 feet. The vein where cut by the tunnel is in a contact between lime and diorite and the vein filling is ribboned with quartz carrying lead and gold. A steam hoist will be put in at the mine and a shaft put down several hundred feet on the ore shoot shown in the tunnel. The property is owned by the Arizona-Hancock M. Co.

### Santa Cruz County.

H. Barnett, manager of the Happy Jack M. Co., near Nogales, reports a strike in the Happy Jack, which gave values of 120 ounces silver, \$5 gold and 12% copper.

### Yuma County.

The Cinnabar mine, 18 miles southwest of Quartzsite, in the Weaver Pass section, is owned by the Castle Dome M. & M. Co. Operations are reported progressing.

The Amalgamated G. M. Co. reports development progressing on its mines, 6 miles southwest of Quartzsite. The road from Congress Junction to Quartzsite is being repaired and a road built from Quartzsite to the mine. Foundations are made for a stamp mill.

## ARKANSAS.

### Boone County.

The Fuller M. & M. Co., at Zinc, is

resuming operations at both mine and mill.

### Searcy County.

Miners have started sinking a shaft on the first drill hole of the Foster tract, near St. Joe, which is being operated by a company of Wichita, Kan., men.—At the Excelsior mine, above St. Joe, arrangements are made to build a road 1 mile in length that may be hauled to the St. Louis & North Arkansas Railway.

## CALIFORNIA.

### Amador County.

At Defender, F. B. Joyce says he is sinking a new shaft on south end of the Defender claim, which is down 95 feet. There is a 3-foot ledge which shows values. The Lone Star mine, on the Defender ledge, but on Calaveras side of the river, has developed a 3-foot ledge of \$50 rock on the 240-foot level. The Riverside mine, near the Lone Star, has struck ore carrying free gold and galena.

### Calaveras County.

Work in the Utica M. Co. mines at Angels has been resumed, repairs and improvements having been completed. Another sawmill has been built to be run by the Utica Co. for sawing logs, wedges, etc., to be used in the Stickle and South Stickle mines.

It is reported that the Campo Seco C. Co., at Campo Seco, is experimenting with a new copper furnace, and if successful will erect seven more at the smelting plant.

Near San Andreas the California Placer M. Co. broke through the lava into the gravel channel last week. There were only a few feet of gravel to the bedrock, which, however, pitched off steeply into a deeper channel. The water is easily handled and the work of developing the channel is proceeding.

Manager Phillips of Pueblo, Colo., at the Campbell mine at Italian ranch, near Murphys, says work is being done to strike the lode, which is expected to be reached by Dec. 1st.—W. H. Clary Jr. is arranging for a mill to be placed on the mine of the Clary G. M. Co. at Indian creek, near Murphys.—E. Cunliffe, who has charge of the Sonora mine, is doing development work and the vein is 6 feet in width. It assays in gold and silver.

The mill of the San Andreas Gold Channel M. Co., owner of and operating the Chris Anderson mine at San Andreas, has started crushing cemented gravel. Fifteen additional men have been put to work this week, which will make twenty men at the mine. Fifty feet of bedrock tunnel have been run and a 20-foot sump sunk in bedrock, which drains the workings. Raises are made from the tunnel to the gravel banks and the cars are loaded automatically. The company has spent \$20,000 in putting the property in shape, says President Miller.

Work of sinking and retimbering the shaft on the mine of the San Andreas Blue Gravel M. Co., near San Andreas, is progressing under the direction of F. J. Juchter, mine foreman. Buildings have been completed and a whim is in place.—D. P. Gray is starting work on the Hagerman gravel mine, on the Calaveras river.

### El Dorado County.

(Special Correspondence).—J. F. Burslen has bought the Lytten placer mine at White Oak flat, near Shingle. The holdings cover 150 acres and are said to show 12 feet of payable gravel. Shingle, Nov. 23.

The Rio Vista M. Co. mine, near Fair Play, has twenty-five men employed. Ore is being dumped to await development of the copper deposits. The company expects to put in machinery. The shaft is being deepened. F. B. Hood of Oakland is interested.—A boiler to furnish steam for hoist on the Ohio mine, adjoining the Mt. Pleasant mine, near Grizzly Flat, has been set up. This is the old Col. Knox mine, afterwards Val de Oro, and is owned by W. Brown.—The Stillwagon mine has been sold to a company, represented by K. C. Crawford, which is also operating the Eagle mine. There are six men on the Eagle and the tunnel is being driven.

The manager of the Crystal gold mine, near Omo, has put on men and started work again.—The men at work on the B. & M. gold mine, near Omo, have found the channel. It is reported 50 feet wide and shows payable gravel.

### Fresno County.

The steamer Rosecrans was loaded with 23,000 barrels of crude oil at Monterey on the 21st inst. for Honolulu, being first cargo loaded through the pipe line from the Coalinga field. The pipe line has been built by the Coalinga Oil Transportation Co.

### Mono County.

The Bridgeport Chronicle-Union says returns of twenty-eight sacks of ore shipped from the Jump-Up-Joe mine at Masonic showed that 1650 pounds of rock

yielded \$800. The Tiny claim, adjoining, also shows values.

### Nevada County.

Improvements will be made at the Orleans mine, near Nevada City. An electric hoist is under construction to be put up at the Houston shaft, through which waste rock will be hoisted, while ore will be taken out through the Orleans shaft. A larger compressor will also be put in. The ore being taken out averages \$40 per ton. A raise is being run from the 700 to the 400-foot level. The ledge is 18 inches wide, and a mill will be built, says Superintendent C. A. Brockington.

### San Diego County.

(Special Correspondence).—The mining outlook in Cuyamaca district is improving. A 10-stamp mill will be installed on the High Peak mine in Julian and a double-compartment shaft sunk to cut the ledge at 500 feet (200 feet below the present workings). This mine is well developed by shafts and tunnels and high-grade milling ore is being taken out and placed on the dumps. The Helvetia, which is on the same vein to the south, has a 10-stamp mill in operation. Ore is being taken from a 5-foot ledge on the 350-foot level, and is plating \$50 per ton. Another shaft will be sunk in the spring.

The new camp of Boulder Creek, 9 miles from Julian, is opening up. Fuller & Moore are working and have a 2-foot ledge of ore which will plate \$25 per ton. The ore carries 1% of sulphurets, which assay \$300. The Nobles mine in Pine valley has changed hands and work will be resumed. Harper Bros. are developing a mine adjacent to the Cuyamaca Co.'s group. They have a ledge 12 inches wide and are putting in a 2-stamp mill to prospect their ore, which they claim will average \$20 per ton.

At the Stonewall mine, near Cuyamaca, work is progressing. The water is down to the 300-foot level and unwatering is at rate of 10 feet per twenty-four hours. There is yet about 25,000,000 gallons to be removed. The twenty stamps are dropping on ore from the waste dump and good returns are reported. Buildings are being put up. G. H. Clarke is manager. Cuyamaca, Nov. 23.

### Shasta County.

The Mountain C. Co., Ltd., operating at Keswick, has issued a circular stating that operations are being carried on satisfactorily, and deliveries of refined copper to buyers this year will approximate 10,000 tons. A site has been bought and buildings started on a sulphuric acid and artificial manure plant on San Francisco bay. When these works are ready the company's ore will be utilized for the production of sulphuric acid and the manufacture of manures, as well as for the extraction of copper. As an adjunct to and in connection with the sulphuric acid business generally, the works and business of the San Francisco Chemical Co. have been bought.

### Trinity County.

Near Weaverville power has been turned on from the new ditch and pipe line at the Fairview mine, says the Searchlight. Ten additional stamps have been put in operation, making thirty in all. Ten more will be added by Dec. 1st, says Manager J. Porter.

### Tuolumne County.

Superintendent W. Vincent has men at work on the Expectation and Realization claims on the main Tuolumne river above the Mohican mine, near Groveland.

Grading is in progress at the Horseshoe Bend mine, near Columbia, for a 60-stamp mill and a railroad track is being laid to Melones, a distance of 2 miles. Other buildings are also being erected.

Operations with forty men will be resumed at the Golden Gate mine, near Sonora.

At the Black Oak mine, near Soulsbyville, forty stamps are dropping in the mill. A second and larger gyratory crusher is being added to the plant. A steam dryer is being built. Improvements have been made in the electrical arrangements.

Z. T. Lillard of Los Angeles has bought the Mackey copper mine, below Jamestown, and will put men to work.—A strike has been made at the Mack mine at Big Oak Flat.—The Over mine, on Bald mountain, near Columbia, is again in operation.—T. H. Bluett will open up the mine on the John Orr estate, adjoining the Norwegian mine, near Tuttle-town. He has a lease on the mine and has put in a 3½-foot Huntington mill with a capacity of twelve tons, which will be started this week.—A rich shoot of ore was struck at the Jumper mine at Stent last week at the 1000-foot level, 750 feet north of the shaft. The ledge shows free gold.

A dynamo with capacity for 150 lights has been set up at the Horse Shoe Bend mine, near Columbia. Four drilling machines are in operation. Foundation has

—Prospecting is going ahead at the Moody mine, near Big Oak Flat, and thirty-five men are at work. The mill has started. Fuel supply is the only drawback, says W. A. Nevills, owner.

Sinking the shaft at the Black Hawk mine, on the Trevithick ranch, 7 miles east of Sonora, is progressing. A hoist and compressor are being put in, says Manager Irish and Superintendent Barnes.

Development work is being increased at the Yellow Winton mine on the main Tuolumne river, near Groveland. Men have been put to work driving two tunnels. J. Burns of Groveland is superintendent.

Two concentrators are being put in at the Republican mine at Jacksonville. Several buildings are under construction and other improvements are being made. The mine is under the superintendency of T. F. McGovern of Sonora.

## COLORADO.

### Boulder County.

C. O. Nelson & Co., who have a bond and lease on the Coney Island group on Guinn mountain, near Eldora, report they have opened a body of sylvanite in their tunnel. The vein is 5 feet wide, the pay streak is 6 inches wide. Nelson will make shipments and a plant of machinery will be put in.

Near Boulder, the Cochran mill at foot of Black Tiger gulch in Boulder canyon, built to treat gold ore, but proved a failure, is being fitted up to treat tungsten ore, which is said to be found in paying quantities in that gulch.

### Chaffee County.

Development work will be in this week on the Uncle Tom group of copper mines, 9 miles north of Salida and 1½ mile from the Salida copper leaching plant, which is in operation. T. N. Elledge and A. E. Hatch of Salida are interested. The main body of ore runs about 6% copper. The Copperopolis vein is from 10 to 100 feet wide and gives average values of 4%. It has been opened in ten places by shafts and tunnels from 25 to 200 feet in depth. The Two Republics Co. of Pittsburgh, owner, figures on treating 3% ore at a profit by copper leaching process. The Uncle Tom group comprises five claims.

### Clear Creek County.

G. A. Pease, who is working the Nabob mine near Georgetown under lease, has opened up a body of ore in the upper adit, 700 feet from the portal and 600 feet from the surface. The adit is being driven ahead for another vein which produced high-grade ore in surface workings.

Near Idaho Springs, President T. M. Marsh, of the Signal M. & T. Co., reports a strike made in the Helen mine in Virginia canyon. The tunnel from the Virginia canyon roadway has been enlarged. A 4-foot vein of ore showed average of 0.44 ounce gold, 24 ounces silver per ton, with lead and copper values.—S. Engle & Co. of Denver, operating the Summit mine in Hukil gulch, under bond and lease, have opened up a 2-foot streak of 2-ounce gold ore and are making regular shipments to the Hudson mill. The ore is oxidized quartz, free milling. In 250 feet the adit level will reach the junction with the Refugee vein, opened previously in a crosscut from the Summit shaft at the 300-foot level, and where a 6-foot vein of milling ore was cut.—A streak of ore assaying \$200 has been opened on the foot wall of the Gem vein in Cascade creek at depth of 150 feet from the surface. The claim is owned by W. W. Cannady of Idaho Springs and Oklahoma men.

Mill run has been made from the recent strike in the American Boy claim in Cascade district, near Idaho Springs. The vein is opened by a tunnel. The mine is owned by the American Boy M. & M. Co., with headquarters at Cheyenne, Wyo.—A 100-foot contract has been let and work resumed on the Sterling tunnel on Soda creek.

The Independent pyritic smelter of Golden has bought the Kilton sampler at Idaho Springs and by December 15 expects to have the mill in shape for sampling and buying ores. A new floor and sampling device will be put in and the plant overhauled. The mill has been idle for several years. J. H. Kemp of Boulder is agent. A sampler has also been established at Black Hawk.

Manager Slater reports the Gold Anchor Co., near Idaho Springs, will continue sinking its shaft to the 450-foot point. Stations will be cut at the 350 and 430-foot points. A mill will be built next spring for treatment of ore blocked out. The Gold Anchor shaft is 250 feet in depth, the deepest shaft in Alice district. At the 250-foot point levels have been extended along the vein for several hundred feet in either direction.—The manager of the Beaver mine says he will sink the shaft an additional 100 feet. The machinery has been overhauled and timbers are on the ground for the work. It is



been built for another engine of 50 H. P. thought the junction of the Beaver with the Sewall vein will be reached. The shaft is 240 feet deep. Low-grade ore is being shipped under the new smelting charges at a profit.

#### Gilpin County.

The Benjai M. Co., incorporated under Colorado laws, with head office in Denver, has bought the After Supper mine in Black Hawk. L. R. Tatum is president of the company. A plant of machinery will be put in and management will be under A. Watters. The main shaft is 140 feet in depth, from which a drift has been run west. The shaft will be sunk several hundred feet and drifts extended. The After Supper is thought to be east extension of the Fiske mine on Bobtail hill.

A hoisting engine and iron water tank have been set up at the Pittsburgh mine of the Cashier G. M. & R. Co., near Russell Gulch. Sinking the shaft an additional 200 feet will be started. Increased developments will follow, also ore shipments.

The Rialto group of mines in Gregory district, near Central City, has been bought by the East Boston M. Co., in which Eastern men are interested. The Rialto group consists of the Rialto and Jean lodes, with surface ground on these and other lode claims. The buyers are owners and operators of the East Boston group, and the two will be worked in conjunction, as they adjoin. The smelting ores from the East Boston mine produced during the past three months gave values of \$100 per ton. It is intended to unwater the property and sink the shaft another 100 feet, its present depth being 550 feet. The Rialto group is equipped with a main shaft, down 600 feet, shaft building, together with two boilers and engine, and a double set of pumps. It is intended to handle the water of both properties. Unwatering has begun and when the bottom is reached they will sink 100 feet more. S. Hoskin is manager.

The Colorado-Tellurium G. M. Co. has bought the Bonanza or Oliver stamp mill, in Chase gulch, near Central City, and has made alterations and improvements. It is equipped with twenty-five slow-drop stamps. A switch has been built from the tracks of the Gilpin Tramway Co. to the rear of the mill, so that delivery of ores is convenient. J. Gundy is mill superintendent. The capacity of the mill is thirty-five tons per twenty-four hours. Manager R. Borchardt reports that they are making satisfactory saving. At the Freedom main shaft operations have been stopped for the time being at the stopes above the 500-foot workings. The last car of smelting ores from these workings netted \$265 at the smelter. Manager Borchardt has been extending the 500 west level and has opened ore. The main shaft is down 822 feet and as soon as the water is taken out it is intended to sink the shaft 200 feet farther. The water is down to the 571-foot point (the pump station) and as the Rialto and East Boston properties are to be unwatered it will relieve the Freedom of doing the major portion of the work, as in the past. Lessees are working in the Freedom No. 2 shaft, east of the main shaft, and drifting towards the main shaft at a depth of 150 feet, and have been shipping milling and smelting ores, the smelting ores running \$50 per ton. The company expects to start work on the tunnel running in from Chase gulch and extend it to the Freedom main shaft, which it will cut at a depth of 350 feet, the total length of the tunnel to be 1368 feet.

#### Lake County.

The shafts going down on Rock hill, Leadville, near the Reindeer, are nearing the point when sinking will be stopped and drifting started, says the Carbonate Chronicle. At the Bessie Wilgus the shaft is down 460 feet and drifts to the ore body started. The Reindeer shaft was sunk 500 feet and the first drift started at the 400-foot mark and the ore body caught 150 feet from the shaft. The Bessie Wilgus is 700 feet farther down the hill, and with the difference in the dip the ore is expected to be found at 450 feet. The southwest drift of the Reindeer is in ore to the end line. The shaft of the Iron Silver, to the north, and the two shafts being sunk by J. Murphy east of the Reindeer, should be in position to drift this week. The shaft being sunk on the President group is in the wash. The shaft being sunk by J. Daly on the California gulch side of the hill is through the wash and entering the solid formation. The Reindeer is shipping 100 tons a day.

The mill at the Yak tunnel, Leadville, is nearing completion. The frame work is completed, and the buildings going up on California gulch, west of mouth of the Yak tunnel, are ready for the roof. This mill is intended primarily for the reduction and concentration of the low-grade ores found in properties tapped by the Yak tunnel. The electric plant, which is in operation, has increased the work in the tunnel and connected properties, but

the full capacity of the Yak plant for the production of mineral will not be reached until the mill is in operation. The Yak is turning out ore from its older properties, and is opening up the new ore bodies in the Tankertown and Bob Ingersoll claims. Electric hoists and pumps have been put in in several of the mines, including the Silver Cord, from which a large tonnage is being taken. The electric appliances will eventually be extended to all the mines operated through the tunnel, and it is expected development of the Belgian will be started.

Work on Johnny hill mines at Leadville is progressing. The lessees on the Ibox properties are doing considerable work and are shipping a large tonnage daily. Development of the Elk is being carried on by J. W. Moore. He has awarded a contract for driving a drift 100 feet from a level below that in which the ore was found. The Elk is near the Ibox.

E. A. Swallow et al. of Denver have bought the Sunnyside claim on Mount Elbert, near Twin Lakes. A company will be formed to develop this claim in connection with the Yellow Jacket and Dan groups and to prospect through the tunnel for the Gordon vein. The Sunnyside lode is 4 feet wide and shows a shoot of pay ore on the surface.

H. C. Norton of El Paso, Tex., has located six claims 6 miles distant from Paisley, and is pushing development work. He will run a 500-foot tunnel on one of the claims. Due to this move, all the adjoining vacant ground has been located as mining claims. Gaylord Bros. have been doing work on a group of claims and the ore shows \$40 per ton in gold.

#### La Plata County.

(Special Correspondence).—The May Day mine is showing improvement. The crosscut tunnel opened the vein a month ago at a depth of 400 feet. The vein at that depth is 2 to 8 feet wide and drifting in both directions has been pushed, the ore taken out being shipped to the smelter and yielding satisfactory returns.

The Neglected mine is taking out two or three tons of high-grade tellurides per day. The mine makes considerable water and pumping expense is heavy. The cost of transportation to Durango is \$12 per ton, but with these drawbacks the mine is paying dividends. The State has appropriated \$5000 for building several miles of wagon road, which will enable wagons to reach the district, when the output will be increased, as there are adjacent to the Neglected several properties which heretofore have been unable to operate profitably.

The Bonnie Girl employs fifty men on the power plant and development. The mill building is completed and much of the machinery is in. Test runs on ore are being made in the old 10-stamp mill, to which a cyanide plant has been added.

The Empire G. M. Co., operating the Small Hopes group at the head of La Plata river, has put in a compressor and air drills and has driven 1000 of the 1400 feet required in the crosscut to tap the main vein at a depth of 900 feet. Nine veins have already been cut and drifting on the last one is showing encouraging results.

The Bulldozer made another shipment last week and smelter returned values of \$130 per ton.

Durango, Nov. 20.

Durango reports say in La Plata county while the volume of production is not greater, the value of tonnage is greater than ever before. The closing down of the Neglected mine several weeks ago, first pending a sale and later a decision of the management to await building of the State road to the district, reduced tonnage of the camp, but this has been made up by other producers, chiefly the May Day, having proven up bodies of ore at depth of 400 feet by crosscuts and also high-grade tellurides. The Neglected is taking out enough ore to justify running the pumps, being high-grade tellurides. Since work has been started by La Plata county on construction of a wagon road, it is expected the Neglected will resume operation. The Oro Fino hill, on which the mine is located, has other mines, which have been operated under disadvantages for lack of thoroughfare over which ore can be transported to Durango for less than \$12 per ton.—The Bonnie Girl company is working fifty men on its dam, power plant and development, and is making trial runs on ores in a 10-stamp mill with cyanide tanks added for tailings. The larger mill building, which will afford 200 tons' capacity, is completed and part of the machinery is on the ground.—The Empire G. M. Co. is operating the Small Hopes group, leased from the Swiss company. It is using machine drills, driving a 1400-foot crosscut to tap the Small Hopes vein at depth of 900 feet and is now in 1000 feet. Nine veins will be cut.—There are approximately 300 men working in the district,

either for wages at mining or in individual leasing and development.

#### Mineral County.

At Creede, the Mollie S. mine, of which R. S. Light is manager, has put in a tramway from the road to the mine so that the ore that formerly was too low grade to ship can be shipped at a profit. Last month he shipped four cars of high-grade ore.

The East Willow M. Co., which operates the Solomon and Ethel mines near Creede, under management of C. Loughbridge, has put in a compressor and will follow the ore body which goes below the tunnel level. The Solomon mill, owned by the same company, is making zinc concentrates running 62% zinc. The company ships about 300 tons of zinc and 100 tons of lead concentrates a month.—J. Hannifin has a lease on the Corsair dump and says he is taking out ore that pays well.—The Bachelor mine, worked by leasers, is making progress. G. Gleason and A. Weaver have a streak of ore in their lease 200 feet long and 60 feet wide which averages twenty-five ounces in silver per ton.—A. M. Collins, who has a lease on the New York dump and the Last Chance dump, is shipping. The ore averages \$15 per ton.

The mineral output of Creede camp for month of October was 7240 tons. The Humphrey Mill Co. has built a flume from the mill along the mountain side to its land south of the mill 400 feet, where the tailings from the mill will be conveyed and there spread over the ground. As this ground is made up of large rocks several feet in depth, the water is expected to seep down a long way before reaching the creek and prove to be an effective filtering device.

#### San Juan County.

Near Silverton, the Dry gulch Galtie Boy mine's lower tunnel of 1300 feet is nearing the ore shoot of free gold opened in the upper workings. P. Lonergan is in charge.

The Ruby mill, near Silverton, is working. The ore bins are filled. There are 1000 tons of ore on the dump. The mill capacity is fifty tons a day. The December vein has 12,000 tons of ore blocked out. Manager T. J. Hurley expects to work forty men in the mine and ten in the mill during the winter. Shipping of concentrates will begin next week.

#### Summit County.

Near Breckenridge, the Washington group on Nigger hill, consisting of 200 acres of patented ground, has been taken over by the Washington-Joliet M. & M. Co. J. Dicoct, W. Seltzer and H. T. Keltie of Joliet, Ill., and A. E. Keables and C. S. Newsome of Breckenridge, incorporators. The property consists of both lodes and placer ground. There are fourteen veins in the group, from which smelting and milling ores have been produced, chiefly under operations of lessees. Low-grade ore is on the dump and in the workings. There is a 20-stamp mill on the mine that is equipped with concentrating tables. It is intended to increase the capacity of the mill and twenty-five men are at the plant erecting buildings. The average value of the Washington smelting ore is \$40 per ton. The deepest workings are 300 feet. Deep mining will reach the blanket contact underneath Nigger hill and the adjacent district containing the Puzzler-Ourray and the high-grade ore mines of Little mountain.

The operations of Hoyle & Hoyle in developing the Gold Dust vein (adjoining the Washington's Puzzle Extension) through a 2600-foot tunnel, cutting the vein 200 feet deeper than the lowest Washington workings, are said to show that the vein of that section carries values with depth.

Near Breckenridge, the lessees of the Morning Star mine, Zerbe, Condon et al., have opened up a streak of heavy lead-silver-gold ore at 175 feet from mouth of tunnel. The vein shows 2 feet of pay ore. The boring machine (modeled after a coal boring machine) is reported doing satisfactory work in boring instead of drilling the holes for blasting the frozen ore, waste and rock. The mine is above timber line, where the line of perpetual frost extends down into the earth for about 100 feet. Ore from the newly developed ore shoot is said to run \$50 per ton in gold, silver and lead.

The Old Union Co. on Mineral hill, near Breckenridge, has its plant of machinery set up at shaft No. 2, and three shifts of miners are sinking the shaft to 500 feet. Later sinking will be continued to 1000 feet. In No. 1 shaft drifting is being done east and west on the 150-foot level; also on the 250-foot level a drift is being run and a raise made in a body of cerussite that carries silver and gold values, says Manager A. E. Keables. G. C. Smith is superintendent.

#### Teller County.

At Cripple Creek the ore shoot in the Rose Maud mine on Gold hill has been

cut in the 200-foot level, giving the leasing company an additional 50 feet of stopping ground. It is being operated by the Pueblo B. & L. Co. The ore shoot is 1 foot in width, and shows sylvanite. The lessees have built ore bins and regular shipments will be maintained.

J. J. Bodfish & Co., who have a lease on the Teutonic mine, on Ironclad hill, Cripple Creek, are putting in a plant of machinery. The shaft is down 90 feet. They will continue it another 100 feet, when they will drift for the Jerry Johnson and W. P. H. vein system. On east end of same claim E. Duncan and Cain, operating under lease, have cut a dike dipping at 45°, which measures 18 feet in width. The ore is of low grade.

At Cripple Creek lessees operating the Puffer claim, of the Anaconda Co., are increasing development work. Larger ore bins have been built. The ore shoot has been opened in a winze sunk from 50-foot level.—Cripple Creek reports say the City of Cripple Creek G. M. Co., the newly incorporated leasing company, has taken the assets of the Cripple Creek Enterprise Co., whose franchise allows it to operate under the streets and alleys of the city. The sale includes improvements on the mine. It is intention of lessees to sink a shaft. The company also has a lease on the Maid of Orleans claim on Beacon hill.

A larger ore house is being built at No. 2 shaft of the Portland G. M. Co., on the south slope of Battle mountain, near Independence. This building will replace the one in use. It will be equipped with washing and picking belts and its floor area is such as to permit of all ore raised during the shifts being sorted in daylight, a decided advantage in handling, owing to the inaccuracy of work by night. It is estimated the building will cost \$75,000. Underground conditions in that section of the Portland are reported improving. Bodies of ore have been opened on several levels. The general value of the product is \$35 gold per ton.

The Columbine G. & C. Co. has been incorporated by W. H. Sanford, R. A. Kincaid, L. L. Rees, E. Whitley and I. F. Peck, with principal office in Denver. They will operate near Cripple Creek.—I. F. Peck has bought the Zennet and California lode claims in East Beaver mining district, near Cripple Creek.

At Cripple Creek the Ophelia T. L. Co. has been incorporated by C. C. Chapin, president; H. M. Gilbert, manager, and W. H. Spurgeon. It is intended to explore for mineral the territory contiguous to the Ophelia tunnel (the Smith-Moffat tunnel), being operated by the Cripple Creek & Pueblo Railroad Co., of which C. C. Chapin is president. The tunnel starts in Cripple Creek gulch 1 mile south of the city, its objective point being the Old Victor mine on the other side of the camp, 3 miles away. At present the breast is half way toward completion, or 7500 feet from the portal.

Cripple Creek reports say with few of the properties being worked to any great extent the mines on Ironclad hill are furnishing a large part of the total value of the monthly output of the district. The mines of that hill will do more when the cyanide mill of the Cripple Creek Co. is completed. The mill will have a capacity of 1000 tons daily. Operations on the W. P. H. mine, under lease to Harrison & Seaver, are being increased. Ore is being broken on an average of 33 feet in width, most of the rock running \$100 per ton. Since the ore was first struck sufficient waste rock has not been hoisted to fill in around the ore house. On the Jerry Johnson lessees are operating. Another ore shoot has been added to the network of veins and ore is being mined practically at surface. On the Damon, near by, several lessees are working who send out a good tonnage every month, while on the Flying Cloud, Forest Queen, Midway, Pride of Cripple Creek and Olive Branch claims lessees are making good production.—On the Summit claim work for the cyanide mill has been started. There is considerable idle territory on the hill, but this is the fault of the owner and not the lessee, says the Gazette. High royalties is the cause which is retarding the development of that ground.

Steam has been turned into the plant of the Bull Hill M. & Dev. Co., on Raven hill below the Moose mine, near Cripple Creek. The property is owned by the Cresson Co. The plant includes a hoist good for 1500 feet, boilers and a compressor. The company, which holds a lease, has crosscut from the 300-foot station into Bull hill. Three hundred feet was added to the shaft during the summer and at the 600-foot point a crosscut of 600 feet will be started to get under the shoot.

Cripple Creek has nearly 5000 miners at work; a production exceeding \$2,000,000 a month and pay rolls aggregating \$600,000 a month, says the Gazette.

Cripple Creek reports say all the sam-



plers of the district are taxed to full capacity with ores at present and in every part of the camp cars of ore are crowded on the side tracks waiting to be moved to the samplers.

It is said a cave-in has opened a body of ore in the Vindicator mine on Bull hill. Lessee Colwell & Co., who have the property under lease, claim they have \$100,000 worth of ore. Two months ago a cave-in occurred which damaged the Cripple Creek Central depot at Independence, besides undermining their tracks for some distance. The rock and dirt that slid into the ground of Colwell was assayed and gave returns of \$80 per ton. A carload shipment was then made, with same values returned. They are operating under lease one of the upper levels of the Vindicator mine and are hoisting the new ore body in Nos. 2 and 11 shafts.

Ore is being developed on the Mimi S. claim of the Abdallah G. M. Co. on south of Squaw mountain, near Cripple Creek. Initial development of the shoot was through the Climax tunnel of the Little Puck Co. and through the shaft on the Mimi S. claim. At 1600 feet from portal connection was made with the shaft at depth of 512 feet. At depth of 300 feet in the shaft a lateral was run north along the vein. The shoot has been opened for 60 feet horizontally. It is 2 feet in width.

A company has been organized to operate the acreage of the Cameron Co. in Cripple Creek district. Within 450 feet of the southwest portion of Cameron, the Pride of Cripple Creek has opened payable ore. The Long John has been leased to Canon City men, and two leases are being operated north of the Long John. This area, comprising 160 acres, has the Sunshine on the north and the Flying Cloud on the south. The company is headed by C. L. Arzeno. Work will be started in December.

## IDAHO.

### Boise County.

The Mineral Hill mine, near Placerville, is developing values. Thirty-two men are at work and the mill is running. The cyanide annex is also in full operation and returns are satisfactory. At the tunnel level the main ledge is 30 feet wide of milling ore. There are several leads 3 to 4 feet wide cut by the tunnel which contain ore. The company will sink a shaft near portal of present working tunnel. It will be sunk 200 feet for double purpose of development and for securing more water. A tunnel will be run from the bottom of the shaft to cut the main ledge, which will be drifted upon, says Superintendent A. C. Gallupe.

### Custer County.

Challis reports say the wagon road being built by the Lost Packer M. Co. from Jordan creek to its mines at Loon creek has been completed. Supplies are being hauled in. J. A. Czizek is manager of the company.

### Elmore County.

At Atlanta the Benton M. Co. has a 3-stamp quadruple-discharge mill in successful operation on ore from the Benton mine. The stamps weigh 1100 pounds each and handle twenty tons per day. The concentrates are high grade and are shipped to smelter. The ore carries values of \$15 to the ton. It is intention of the company to treat custom ore pending increased development of its own ground, which will be of advantage to claim owners of Atlanta district. This will require enlargement of the plant, says Manager Ennis.

### Idaho County.

The Big Creek & Thunder Mountain Railroad Co. has been incorporated, to build into Thunder Mountain mining district. The road will start at Payette Lake and follow the Payette river to Secesh creek to the south fork of the Salmon river, then to the east fork of Profile creek, then along Profile creek to Big creek, thence along Big creek to Monumental creek, and thence to Roosevelt, a distance of 130 miles. The directors are W. H. Powell, J. M. Devere, of New York, and M. B. Jacobs, F. W. Hunt and C. J. Perkins of Boise. F. W. Hunt is president and M. H. Jacobs secretary. Work will be started on the road in the spring.

### Owyhee County.

H. S. Green of Cohoes, N. Y., part owner of the Cumberland group of claims, mills, etc., on War Eagle mountain, near Silver City, says they have formed the Pioneer M. Co. and will proceed to work the Cumberland. A. Buckbee will remain with the company as manager. The company has forty men at work and the 10-stamp mill, which has been idle for three years, was started up the first of the month. The ore is said to run \$25 per ton.

### Shoshone County.

Near Wallace the King of Pine Creek M. Co. is developing a group of five claims along Pine creek,  $3\frac{1}{2}$  miles south of

the Pine creek spur of the Oregon Railroad & Navigation Co., and 3 miles west of the Bunker Hill & Sullivan mines. For 10 miles along that creek the ground is covered with locations, on many of which development is under way. Among these are the Douglas, Highland Chief and Ross Gulch. From the Bobby Anderson, on which there is a 300-foot shaft, there has been extracted shipping ore. There is abundance of timber for mining and fuel. From Pine creek and its feeders there is water supply available. Four ledges show in the King of Pine Creek group, three claims covering the east-west strike of the leads. One ledge is being developed by an adit, in 200 feet, in the face of which the ledge is 8 feet in width. The gangue is quartz and quartzite, associated with pyrite and arsenical iron. Lead-silver values are shown.

Wallace reports say for \$11,000 and other considerations the Idaho Con. G. M. Co. has sold five mining claims to the Golden Chest M. Co. The claims are the Stevens bar placer claims, the Stevens fraction, Timber King, West fraction and Jim lode claims, which adjoin the Golden Chest group, a mile from Murray. F. Watson of Spokane, Wash., is president of the Idaho Con. M. Co. The suit brought by the Idaho Con. G. M. Co. against the Golden Chest M. Co. to recover \$20,000 for ores extracted from one of the plaintiff's claims has been dismissed by Judge Beatty in the federal court, the suit having been settled out of court. It was alleged that the Golden Chest Co. drove the tunnel from its claim through the Timber King and extracted ore to value of \$20,000, in September, 1903.

Wallace reports say that December 5 the property of the Portland M. Co. will be sold at sheriff's sale. The property, which comprises the Red Dragon, Mule Deer, Silver Tip, Sitting Bull, Silver Tip Fraction, Parallel Fraction and West Fraction claims, is on Sunset peak.

Carbonate ore is being taken from the Tamarack mine on Nine Mile, near Wallace. Work is progressing. The dump for concentrating ore is growing and cribbing must be put up. The ore is lead carbonate, carrying high values in silver. Some of it is sand carbonates, as it is broken down from the ledge with a pick, being loose. No powder has been used in the stope except in its starting. The tunnel below the raise has been driven in concentrating ore.

### Washington County.

Mineral City reports say the new furnace at the smelter of the Ladd Metals Co. is in place and ore treatment will be resumed. The ore bins at the smelter are full and the mines adjacent are in position to supply ore necessary for continuous run, says Manager G. W. McDowell.

## KANSAS.

### Neosho County.

Chanute reports say the Standard Oil Co. has begun paying for oil on the straight gravity basis and the terms north and south Neodesha have been dropped. Hereafter all oil bought by the Standard in the Kansas-Oklahoma field will be paid for on the following scale: Oil grading 32° B. and better, 87c a barrel; 31½° at 82c a barrel; 31° at 77c a barrel; 30½° at 72c a barrel; 30° at 67c a barrel; 29½° at 62c a barrel; 29° at 57c a barrel; 28½° at 52c a barrel; 28° at 47c a barrel. Since the first shipment of oil from wells in Kansas to the refinery at Neodesha, there has been an arbitrary line drawn through the county, south of Chanute. All oil produced north of that line was paid for at the rate of 20c a barrel less than the oil produced south of it without regard to grade. Thus oil of 32° gravity at Chanute was worth 20c a barrel less than 32° oil produced 3 miles south of Chanute. The effect has been to turn the tide of investment to the southern end of the field. So far as the producer is concerned, says the Record, in many cases the new scale means a loss to him. But the average returns to the field will be made up by increase in lighter grades. There is a great deal of 32° oil produced east of Chanute on the "Mundy trend." The old rate for the oil was 67c per barrel, while under the new scale the operators will get 87c a barrel. The companies on that belt are the Logan, Clermont, P. C. C., North Petroleum, Ideal, Garden City, Diamond and others.

## MISSOURI.

### Jasper County.

The Tamworth mine, on the Aylor land south of Duenweg, owned by Webb City and Carterville men, is reported improving. They propose building a mill.—The Harrington M. Co., operating on the Hummel lease, has put in jigs and begun cleaning ore.

A. W. Canada has begun building a mill on the site of the Oceola plant, east of Ohio mine, near Webb City. A lower

run has been developed in sheet ground.—At Alba the Morris & Co. mine has been sold to J. W. Durby et al. for \$12,000. J. Varner et al. of Webb City are erecting a mill on the same land, which will be ready to start this week.—J. Lesly is drilling for R. M. Cain, Sanders & Co., on a 5-acre lease of the Setser land.

E. P. Church, T. Shelton, W. R. Marsh, L. Hamilton and G. Bayless of Carterville have leased the Old Colony mine and mill on the Missouri Zinc Fields ground and have been cleaning up and breaking dirt. They are making a test run of the ore. The former operators were cutting a face 18 feet high. They will put in air drills.

### Newton County.

Carterville men have leased 20 acres in Newton county, 5 miles south of Joplin. A shaft has been sunk on the lease and they have put in a steam hoist and begun drifting in favorable ground with shins. J. H. Shimmons of Carterville is superintendent.

## MONTANA.

### Broadwater County.

J. Limpke, driving a tunnel to the Burlington lead, reports progress. The tunnel is a crosscut. The Burlington is on Beaver creek, near Winston.

### Deer Lodge County.

The Amalgamated C. Co. is digging up the ground around the old smelting works at Anaconda. The old plant has been removed. There are large dumps of slag on the ground, and it is said these are being assorted and sent to the smelter for reduction. Under the old methods a percentage of the copper was lost. At present, the blister copper turned out at the Washoe smelter is sent to Baltimore for refining. The contract with the Baltimore company has almost expired, and when it does the Washoe company will refine its product at Anaconda. At the news works the "slums" from the concentrator are being saved to be re-worked. Reverberatory furnaces are being built at the smelter. At the old works the largest reverberatories were 40 feet long. The new furnaces are 112 feet long and turn out 280 tons of copper a day.

Near Anaconda, the Jennie Dell mine is being opened up. The shaft has reached depth of 450 feet and a station is being cut. It is reported they have struck a vein of gold and silver ore near the bottom of the shaft.

### Lewis and Clarke County.

The quartz mill owned by Lindt & Co., Scratch Gravel district, north of Helena, has been started up. The mill is of ten stamps.

### Jefferson County.

G. Sweeda, owner of the Copper Queen group between Cataract and Jack's creek, above the Cataract C. M. Co.'s mines and smelter, near Basin, says the group has been bonded for \$65,000 to Springfield, Mass., men. The veins are large and carry values in copper. Machinery will be put in to concentrate the product. The haul to the railroad is considerable at present, but with the building of the proposed railroad from Elliston to Basin the mines of the district will have added facilities. E. R. Dean is in charge.

### Silver Bow County.

At Butte the Minnie Healy mine, operated by F. A. Heinze, was closed on the 20th inst., by an injunction issued by Judge Clancy at the instance of the Amalgamated C. Co. The shut down throws out of employment 1000 miners, smeltermen and other laborers. By an order of the lower court Heinze was allowed to work the property, which has been in full operation until this shut down. The injunction was granted on allegations made by the Amalgamated Co. that Heinze was using the Minnie Healy as a means of looting the adjoining property, which belongs to that company. The Minnie Healy injunction follows a suit for \$5,000,000 against Heinze for ore alleged to have been looted from Amalgamated mines.

## NEVADA.

### Esmeralda County.

In Bullfrog or Amargosa district, 7 miles east of the original discovery, is the townsite of Beatty. R. Montgomery, interested there, says surface values run from \$20 to \$120 per ton, mostly in gold, while on the townsite there are 10 inches of running water. On one of the claims owned by Sweeney & Garner, there is a shaft 80 feet deep, supposed to have been sunk by Mexicans, who worked the gold ores in an arrastra and ran a small furnace on silver ores. Beatty is 63 miles from Goldfield, on the old road from Austin to Fort Mohave. The railroad being graded by F. M. Smith to the borax deposits is near Pahump, 55 miles south of Beatty, and will pass through the district.

The Gold Bond M. Co. has been incorporated to operate the Tinhorn group of

five claims at Goldfield by R. L. Mayfield of Shreveport, La., president; W. H. Clark, W. F. Bond et al. Ten men, under Superintendent A. H. Crampton, are at work. Two shafts are being sunk and milling ore is on the dump.

Seventeen miles northwest of Goldfield, in Silver Peak mining district, W. F. Bond & Co., J. H. Allen and J. G. Brown have a group of five claims—the American Boy, Last Chance, Silver King No. 1, Silver King No. 2 and Silver King Fraction. The ledge on the American Boy has been opened up by a series of open cuts. The ore goes \$40 per ton, the values being in gold, silver and copper. On the Silver King lead ore has been opened up. Men, under Superintendent Allen, will start work this week and ore shipments will be started. At a point 175 feet south of the present working shaft a shoot of ore which crops at surface has been opened on the Combination mine at Goldfield, says the Review. The shoot has been proved for a distance of 100 feet, the ore body varying from 3 to 8 feet in width, with values \$100 per ton.

The Goldfield Lone Star M. Co. has been incorporated under Wyoming laws to operate the Lone Star group of 300 acres, bought by Shove, Aldrich & Co. of Colorado Springs, Colo., and R. W. Griswold of Goldfield. The company will start operations for development of its ore bodies.

### Lincoln County.

The Little Mendah M. Co. has been incorporated at Salt Lake City, Utah. The company owns claims adjoining the Mendah mine, near Pioche. The officers are W. A. Wright, president; L. A. Copeland, J. Zink, B. S. Rives and J. Langton.

### Storey County.

(Special Correspondence).—Two enterprises of importance to the future of the Comstock are under way. One is draining of the lode by a comprehensive plan, being carried out by the companies interested combined under a pumping association to reduce expenses and get results that would otherwise be very costly. The other is the treatment by cyaniding of low grade tailings left by the mills in the bonanza days. The latter is still in the experimental stage. About a year ago the Chas. Butters Co. erected a \$400,000 cyanide plant in Six-Mile canyon, 2 miles east of Virginia City, at the base of Sugar Loaf mountain, and began treatment of the tailings impounded there. The tailings were bought cheaply, but are low grade, and the attempt to treat them on a paying basis has developed many difficulties peculiar to that ore. Some of the problems have been satisfactorily solved and substantial contributions to the process made. The most important one is probably the handling of slimes by filter, by means of which the item of time for settling—one of the chief difficulties encountered here—has been eliminated, and it is stated a saving of as close as 99% obtained. The slimes are introduced into a square tank closely filled with frames to which filter cloth is attached, and the liquid solution carrying the values is drawn through by a vacuum pump. The process is rapid and economical in saving the cyanide solution and values, as well as the element of time. The tailings vary in value in different parts of the dam, and some of them, after exposure to the air, yield satisfactory results. The plant is under supervision of W. R. Crosby.

At the Con. Cal. & Va. shaft unwatering and renovation have been going on for six years past, and though it has entailed drainage of much contiguous property, has yielded satisfactory results. Ore is being taken out down to the 2350-foot level, 600 feet below the level of the Sutro tunnel, to which the water must be pumped, and although the water at this depth is very hot, the mine is well ventilated and conditions for the miners fairly comfortable. The entire mine is lighted by electricity, which also furnishes power for pumps, compressors and other purposes underground at a great economy over steam. The power is transmitted from Floriston, 37 miles west, on the Truckee river, west of Reno, and is also utilized throughout the city and entire district, which includes Gold Hill and Silver City.

On the 2150-foot level of the C. & C. shaft are three Riedler pumps, with a combined capacity of 45,000 gallons per minute to the Sutro tunnel level. From the 2350-foot level of the shaft to the 2150-foot level water is lifted by the hydraulic elevator to a sump from which the Riedlers take it. They are not worked to their full capacity, and alternatives are prepared against a failure of the power. Superintendent McKinty is installing another compressor. The hoist is one of the largest in the West. All cables, as well as cages and every article used in and about the mine is manufactured in the company's shops on the ground.

About one year ago the Pumping As-



sociation bought the Ward shaft, which is being retimbered and deepened as another pumping station. A pumping plant at the cost of \$80,000 will be put in by Superintendent L. M. Hall. The intention is to sink this shaft to the 3300-foot level. It is connected with the Suro tunnel and has been retimbered to that level. The Ward is a mile south of the C. & C. shaft. Another mile south of this the Alta shaft is being retimbered, to be used as a third pumping point, and it is believed that these three will thoroughly drain the lode and permit deeper working in all the mines of the district.

The Kinkead mill, J. H. Kinkead, manager, a short distance below the C. & C. shaft, is working on custom ore and making satisfactory saving of concentrates. No attempt is made to amalgamate the sulphide ores, but plating is done when high-grade ores are run.

Near Silver Hill the Justice mill, a 10-stamp, old-style stamp, is treating ore from the Justice mine. Amalgamating and concentrating is the process. Near it the Taylor mill is treating custom ore, at present from the Chollar. The process is grinding and pan amalgamation.

The Silver Hill mine is preparing to re-new work in its shaft.—The Overman and Yellow Jacket are working.

Although it is not expected that these camps will be brought again to their past standard of bonanza production, it may reasonably be hoped that they will still continue to turn out a large amount of ore which modern methods of mining and treatment will handle at a profit to those concerned.

Virginia City, Nov. 22.

## OREGON.

### Baker County.

At Baker City, Judge Eakin has rendered a decision in favor of Owens, in the case of the Virtue Mines Dev. Co. vs. J. Owens of the Cyclone mine, in which it sought to enjoin Owens from removing the tailings from the old Virtue mill dump. Defendant has a contract with the company by the terms of which he had the right to remove seventy-five tons for sampling purposes free, and all in excess of that amount he was to pay for at rate of 75 cents per ton. When the tailings were tested by Owens by cyanide process they proved to carry from \$10 to \$40 per ton. Owen has renewed work on the dump.

In the Standard mine, near Sumpter, the drift on the Cleveland-Willie Boy has opened a shoot of gold-bearing sulphide ore and Superintendent Heath says he has a width of 10 inches, with galena next to it. The company also has a body of cobalt-gold ore in the Standard vein. Metallurgist Nicholson of the company has been testing the ore for treatment methods.

Work has begun on a wagon road from the California mine, Cable Cove district, near Sumpter, to the Constellation group. The first section will be a mile and a half long, and will connect the Constellation, Gipsy Queen, Gipsy King and others with the main Cable Cove road, and will be the means of getting the output of several properties to the smelter. Smelting ores are blocked out and on the dumps of these groups.

### Douglas County.

Since the recent rains the Oregon Securities Co., operating in Bohemia, has water to run its electric plant to full capacity. More men have been added and the main tunnel is being driven ahead at rate of 6 to 10 feet per day and by Dec. 15 it is expected to reach the Champion vein, which has been opened on surface. The company has its mill and tram completed.—On the Riverside group during the past few weeks men have been putting in a flume from above the tunnel on Horse Heaven creek to run the blower to force air to the breast of the tunnel, which is in 700 feet. The contractors will begin work on contract for 500 feet more.—The contractors on the Oregon-Colorado report progress. Work will be continued during the winter.

At the Vesuvius mine, near Bohemia, Manager F. J. Hard reports the 10-stamp mill and the 2000-foot tram are working satisfactorily.

J. C. Lewis has bought nine claims on both sides of Rogue river at mouth of Whiskey creek, near Glendale. They form the Royal Rogue group, and carry copper, nickel and gold.

### Grant County.

The concentrating plant at the Dixie Meadows mine, near Baker City, is in full operation. The mine has ore blocked out and its continuity, it is reported, has determined the length of six claims showing a width of 30 feet between walls. The greatest depth attained is 350 feet. The mine, comprising eight claims, is located on Dixie butte in northern part of Quartzburg district, and has 3000 feet of underground workings. The Ruby claim has

had principal development. The mill is equipped with a gyratory crusher, two sets centrifugal rolls, a Huntington mill, five concentrating tables and a 120 H. P. steam plant. The Dixie Meadows G. M. Co. is owner. Development has been done under Superintendent Reese. Men are blocking out ore preparatory to putting in a reduction plant of increased capacity in the spring.

After proving continuity of the vein the length of three claims on the Ruby group by open cuts, C. Jensen has started a crosscut tunnel of 200 feet to tap it at depth of 150 feet. The vein parallels the Dixie Meadows vein, near Prairie City, and the open cuts show it 15 feet wide, with values of \$12 per ton. The group is on Ruby creek.

### Josephine County.

The Mount Pitt M. Co., whose mines are on Jump-Off-Joe creek, 12 miles above Merlin, has completed two arrastras. The tubs are 12 feet in diameter and the power is furnished by a 50-foot overshot wheel, says Superintendent Hooper. He ran a crosscut, striking the vein at a depth of 60 feet, and cutting 8 feet of ore which carries free gold. The arrastras will handle four tons of ore in ten hours.—The Golden Wedge, on Rogue river, in Galice district, laid up for two months this fall, is equipped with a 2-stamp mill and has again started up, says Superintendent Miller. The ore is high grade. A crosscut is being run, which will tap the vein 150 feet below the main tunnel and 80 feet below the present workings. The ledge is 4 feet in width.

Grants Pass reports say the owners of the Sterling placer mine, on Sterling creek, V. Cook of Portland, manager, have shaped the hydraulic for increased operations this winter. The Sterling M. Co. is owner of the Sterling mine, with H. E. Ankeny, superintendent. A battery of four giants has been set. There is water enough to operate at least two giants day and night. The gravel banks of the Sterling are cemented, requiring blasting. The company has prepared to do the blasting from tunnels or drifts driven into the banks. The powder will be set in these and fired by an electric battery.

Near Grants Pass the 10-stamp mill of the Eureka mine of Soldier creek, which has been idle while the mine has been undergoing overhauling and more extensive development, will be started again this week. The Eureka is owned by California men, and is under the management of A. P. Nelson.

Work for the winter's run has begun by the Galice Con. at Galice. Manager A. Cousin says he has started four giants of the battery of five. Two are being operated on Gambler's bar, on the Rogue, below Galice, and the other two are at work on the high benches along the creek. Later two more will be put in operation.

## SOUTH DAKOTA.

### Lawrence County.

Ninety stamps are dropping at the Horseshoe mill, says Manager W. L. McLaughlin of Deadwood. The daily tonnage is 400. The refinery and melting room is completed. The precipitates as they come from the mill will be dried and smelted with litharge, the resulting bullion cupelled, and the bars will be ready for sale. The slags from the process will be treated on the ground.

Manager Farnham states that he is driving a tunnel following a 6-foot vertical between the porphyry and quartzite at the Queen of the Hills mine, near Pluma. The ore assays \$6 on the average. The company is grading for a 20-stamp mill, expecting to put in a combined amalgamation-cyanidation process. The Victor G. M. & M. Co. has been incorporated to operate a group in Two Bit district, between Two Bit creek and the head of Lost gulch, near Deadwood. The property is 1½ mile north of the Gilt Edge-Maid mine. The officers are J. A. Barnet of Kansas City, Mo., president; I. N. Lawrence of Deadwood vice-president and manager; R. Lawrence and T. E. Regan.

The Alliance G. M. Co. has been incorporated by Alliance, Neb., men and has bought 600 acres of land near Mystic. The property is reported to show several quartz lodes and promising placer deposits. The ores are free milling and the country is supplied with water and timber. The officers are D. Bowman president and T. J. O'Keefe and I. Read.

### Pennington County.

The Commonwealth M. Co. of Lead City has bought the Montezuma mine near Rochford. The Montezuma is equipped with a Griffin mill. The Commonwealth Co. will open the mine. The ore occurs in a free milling vein developed by an open cut. It can be cheaply mined and transported to the mill. The Commonwealth Co. also owns mines on the west of the Globe group, between Lead and

Terry, where development is being increased. W. F. Dutton of Lead is president.

The Redfern M. Co. is sinking a working shaft on its mine, near Tigerville.

## UTAH.

### Beaver County.

The Majestic C. Co., at Milford, reports during the month of October a total of thirty-seven carloads, or 1000 tons, of ore were shipped to the Salt Lake smelters, from which a net profit of \$8000 was realized. The shipments came from only two mines—the Harrington & Hickory and the Old Hickory. It is estimated there are 100,000 tons of ore ready to be mined in the Harrington & Hickory lead-silver mine; this tonnage being exposed in the Gomer shaft workings. The smelting charge was \$6.50 per ton. The ore sent out from the Old Hickory copper mine averaged two ounces in silver, 12% copper, 30% iron, .015 ounce gold, 9.3% sulphur and 28.4% silica.

W. W. Wait, treasurer of the Blue Acre C. Co., operating near Milford, reports the management has applied to systematic development of its territory \$29,373. They have opened up several showings of shipping ore. Work is being centered on No. 4 shaft and developing paying quantities of concentrating ore.

The tunnel being driven to connect the Newhouse concentrator at Newhouse, near Frisco, with the 600-foot level of the Cactus mine, has been completed to length of 5300 feet. About 550 feet more driving will be required. Progress is reported at rate of 100 feet per week.

Progress is reported at Frisco by Peck Bros. on their zinc plant, which is to run on Horn Silver ores. Manager P. T. Farnsworth of the Horn Silver Co. says the plant will be ready for operation in January next. Pipeline will be built to convey water over the mountain range from the reservoir at Newhouse.

### Box Elder County.

The Midland G. & C. M. Co. at Ogden has been incorporated. It owns fourteen mining claims in the Sierra Madre mining district in this county. The officers are: G. Dean, president; F. J. Hirt, A. Swinkwood, D. Cowvey, C. E. Dean and C. C. Touck.

### Millard County.

The Oasis M. Co., operating in Drum district, owns claims 30 miles from Oasis, from which ore has been shipped running \$20 in gold, and 10% copper. The ore also contains iron. J. Clive, part owner, says if a railroad enters the district work will be increased and lower grade ore can be shipped.

### Salt Lake County.

A. Murphy, in charge of operations at the Pioneer group, in American Fork canyon, near Alta, says a strike has been made in the property of the Pittsburgh M. Co. at head of American Fork canyon. The vein has been crosscut for 12 feet, showing galena ore. The Pioneer group adjoins the Pittsburgh.

S. Bamberger, manager of the Fortuna mine at Bingham, reports exploration being increased and he is working thirty men. He is making progress in opening up of ore bodies and in shipments. The mine is sending out an average of five cars of ore weekly to the smelters. Part of this ore comes from the lead-silver veins and the balance from those in which copper predominates. The Fortuna mine has been developed by three tunnels, also crosscuts.

The fifth furnace at the Bingham Con. smelter at Bingham is in operation.

It is said the Boston Con. C. Co. at Bingham is earning \$1000 net per day, owing to increased price for copper, on an output of 250 tons of ore per day shipped to the Bingham smelter. An advance of 1½ cents per pound in the metal makes a difference of \$225 per day to the Boston company on this output. The company reports no difficulty in meeting requirements of its Bingham smelter contract to deliver 250 tons of ore per day, containing 3% copper.

### Summit County.

The work of extending the Ontario drain tunnel to the Daly-West ground at Park City is progressing at rate of 5 feet a day.

## WASHINGTON.

### Chelan County.

Near Chelan, C. Rubin, superintendent of the Crown Point M. Co. at Railroad creek, says they have a mill building up for their dry concentrator, which will be put in next spring. A house for the ore crushers will also be erected. They have been running tunnel No. 4, which is to connect with tunnels Nos. 1 and 2 on the molybdenite ledge. It is intended to put in electric drills next spring.—Superintendent R. Earl of the Thunder Creek M. Co. says the 4 H. P. dynamo, an electric drill and other machinery are in operation. W. H. McAllister is mine foreman

in charge. The mine is said to be an extension of the Boston ledge. The Boston mine is across the divide from Horseshoe basin, and the ledge parallels the Davenport and Blue Devil ledges. Average assays from the Willis & Everett claims, from an ore body 3 feet thick, give 100 ounces of silver.—Superintendent H. F. Bruckner is running a union tunnel for the Cascade G. & C. Co. and the Horseshoe Basin M. Co. to cut the Davenport ledge. The tunnel is in 200 feet of the 700 feet to be run.

The Crown Point M. Co., on Railroad creek, S. J. Gray's property on Meadow creek, the Davenport companies in Horseshoe basin, the Thunder Creek M. Co. on Thunder creek, and the Holden G. & C. M. Co. on Railroad creek will continue work throughout the winter.

### Ferry County.

Near Republic the California mine will be reopened. Since the mine was closed several months ago the shaft caved in above the water level and will be retimbered, says Manager Case. The mine will be unwatered and exploration work resumed.

The Colorado group, on Nine Mile creek, 18 miles northeast from Keller and same distance west of the Columbia river, has been sold to J. C. Davenport of Spokane for \$5000 cash. The group consists of the Colorado, the Prospect and the Prospect Fraction claims. A shaft has been sunk which has developed a body of ore 5 feet wide that carries 50% of lead, much silver and gold values. Ore has also been developed in a tunnel. Davenport will build a wagon road from the mine for an outlet to the smelters.

Fisher & Miller, lessees of the Lucille Dreyfus mine at Danville, expect to ship from two to three carloads of ore a week. They have struck ore 8 feet wide on the 100-foot level. They also have ore in the upper workings.

Near Republic, the Mountain Lion is shipping 100 tons of ore per day to the Granby smelter, over the Kettle Valley lines, and twenty men are employed, says Superintendent Cochrane.—Superintendent Case of the California mine has put men to work to resume development. The shaft will be retimbered.—C. Verill, in charge of development work on the Mountain Boy at Park City, near Republic, reports 90 feet of tunnel and drift run in eighteen days. The mine is being worked in both upper and lower tunnels.

### Lincoln County.

Near Springdale, the Turk smelter of Cedar canyon has been blown in. The smelter has a capacity of 100 tons daily. The plant is owned by the Turk M. & S. Co. and cost \$50,000. The company owns eight claims. The ledges worked carry copper and gold. There are several shipping mines in Cedar canyon, and ores will also be secured from the camps of Ferry county and from other districts in Stevens county. The officers of the Turk M. & S. Co. are: A. W. Turner, president; H. A. P. Myers, and H. J. Davis, manager.

### Okanogan County.

The Bodie mine at Bodie, near the Ferry county line, is reported improving. The 52-stamp and cyaniding mill has proven successful. There are twenty-five men at work.

The Buckeye M. Co., operating near Molson, is putting in a stamp mill and other machinery.—The Ben Harrison Co. at Chesaw has received an engine and boiler to operate the Opal mine, and is planning to put up a mill.

## WYOMING.

### Uinta County.

Deposits of coal and copper are reported found by O. Grimmelt, W. G. Johnson and J. B. Heenan of Lander, who have located several claims in the coal region geologically known as the Snake River coal field, in Jackson's Hole, Uinta county, 15 miles east and southeast of the Teton mountains. The coal veins are from 4 to 6 feet thick. The claims located are on Buffalo Fork, an upper tributary of the Snake river, a stream capable of furnishing a supply of water power and on the route of a proposed railroad which will be built west from Casper through Wyoming to Boise, Idaho. In addition to the coal a 12-foot vein of ore, giving assays of copper, gold and silver, has been located on the same stream and is being developed by G. Hays and C. Peterson of Dubois. Placer gold is found in the streams of the section, and a company has been organized to do placer mining there.

## FOREIGN.

### AUSTRALIA.

#### New South Wales.

The Minister for Mines of New South Wales reports the matter of establishing a limited number of State batteries on goldfields (particularly upon prospecting



fields), and of so amending the mining act as to provide for local mining boards of practical men to control the prospecting vote, are under consideration.

The management of the British Broken Hill Co., at Broken Hill, has arranged to install the Delprat salt cake process at its mine. The company has 200,000 tons of tailings at surface, averaging 4.5% lead, 5 ounces silver and 17.5% zinc. The company also intends to carry on prospecting operations from Marsh shaft on block 16.

Queensland.

At Charters Towers the underground fire in the Brilliant mine having been overcome, the Brilliant Block G. Co. reports work resumed in its mine on October 31st.—The Brilliant Central G. Co. resumed work on October 24th. On November 2nd six weeks' returns are reported: Crushed 2568 tons of quartz for a yield of 2849 ozs. of gold, including the clean-up of the plates; cyanide bullion, £1601. New Queen G. Co. resumed work on October 24th; started mill crushing October 31st.

The Mount Sampson G. M. Syndicate has been formed to work property on Upper Cedar creek, Samford district, 20 miles from Brisbane. Leases have been acquired for 560 acres of freehold property.—During September, 38½ tons of stream tin (value £2761) and 21½ tons of copper and silver matte were shipped from Stanthorpe, the latter being the product of the Silver Spur silver mine. At the Silver Spur silver mine at Texas operations are being extended and the working and output will be doubled. The new furnace is in full working order. Manager E. Hall is enlarging the old furnace to the same dimensions as the new one.

The Mungana M. Co., Ltd., operating at Chillagoe, in its report for the past fiscal year shows 7005 tons of copper ore and 10,720 tons of lead ore treated at the Chillagoe smelters. Production was 353 tons of copper, 1904 tons of lead and 167,496 ounces of silver. Work at the mines is being conducted at the Lady Jane and Girofla shafts. In the Lady Jane, at the 150-foot level, the lode showed 18% copper, 16% lead and thirty-four ounces silver. Stopes are opened up and sinking resumed. No. 3 shaft is equipped and 8000 gallons of water per hour are being handled. The open-cut at the Girofla mine produced 15,987 yards overburden and 10,132 tons of ore, containing 44.85 tons copper, 2602 tons lead, 85,271 ounces silver. From an intermediate level at the 180-foot level of the shaft 3119 tons of ore were stopped out, yielding payable values. This formation at 200 feet proved unpayable. In the Lady Jane levels are being opened up at 200 feet and 250 feet.

Western Australia.

The Great Fingall Con. Co. at Kalgoorlie reports for month of October: 100-stamp mill treated 14,911 tons for 9964 ozs. gold; 14,706 tons of tailings treated by cyanide for 3153 ozs.; 205 tons of concentrates treated for 1034 ozs. Total 14,151 ozs. fine gold. In southern end of Day Dawn shaft have met foot wall of reef at depth of 1271 feet, averaging 1 dwt. per ton for width of 9 feet. Have met foot wall northern end of shaft at depth of 1273 feet; reef 9 feet wide, averaging 7 dwts. per ton.

At Leonora the Sons of Gwalia reports for October: Ore crushed, 9270 tons; 3731 ozs. fine gold recovered; tailings treated by cyanide, 6212 tons for 844 ozs.; concentrates treated, 156 tons for 619 ozs.

BRITISH COLUMBIA.

Cassiar District.

Atlin reports say the total gold output of the Atlin district the past summer is estimated at \$600,000, or \$100,000 in excess of that of last year. The season has been shorter than usual.

East Kootenay District.

Work is being carried on at the Bull river placer camp, near Fort Steele, for a dam and flume. Mining machinery will be put in by the Bull River M. & P. Co. The company has four placer leases which will be worked by hydraulic mining, and will put in a power plant for electric lighting and supply power to mines in the Kootenay valley.

In the St. Eugene mine, at Moyie, a strike has been made in the 125-foot level of the shaft and in 1250 feet. In the face of the drift are 15 feet of galena. It is shipping ore and will be sent to the smelter. The ore body has a depth of 1200 feet from surface.

J. C. Drewry, a director of the St. Eugene M. Co., says the normal output of the St. Eugene mine at Moyie is 3000 tons of concentrates a month; but, owing to shortage of water, the output was curtailed during August, September and October. A pumping plant is being set up to pump water from Moyie lake to supply water for the concentrator. A 200 H. P. engine is being added to give the concentrator additional power. These improve-

ments are about completed and the St. Eugene output will be brought up again to the 3000-ton per month mark. In making a raise from the 1800-foot level, they struck a shoot of galena which is 5 to 15 feet wide. Then they drove ahead on the 1700-foot level and cut the ore shoot found in the raise. On the 1925-foot level, the first shaft level, in the east drift, they have been driving steadily in ore since last May. The drift is 7 feet wide. This ore is of concentrating character and will concentrate 5 into 1.

Roseland District.

At Roseland, Manager M. R. Galusha of Spokane, Wash., says he has arranged for building an aerial tramway to connect the Jumbo mine with the tracks of the Red Mountain Railway. He has surveyed the line for the tramway. Since the Jumbo mine began operations, eighteen months ago, ore has been hauled in wagons. Ore has been found at depth, and the tramway will be built on an air line from tunnel No. 2 of the Jumbo down to Little Sheep creek, connecting with an ore bunker on Big Four flat and with the railway at a point about 1½ mile west of Roseland. The length of the tramway will be 5080 feet and will cost \$15,000. The Jumbo Co. intends to ship 500 tons a day, instead of 500 tons a week.

Vancouver Island.

A body of ore, running in copper and carrying an ounce of gold per ton, has been struck on the Victoria mine, of the Vancouver Island Ex. S. group, 2 miles north of Ladysmith. A drift was run from the tunnel that cuts the ledge at a distance of 120 feet. The vein shows a body of ore 7 feet wide. Shipments will be made to the smelter.

West Kootenay District.

In Trout Lake district the Winslow group is on Silver Cup mountain, 2 miles northeast of Trout Lake landing, which is 7 miles southeast of Trout Lake City. Two miles west from the Winslow is the Copper Queen group consisting of three claims. The outcrop shows a vein of quartz 30 feet wide. The owners of the Copper Queen are Copp, Westfall and Windsor. They have increased developing work this year and put up winter quarters. It has tunnel sites, and can be reached by a 2-mile tramway line from the lake shore. East of the Winslow are the Lucky Jim and U and I groups, both showing gold values. The Copper Queen and Lucky Jim are adjoining the Silver Cup mine. On the Winslow the lead is 8 feet wide; a tunnel has been driven which is in ore. Near the Winslow and belonging to the same owners is the Cromwell claim. The Winslow ore is pyrite with free milling gold.

BRITISH GUIANA.

Georgetown reports say exports from January 1 to October 18 includes: Gold, 64,005 ozs. 17 dwts. 19 grs. at \$1,131,800.61, a decrease of 4191 ounces, compared with same period of 1903. Diamonds, 8633½ carats, value \$67,839.22, an increase of 1616½ compared with 1903.

The Chronicle of Georgetown says the Peter's mine on the Pururi river will be opened up by the British Guiana G. Con. Co., Ltd. The superintendent has forty men clearing ground and erecting buildings. The mine will employ 1000 men. A 15-stamp mill will be put in to be built in sections, no one piece to exceed 300 pounds in weight to facilitate transportation. This is expected to handle 1000 tons of ore from the Peter's mine per month. The place will be fitted with an electric lighting plant.

CANADA.

Ontario.

Wabegoon reports say that in the Manitou J. E. Burns, president of the Northern Light Co. of Detroit, Mich., operating the Paymaster mine, has arranged for development during the winter. So far 100 feet of sinking has been done.—In the Eagle Lake district, in addition to the two Buffalo companies operating, the Honor Bright G. M. Co. of Ontario will start development.—Steam was turned on in the 10-stamp mill at the Redeemer mine, in Dryden belt, last week. G. A. Corbell of Tiffin, Ohio, is part owner.

—Reports from the Sturgeon Lake district say that J. S. Steele expects to have his mill running on St. Anthony reef this week.—H. J. Tharle of Buffalo, N. Y., with Pennsylvania men, has bought the Minto mine, near Fort Williams, for \$108,500. It is 5 miles from the Sunbeam mine, which is a regular producer. It comprises 120 acres.

IND'IA.

For month of October, the following reports are made by gold mines at Kolar: Champion Reef G. Co., 15,732 tons of ore produced 15,277 ozs. of gold; 17,672 tons of tailings (cyanide process) produced 2137 ozs. Total, 17,414 ozs. There is a

slight reduction in the return due to smaller quantity of tailings now available for treatment.—Hutti (Nizam's) G. Co., 1207 ozs. of gold from 1950 tons crushed.—Mysore G. Co., 15,800 tons of quartz produced 15,330 ozs., 12,900 tons of tailings (cyanide process) produced 951 ozs. scrapings from plates 365 ozs.; total, 16,646 ozs.—Mysore West G. Mysore-Wynad G. Co., 1044 ozs. from 2180 tons.—Nundydroog G. Co., 6500 tons of quartz produced 5364 ozs.; 5018 tons of tailings (cyanide process) produced 479 ozs.; total, 5843 ozs. of gold.—Ooregum G. Co., 10,644 tons of ore produced 5030 ozs.; 10,704 tons of tailings (cyanide process) produced 970 ozs. Total, 6000 ozs. of gold.

MEXICO.

Chihuahua.

W. K. Ryan, of Chihuahua, has bought the Hidalgo zinc mine of Gibbs & White, of Minaca. The property consists of thirty-six pertenencias adjoining the Calera zinc mine of the Calera M. Co. It is 12 miles from Minaca, but a spur will be run from the Chihuahua & Pacific's extension up to the Calera, on which development work is being done.

G. B. Jacobs and S. Lawrence report their jig concentrating plant in Santa Eulalia working successfully. It is what is called the "intermittent jig of the Joplin type," operated by a gasoline engine. The plant does not require a continuous stream of water, water being packed on burros. The plant has a capacity of twenty tons of ore per day. Jacobs & Lawrence are also shipping twenty tons of ore per day. The ore concentrated is of lead.

P. H. McDermott, of Los Angeles, Cal., and W. N. Cannon, of San Diego, Cal., have bonded the Americano lead-silver mine at Terrazas on a basis of \$125,000 gold and will start work by Dec. 15. The mine is owned by the American M. & S. Co. They expect to handle the water with the pumps already on the mine. Bodies of ore are said to exist below water level, and they expect to put in a fifty-ton smelter. The Americano mine is said to have produced in the past two years ore to value of \$125,000 gold, from above water level at 250 feet.

Coahuila.

The Monterey News says the Torreon smelter, of Torreon, which has a lease on the Cabrillos mine in Coahuila, is preparing to increase the present output of 3000 tons per month. Engineer C. Bluse has taken charge of the work. The Torreon smelter exchanges this ore with the "smelter trust" and it is shipped to Monterey, and the "trust" delivers a like amount at Torreon.

A. Longega, W. Beckman, et al. have acquired title to 25,000 acres of coal lands 25 miles west of Sabinas and development will be started by Dec. 1st. Machinery, including engines, boiler and hoists, is on the ground. It is stated that a branch railroad will be built from the mines to Sabinas, on the International Railroad.

Durango.

It is reported from Guanacevi that the De Soto mine has been sold to J. A. Corani of Boston, Mass., for \$600,000, Mexican. About 200 men are at work in the mine and a 100-ton concentrating plant will be built. It is claimed \$100,000 of ore is on the dumps and \$600,000 blocked out underground.

Jalisco.

S. S. Gates, superintendent of the Pazas mine, near Ahualulco, says cyaniding equipment will be added to the company's milling plant.

Lower California.

(Special Correspondence).—The Ybarra G. M. Co. holdings near Calmali have been leased to B. Hall et al. of San Francisco, Cal.

Calmali, Nov. 12.

The Alamo Electric P. & M. Co. is preparing to put in three gas engines, single cylinder construction, 20 inches diameter, 30-inch stroke; also a gas plant, to operate with wood, of 240 H. P. capacity. The plant will be built at Alamo, and is to drive electric generators for furnishing electric power for gold mines.

Mexico.

R. M. Raymond, manager of El Oro M. & R. Co., Ltd., operating at El Oro, in his report for the year ended June 30, 1904, shows mining expenditure of \$794,357; bullion recovered, \$1,424,745; railroad receipts, \$255,411. Mining operations during the year opened up 13,182 feet of workings. From these and older workings 109,288 tons of ore were taken, of which 106,921 tons went through the mill. The ore carried \$14.54 gold and \$2.11 silver per ton. Extraction was:

	Gold.	Silver.
By stamp mill.....	\$2 22	\$0 05
By cyanide.....	0 89	0 83

Another mill is being built to treat the

tailings by a combination of amalgamation and cyaniding. Cost of handling the ore was:

	Per Ton.
Mining.....	\$1 78
Mine development.....	1 08
Milling.....	1 19
Cyaniding.....	1 25
General expenses.....	1 55
Total cost per ton.....	\$5 85

The mine development is reported as showing 561,073 tons of ore in sight. The company has contracted with the Mexican L. & P. Co., Ltd., for electric power.

Sonora.

The Sonora M. & M. Co., C. O'Keefe of Nogales, Ariz., president and manager, will put in a 20-stamp mill and cyanide process on the Juarez mine, near Altar, which it has bought for \$65,000.

Manager C. H. Johnson says coal mining machinery will be put in at the coal mines in which he is interested at San Marcial.

Vera Cruz.

P. N. Furber, president of the Oil Fields of Mexico, says he is putting in machinery, materials and tankage for his company, which is drilling its second well at El Cuguas, near Papantla.

Zacatecas.

La Gloria mine is shipping ore. D. McLaughlin has installed improved methods and machinery. La Gloria mine is at San Pedro de Campo, in Concepcion del Oro district, and shows production of gold with silver and lead values.

NEW ZEALAND.

The Department of Mines has issued its annual report for 1903, showing an increase of \$309,032 in gross value of minerals produced over 1902.—The quantity of gold entered for export during 1903 was 533,314 ounces, valued at £2,037,831, and of silver 911,914 ounces, valued at £91,497, being an increase of £105,920, as compared with the export returns for 1902. Total value of gold, silver, coal and other minerals (including kauri gum) produced to end of 1903 was \$85,813,240. The quantity of gold entered for exportation through the customs for the year was: Auckland, 232,681 ounces; Marlborough, 927 ounces; Nelson, 7962 ounces; West Coast, 125,241 ounces; Otago and Southland, 166,458 ounces.—The report states that hydraulic and alluvial mining continues to give employment to a large number of men in Middle Island (the Nelson, West Coast, Otago and Southland districts being the principal centers of operations). During the year work had been carried on heavily at a majority of the claims, but a severe winter caused damage to water races in parts of Otago, the length of the working season being shortened in consequence.—The dredger mining branch of gold mining was steady during the year, total number of working dredgers returned for 1903 being same as previous year—201. Both the West Coast and Central Otago showed a decrease in number of dredgers at work; but in Southland the number increased.—The sum of £1088 17s 3d was expended in subsidies, for the year ending March 31, 1904, to prospecting associations and parties of miners engaged in prospecting. The royalty obtained by the government in respect to purchase of patent rights of the invention of the cyanide process of gold extraction amounted to £7565. The sum of £5176 17s 7d was paid during the year as compensation to land owners in respect to rivers and streams which had been proclaimed as water courses into which tailings and mineral debris may be discharged. Under the heading of "School of Mines" the report says these institutions continue to prove of benefit to persons employed in and about mines and batteries, and the instruction given is such as to enable students to attain the knowledge necessary to qualify them to hold the responsible positions connected with their profession.—The output of coal and lignite (including a small quantity of oil shale) during 1903, was 1,420,229 tons, being an increase of 55,189 tons over 1902. The Northern district produced 209,795 tons; West Coast district, 781,032 tons; Southern district, 429,402. The total number of mines returned as having been at work during the year was 178; average number of men worked, 2852. There are two State coal mines in New Zealand, one at Seddonville, which started to put out coal towards the end of the year, and the other at Point Elizabeth. Both are producing coal suitable for steaming purposes.—During 1903 the number of fatalities in connection with mining operations was greater than had been the case for each of the previous three years. In the quartz mines, employing total of 3597 men, there were nine fatalities; in hydraulic and alluvial mines and dredgers, employing 6613 men, ten fatalities; and in coal mines, with 2852 persons employed, four fatalities.



## Personal.

J. HALL is foreman of the Wildman mines at Sutter Creek, Cal.

W. J. ADAMS is examining copper deposits near Nacoziari, Mexico.

J. LEWIS is superintendent of the Peabody coal mine, Springfield, Ill.

H. B. LIND is manager of the Jupiter Goldfield M. Co. at Goldfield, Nev.

ERNEST LEVY is manager of Le Roi No. 2 copper mine at Roseland, B. C.

V. P. STRANGE is manager of the Goldfield-Great Bend M. Co. at Goldfield, Nev.

W. ERNEST is mill superintendent of the Columbus Con. C. Co. at Alta, Utah.

J. E. BARNES is superintendent of the Bonanza group of mines at Goldfield, Nev.

FRANK NEWTON is superintendent of the National M. Co. mill, Steins Pass, N. M.

A. H. CRAMPTON is superintendent of the Gold Bond M. Co., operating at Goldfield, Nev.

J. GUNDY is mill superintendent for the Colorado-Tellurium G. M. Co., near Central City, Colo.

A. MURPHY is superintendent of the Pioneer group in American Fork canyon, near Alta, Utah.

J. F. STANDISH is manager of the Sunset M. & M. Co., near Russell Gulch, Gilpin county, Colo.

S. HOSKIN is manager of the mines of the East Boston M. Co., operating near Central City, Colo.

A. WALTERS is superintendent of the After Supper mine of the Benzai M. Co. at Black Hawk, Colo.

T. RATSON is head mining captain at the Ahmeek copper mines, near Calumet, Mich., vice W. Daniel.

L. W. TATUM has returned to Chicago, Ill., from Kentucky, where he had been examining fluor spar lands.

A. BUCKBEE is manager of the Cumberland mines and mills of the Pioneer M. Co., near Silver City, Idaho.

Y. WATERABE, professor of metallurgy in the Imperial College of Tokio, Japan, is inspecting California mines.

R. B. MCGINNIS of Douglas, Ariz., is mining engineer for the Marquette Exp. Co., operating at Goldfield, Nev.

F. L. FOREMAN of Wardner, Idaho, is manager of the Dannemora G. & C. M. Co., operating near Wallace, Idaho.

I. N. LAWRENCE of Deadwood, S. D., is manager of the Victor G. M. & M. Co., operating in Lawrence county, S. D.

R. C. W. KESWICK, a mining engineer of southwest Australia, is studying gold dredging operations at Oroville, Cal.

E. MASSY is superintendent of the La Brisca gold mines of the Greene Con. G. Co., near Magdalena, Sonora, Mexico.

J. E. MILLER, formerly State mine inspector for Illinois, is superintendent of the Superior C. M. Co. at Gillespie, Ill.

J. E. HEWSTON, E. M., has left San Francisco, Cal., to take the management of gold mines near San Jose, Costa Rica, C. A.

E. F. DUNN of Kew, Victoria, Australia, has been appointed as Victorian Government Geologist, vice J. W. Gregory resigned.

A. W. BUCHANAN, secretary of the American Conduit Co. of Chicago, Ill., is in Pasadena, Cal., where he will spend the winter.

W. H. HILL is building a 100-ton amalgamation and concentration plant for the Lucky Tiger G. M. Co. at Yzabel, Sonora, Mexico.

C. E. HEIZER is in charge of the Spearfish mines and mill, near Cyanide, S. D., during the absence of Manager Brown in California.

D. G. JEWETT of Los Angeles, Cal., has been making an examination of the Gold Basin mines, Tuolumne county, Cal., for Los Angeles parties.

C. H. REPATE, formerly with the Washoe C. Co., at Anaconda, Mont., has re-entered employ of that company, as mechanical superintendent.

F. BUTLER, formerly superintendent of the Chainman mine at Ely, Nev., has accepted a position with the Topaz M. Co. at Rama City, Nicaragua, C. A.

A. K. BREWER, superintendent of

Smelter No. 2 at Monterey, Nuevo Leon, Mexico, returned there last week from an extended trip in the United States.

J. R. FINLAY, formerly manager of the Portland G. M. Co., Cripple Creek, Colo., has opened office at Colorado Springs, Colo., as consulting mining engineer.

T. F. BODY has declined the position of the late Edw. Doerr at the Chapman mines, Durango, Mexico. The appointment carries with it a salary of \$10,000 per year.

HARRY P. STOW left San Francisco yesterday for Treadwell City, Alaska, where he assumes charge as assistant superintendent of the Alaska-Treadwell G. M. Co.

F. W. BRADLEY, who sustained severe personal injuries by the explosion of gas at his residence in San Francisco, Cal., last week, is convalescent, and will not lose his eyesight as at first feared.

I. DAVIDOV of New York City, N. Y., has resigned as manager of the Santa Barbara Placer Co., Bertha G. M. Co., Fortuna G. P. Co. and other companies operating in Colombia, S. A., to devote his time to personal holdings.

E. G. COKER, assistant professor of civil engineering, McGill University, Montreal, Quebec, has been appointed professor of mechanical engineering in the City and Guilds of London Technical College, Finsbury, London, Eng., vice W. E. Dalby, appointed professor of civil engineering in Central Technical College, London, Eng.

## Obituary.

JOHN ALLEN, reputed one of the discoverers of gold in what is now Montana City, Mont., died in Helena, Mont., on the 22nd inst. Allen went to Last Chance in 1864. He made his home near Marysville, and discovered and named Pigeon gulch.

M. SOMMER of Salt Lake City, Utah, part owner of the Steele mine at Park City, Utah, died at Park City on the 13th inst. while inspecting the Steele mine. He was also interested in the St. Louis-Ontario mine in the same district. Deceased was a native of Frankfort, Germany, aged 44 years.

H. S. MUNROE, a pioneer miner and mine owner of Tuolumne county, Cal., died at Sonora, Cal., on the 18th inst. Deceased was for several years associated with the late T. C. Birney in working the Bald Mountain pocket mine and the Tanzy lead. He was a native of Massachusetts, aged 73 years.

## Books Received.

"Oiled Roads of California" is the title of Bulletin No. 2, issued by the State Department of Highways, Sacramento, Cal., from whom it may be had on application.

Under title of "Mineral Resources of the United States for 1903," the United States Geological Survey has issued: "Production of Mineral Waters" and "Production of Mineral Paints."

"A Preliminary Report on the Bauxite Deposits of Georgia," by T. L. Watson, is the title of Bulletin No. 11, issued by the Geological Survey of Georgia, W. S. Yeates, State Geologist, Atlanta, Ga. It is well illustrated with engravings of the mines and plants, and contains chapters of the distribution and description of the mines, the geology of the deposits, their genesis and chemistry, and the technology of bauxite in the manufacture of aluminum and alum.

Many books have been written on assaying. Any addition to this great library is now received with some curiosity as to why it should displace standard treatises that have stood the test of time. Each of these fills some place in the varied needs of different assayers. Wet methods, dry methods, theoretical methods, rule-of-thumb methods and practical methods have each been exemplified. "Notes on Assaying and Metallurgical Laboratory Experiments," by R. W. Lodge, is really an account of some of the experimental work carried on by the mining students of the Massachusetts Institute of Technology. It is a treatise on methods of fire assay of metals. As a text book for students it offers a good guide for their work. It requires a previous knowledge of chemical methods and reactions for intelligent study. Its main value lies in

giving reasons why certain results follow certain treatment. In this respect it is far superior to many of the rule-of-thumb manuals issued by correspondence schools. Its chief lacking seems to be practical methods for the immediate and accurate assay of ores when all the equipment of a modern laboratory is not at hand. The new material in the book consists of data derived from experiments in laboratory work. Some new ideas on cupellation appear; the effects of varying the heat and the charge for a number of typical ores is ably discussed. They show that careful scorification gives as accurate results as any other method for the treatment of zinc box residues. 0.05 A. T. of residues ground to pass a 200-mesh screen, mixed with 35 grams of test lead in a 3-inch scorifier, and covered with 30 grams of test lead and 10 grams of borax glass, will give the best results, the temperature being reduced to 780° C. after five minutes of fusion. Laboratory means for testing the most economic treatment of various ores are fully described. John Wiley & Sons are the publishers; it will be sent postpaid by the MINING AND SCIENTIFIC PRESS upon receipt of \$3.

## Commercial Paragraphs.

The Century Electrical Works of San Francisco, Cal., has bought property in Richmond, Cal., on which to erect a factory for the manufacture of electrical apparatus.

The United States Government has just purchased from the Rand Drill Co. twenty-seven Imperial pneumatic hammers and drills. These are to be used in connection with the Manila harbor improvements.

## Latest Market Reports.

SAN FRANCISCO, November 25, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59c, refined (1000 fine); San Francisco, 59c; Mexican dollars, 47c San Francisco, 47c New York.

COPPER.—New York: Standard, \$14.87½; Lake, 1 to 3 casks, \$14.87½@15.12½; Electrolytic, 1 to 3 casks, \$15.00; Casting, 1 to 3 casks, \$14.62½; San Francisco: \$16.00. Mill copper plates, \$17.00; bars, 18@24c. London: 286 spot per ton.

Copper shows a further slight advance over the quotations of last week, the highest price quoted being \$15.12½ for Lake. No further rapid advance is anticipated at this time, though the price may continue to slowly climb upward.

LEAD.—New York, \$4.70; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: 41½ long ton.

SPELTER.—New York, \$5.87½; St. Louis, \$5.00; London, \$25 5s 3d ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$29.00@29.17½; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, 32½@35c. London, \$132 10s spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100 lb. lots, 16c.

ZINC.—Metallic, chemically pure, 3½ lb., 50c; dust, 3½ lb., 10c; sulphate, 3½ lb., .04c.

NICKEL.—New York, 40@47c 3½ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$14.60 @—; gray forge, \$12.00; San Francisco, bar, 3c 3½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$19.50; open hearth billets, \$19.50; San Francisco, bar, 7c to 12c 3½ lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ¾ lb. above kegs price; in 1 and 5-lb. tin cans, 100 lbs. per case, ¾c. per lb. above kegs price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for car-load lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city 3½ bbl.

CEMENT.—Imported, \$2.15@2.65 3½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 3½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. O. B. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c 3½ set; 14 oz., 40s., 10c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c 3½ lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 3½ lb.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c 3½ lb.; Cal. s. soda, bbls., \$1.20@1.40 100 lbs.; sks., \$1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c 3½ lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66½ B, 1¼@2c 3½ lb.; nitric acid, carboys, 8c 3½ lb.

OILS.—Linseed, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; Lucol oil, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 80° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do. in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c 3½ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c 3½ lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c 3½ lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, 3½ lb., 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c 3½ lb.

MOLYBDENUM.—Best, \$2.75 3½ lb.

CHROMIUM.—90% and over, 3½ lb., 80c.

PHOSPHORUS.—American, 3½ lb., 70c.

SILVER.—Chloride, 3½ oz., 90c@1.00; nitrate, 55c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—3½ lb., \$2.75.

SODIUM.—Metal, 3½ lb., 50c.

BISMUTH.—Subnitrate, 3½ lb., \$2.10.

URANIUM.—Oxide, 3½ lb., \$3.50.



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## In Need of Information.

The strange and somewhat unusual spectacle is sometimes seen of a mine remaining idle for years when adjoining it are mines which are working and

mines are idle because the owners are unable to treat the ore satisfactorily, and are unwilling to risk the money necessary to build experimental works for the purpose of gaining information on the subject. In these days there are few ores the successful treat-

lar ore under discussion. Again, a satisfactory and inexpensive method of treatment may be known; but the mine owner, being wholly unacquainted with it, seeks in vain through the range of his own limited experience for a solution to the vexing problem.



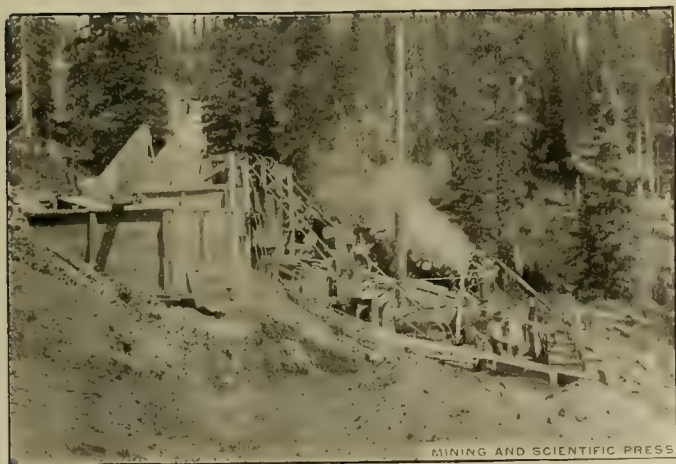
Ten-Stamp Mill of Sanger Mine, Near Baker City, Or. (See Page 373.)



Hoist at the Sanger Mine, Near Baker City, Or. (See Page 373.)



Hoist and Mill at the Virtue Mine, Near Baker City, Or. (See Page 373.)



Stamp Mill and Jigs at the Imperial Mine, Near Sumpter, Or. (See Page 373.)



Mill Foundations at the Sanger, Near Baker City, Or. (See Page 373.)

each month pay a dividend. If it be known that the idle mine contains no ore of value, its idleness is easily explained, but when the idle mine has produced a large amount of gold and it is known that ore bodies still exists in the mine its idleness is difficult to explain, particularly when no legal difficulties are responsible for the idleness. In some instances good

ment of which is beyond the knowledge of metallurgical engineers, but the well known methods may not be economically applicable to a particular case. Smelting is the last resort in a great number of instances, but while it is known that smelting will successfully reduce the ore, it may be too expensive for the values contained in the particu-

For years the MINING AND SCIENTIFIC PRESS has devoted itself to the exposition of all that was reliable and valuable to the miner, the metallurgist and engineer, and there are few processes in actual and successful operation in any part of the world that have not been exploited in these pages—often illustrated by engravings and drawings.



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J. F. HALLORAN.....Publisher

SAN FRANCISCO, DECEMBER 3, 1904.

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THE usual number of fatalities resulting from the thawing of dynamite is being reported. In these accidents the cook stove, steam boiler, open fire and other methods, long since recognized as very hazardous, figure as prominently as usual upon the approach of each winter.

IN a suit for alleged damages resulting from sulphurous fumes from the copper reduction works at Ducktown, Tennessee, the Supreme Court of that State has rendered a decision in favor of the copper companies, and dissolves the perpetual injunction issued by the lower court restraining the copper companies from roasting sulphide ore in heaps in the open air, on the ground that the process was a nuisance. The court evidently judged the matter from the standpoint of the relative benefit and damage to those interested, and decided that heap-roasting was not a nuisance in these cases and that no damages were obtainable as a result of the failure of vegetation to grow in the vicinity of the roasting heaps.

THE prolonged strike which has been on in the Telluride district of southwestern Colorado since September 1, 1903, has been declared off by the Western Federation of Miners, who claim they have gained all they asked—that is, an eight-hour day and \$3 per day. Nothing is said about the employment of union men only and, as press dispatches are silent on this subject, it is probable that this point was not insisted upon. All Colorado will no doubt give a sigh of relief at this fortunate ending of a long and bitterly contested fight between organized labor and organized capital. The probability is that mining in southwest Colorado will receive a decided impetus and that greater confidence in the future will be felt throughout that State.

## Annual Labor and Relocation.

The question of the right of a locator of a claim to profit by "his own negligence in failing to perform the annual labor" (or to make improvements) required by the Federal law is one which has run the gauntlet of the courts. The question as it came before the Supreme Court of Utah was: "Can the locator of a quartz mining claim, who has allowed his location to lapse by a failure to perform the necessary work, make a relocation or a new location covering the same ground?" The court decided that such right was recognized by the Circuit Court of the Ninth Circuit (Warnock v. De Witt, 11 Utah, 324; 40 Pac., 205. Case dismissed by the United States Supreme Court on appeal, for failure to comply with Rule 10) and also by the Land Department. Further, the fact that a prior locator, after his right has lapsed, may renew it by resuming work, would appear to be a favor or right granted to such prior locator, but to deny him the right to locate is to deny him the right given to strangers. The case in the circuit court referred to is that of Hunt v. Patchin, 35 Fed., 816, and that of the Land Department was a letter from Acting Commissioner Holcomb to a man in Leadville, Colo. The case of Hunt v. Patchin does not appear to apply directly to the question, that being a case wherein several co-owners were concerned, and arose over an instance where one of a number of partners attempted to relocate for himself alone, while excluding his copartners. In the instance of the Land Commissioner, it was not a litigated case, but merely the opinion of the Commissioner, expressed in a letter, that one of several co-locators, all of whom are in default, may relocate in his own name, and hold the claim adversely to his former partners.

The Federal law makes discovery and location of a mineral vein, or deposit, the basis of the title to such property, and subsequently its development, by working and improvement, as a condition upon which it may be held. (Erhardt v. Boaro, 113 U. S., 527, 535, 5 Sup. Ct. Rep., 560.)

Lindley on Mines calls attention to another important phase of this question, which is of particular interest at this time, on the eve of a new year, which is that "the forfeiture is not complete until a relocation has been made. It is the entry of a new claimant with intent to relocate the property, and not mere lapse of time, that determines the right of the original claimant. The right to resume work before relocation by another is evidence that the original estate is not wholly lost by the failure to do the work. (Larkin v. Sierra Buttes G. M. Co., 25 Fed., 337, 343.)

The Supreme Court of Colorado has said: "As between the locator and the general Government the failure to do the annual assessment work does not result in a forfeiture. In other words, it is not necessary to perform the annual labor, except to protect the rights of the locator against parties seeking to initiate a title to the same premises. \* \* \* To otherwise express our views, it might be said that, after a valid location, the title thus acquired remains so, whether the annual assessment work is performed or not, until forfeited or abandoned. (Beals v. Cone, 27 Colo., 473.) \* \* \* Forfeiture is not complete until some one else has appropriated the property." (McCarthy v. Speed, 11 S. D., 362.)

By location the locator is given by the Federal laws from one to two years (according to date of making location) within which to perform his assessment work. Within this period his claim is valid and no one can deprive him of it. If at the expiration of the time (end of the second calendar year after date of location) he is permitted to relocate he may hold the claim another period of two years without work, and in this manner, by making a relocation biennially, he could hold the claim indefinitely without any work whatever, which is clearly contrary to the spirit of the law.

Annual work if performed as required by the Federal statutes (in addition to such further acts as may be required by State or Territorial and local laws) secures the locator in his title as against all others, and if the locator has failed to perform his assessment work his claim is subject to relocation, which he can only prevent by resuming work before a stranger enters upon the claim for this purpose.

Unfortunately the Supreme Court of the United

States has never passed upon the question, but there is little doubt but that the attempt to hold a claim indefinitely or for any period longer than that allowed by the statutes by the mere act of relocation would be declared non-compliance with the law and the claim subject to relocation by a stranger.

## Deeper Tunnel for Cripple Creek, Colo.

Realizing the great benefits derived from driving the El Paso drainage tunnel in the Cripple Creek district of Colorado, the mine owners are now seriously considering the driving of another tunnel under the hills of the district which will be 1500 feet lower than the present tunnel. The El Paso tunnel was driven a total distance of about 6000 feet. A portion of this distance was already in existence when the tunnel was projected, being the lowest level of the El Paso mine. The cost of this work was about \$85,000, which was subscribed by those directly benefited by the enterprise. It has been even more far-reaching in its beneficial effects than was anticipated. It is known that such a tunnel as that now proposed would make available a large amount of ore lying below the present lowest drainage level, but that this immense block of ground—1500 feet high and in some places 4000 feet high, to the surface—would necessarily require a long time for its drainage, consequently the tunnel should be started as soon as possible in order that the benefits may be enjoyed as soon as practicable. There is still a large amount of unexplored ground above the level of the El Paso tunnel, but in all probability this will be mostly worked out before the proposed deep tunnel can be completed, and before it has had a noticeable effect on the drainage of the ground between the level of the El Paso tunnel and that now proposed. The rate of progress in such a tunnel would probably not exceed 3500 feet per year, if it attained that much, though the first year this distance might be passed by working from three or more headings, but it is unlikely that any attempt would be made to sink to the tunnel level in the deep portion, as sinking any faster than the water level receded in the rocks would be very expensive. It is said the tunnel will be started near Marigold, a village on the Canon City road.

THE gold districts of Western Australia are struggling with the "theft-of-gold" problem and are seeking legislation which will provide more extreme penalties than those at present existing for the repression of this growing evil. An effort is being made particularly to reach the receivers of stolen gold, of whom it is said no less than fifty were known to the authorities a few months ago, but the active efforts made to apprehend these receivers of stolen gold has made them more cautious if not more honest, and the stealing continues without serious interruption. Legislation does not prevent the theft of gold from a mine any more than it does the theft of other valuables, but a means of thoroughly searching the men is undoubtedly the best preventive. This theft of gold is world-wide and appears to be one of the penalties which the owners of rich mines must pay for their possession. It is always the mines which produce rich pockets of native gold, or very rich tellurium ores, that are the heaviest losers. It is rarely that ore rich in gold is stolen if the evidence of the richness is not apparent.

THE principal, and in fact, the only, objection to wild cat mining reports and mine promotions is that they do not, as a rule, state facts. A good prospect may develop into a large and valuable mine, but the "fact" that it is at first a good "prospect" does not justify the statement that it is a property worth millions. If promoters would state the truth in their prospectuses no one would object, and those who were willing to take the risks such an investment involves could have no cause for complaint, but the glittering promises made by these irresponsible schemers is often too much for the cupidity of the unsophisticated, who go in to win, but always lose. Mines are made, rarely found, and a prospect which at the beginning makes an unattractive showing, sometimes proves to be a great and valuable mine, while on the other hand good prospects do not always develop as satisfactorily as anticipated. In either case why should not the facts be told, that they who desire to speculate may know just what risks they are taking?



## CONCENTRATES.

It is impossible to judge the value of ore in a single mine, much less that of an entire camp or district, without a thorough examination of every mine in the district.

SMELTERS cannot reduce ores without a certain amount of silica being present in the charge, and if the ore does not furnish the necessary amount it must be supplied from some other source.

WHERE governors on engines are run by a belt they should be in duplicate, so that in the event of one belt breaking the other would probably remain intact and thus maintain control over the engine.

THE proper way to learn what lands have been patented to the railroad companies is to apply to the United States Land Office in the district in which the lands, concerning which information is desired, are situated.

ZINC ores, to be considered first-class, must contain at least 60% zinc in the Missouri field. The attempt is made to produce, by dressing and concentration (magnetic and otherwise), as high a grade ore as possible. Pure zinc blende contains 67% metallic zinc.

THE tin mines on the east coast of Australia, near Lottah, occur in granite as a stockworks, there being no sharply defined limit to the ore zone either longitudinally, vertically or laterally, though the granite in which the ores occur outside of the mineralized zone is wholly barren of tin.

THE greatest element of danger in mine work is in the falls of rock from the roof of drifts and stopes, in places where no imminent danger is apparent. This is often the case in those portions of veins where the walls converge upward, leaving A-shaped masses to drop, and with little or no warning.

THE longest "V" flume in California is that in Madera county. It has a length of 53 miles, with 18 miles of branches. The sides are 36 inches, with a width at the top of 46 inches. It was built to float lumber from the mountains to the yards in the San Joaquin valley. It is stated to have cost \$270,000.

THE silver sulphide resulting from precipitation from sodium-hyposulphite solutions by means of sodium sulphide is often difficult to reduce to bullion. It were better in many instances to ship the silver sulphides thus obtained to a refinery, if the shipper and refiner can agree upon the value of the shipment.

MANGANESE is associated with a very large number of minerals, some of them very common, others comparatively rare. It exists principally as oxide, but also occurs more or less abundantly as silicate and carbonate. It occurs with tungsten, tantalum and other rare and heavy minerals. The principal production of manganese ores is from its various oxides.

AN apex discovered beneath a later flow of volcanic rock, or of gravel or other detritus, is as valid as an apex occurring at the surface, but in all cases where the extralateral right is involved it is necessary to absolutely identify the vein and its continuity from the apex to point of contention, and this is sometimes difficult where the vein system is complex and broken.

AT present in California the law protecting the owners of mining claims, bonded to others, from attachment by workmen, by posting a notice to the effect that the claim owner will not be responsible for debts contracted, etc., is somewhat involved, but it is probable that a new and more comprehensible act will be passed at the coming session of the Legislature of that State.

ERUPTIVE ROCKS are often found to contain fragments of unaltered sedimentary rocks which occur in the vicinity. Thus, a sheet of rhyolite may be found to enclose fragments of quartzite which underlie the rhyolite. Sedimentary rocks near contact with intrusive eruptive rocks often contain crystals of feldspar and other minerals, the result of contact metamorphism.

WHERE a large volume of water is obtainable under low head, turbine wheels may be put in to develop power, and often such installation is less expensive than the high head and impact wheel installation, because of the longer ditch and pipe line required. In the latter, less water will do more work under certain conditions. Of these conditions the person contemplating an installation must be the judge.

A BARREL of crude oil in the California oil fields contains forty-two gallons; 2240 pounds of oil (long ton) is equal to seven barrels, or about 7.6 pounds per gallon. It is generally estimated that four barrels of California fuel oil equals 2240 pounds of good coal, and a ton of good coal is usually estimated to be equal to two cords of dry pine cord wood. Numerous experiments made with oil have demonstrated that a pound of good oil

burned under a tubular horizontal boiler, with a burner of proper construction, will evaporate from 13 1/2 to 15 pounds of water. Nearly all the varieties of clean fuel oil in California give approximately the above result. The fuel value of coal varies greatly.

A PATENT may be applied for to a mining claim as soon as the necessary \$500 worth of work has been performed. In this the element of time is not considered. The work may all be accomplished in a single day if desired. It is not necessary to do the work for five years—\$100 worth annually—in order to obtain patent, though a patent may be obtained at the expiration of this time if \$500 worth of assessment work has been done or improvements made.

It has been claimed that gold was never present in rocks in the absence of pyrites, but this has been proven to be without foundation. Gold is known to occur in many instances in quartz, marble, sandstone and in other rocks—eruptive, metamorphic and sedimentary—where no pyrite is present. Pyrite is said to always contain gold, but it is sometimes present in that mineral in such infinitesimal amount as to escape detection, if actually present at all.

DIKES AND FAULTS are of such frequent occurrence in the Transvaal as to seriously affect the position of the surface plants, and the mining operations in the mines. It has been customary in estimating the tonnage of any given area on the Rand to deduct 15% as an allowance for faults and dikes. In some instances, however, the faults are thrusts and the payable area is duplicated over a certain portion of the beds, which will result in giving a greater tonnage than the estimate calls for, but most of the faults are normal.

THE machinery (attached to the soil), such as engines, mills, derricks, pipe lines, etc., which may be found on a mining claim, either quartz or placer, subject to relocation, passes to the relocater of the claim, on the general principle that the title to the claim passes to the relocater, and that the original owner cannot enter the premises to remove the machinery, for the reason that he is a trespasser. It should be understood that the law does not specifically state that the relocater becomes the owner of such improvements as are attached to the soil, but that it is the principle above stated that operates in such cases.

THERE are now in California few tailings piles containing values. Nearly all have been treated or are in process of treatment by the cyanide process. The exception to this statement is found in numerous large dumps of tailings from chlorination works in various parts of the State. These tailings consist largely of iron oxide, partly roasted iron sulphides, a little silica, lime, magnesia, etc., and gold and silver to the amount of \$3 to \$10 per ton. Thus far all efforts to work these tailings at a profit have been abortive, though the attempts in that direction have been many, and some of them elaborate and expensive.

THE best idlers to carry running ropes are grooved wheels. They are superior to cylindrical idlers, and do less injury to the rope. When idlers are placed in at a bend in a shaft, it is well to put in two or three wheels provided with double grooves. These should be placed side by side, forming a series of either four or six grooves covering a space of 8 to 12 inches, which is almost certain to come within the range of the rope as it rises on approaching the bend. The idlers should run loose on the shaft, being held in place by collars and given only sufficient play to keep them from binding. The shaft may also turn in boxes, thus reducing friction and lessening the liability of the idlers to cut the shaft. The idlers should be oiled daily, and more frequently if necessary.

IN some smelters it has been found advisable to charge into the furnace with the ore blocks of wood, which, as they reach the zone of fire, burn and at the same time serve to keep the charge from packing too firmly. It is only with ores which show a disposition to thus pack tightly that wood is used. The coke charge in furnaces varies greatly from almost none to 20%, or even more. From 6% to 7% is probably the average with copper furnaces treating sulphide ore. The general impression is that all coke is alike, but smelters are aware that such is not the case. One shipment of coke may be all right, and good work is done with it, when another shipment from the same manufacturers will give very different results on the same ores. This is particularly noticeable in lead smelting.

IN mica schist lenses of quartz are often found which are gold bearing, and many mines have been opened on this type of vein formation. Usually the lens feathers out and mining ceases until some one has the courage to prospect blindly for another lens in the vicinity of that worked out, and in many cases the effort is successful, and the mine again becomes profitable. These lenses usually occur along a definite strike approximating that of the schists, and they also generally re-occur in depth in similar manner. No mine of this kind should be considered worked out until careful search has been made on both strike and dip of the mineral zone for other shoots of ore. In some instances ore deposits of this character are accompanied by intrusive dikes, and in others none are found. Where such do occur they are

often of granitic character—pegmatite or aplite. The dikes themselves are also sometimes gold bearing. In San Diego county, Cal., in Julian district, pegmatite accompanies veins of the same description, and also in the Harney Peak region of the Southern Black Hills of South Dakota. In Madera county, Cal., the intrusive dikes associated with gold veins are mostly aplite. Dikes often occur with the gold quartz lenses of Georgia and the Carolinas, and also some of those north of Lake Superior, in Canada.

SOME mill men recommend the use of dilute cyanide of potassium on mill plates, and some even think it a good thing to introduce to the battery; but the consensus of opinion among mill men is that cyanide hardens mill plates and eventually renders them unfit for amalgamation. The copper should be thoroughly cleaned, and, after proper annealing, given a heavy electroplate of silver. It is then in first class condition, and, with proper care, should remain so. For many years it was thought by mill men that raw copper plates were superior to all others; but experience has shown that silver-plated plates are superior to all others for amalgamating gold, and tests in mills with raw copper plates have proven that the percentage of gold saved was increased materially by the use of silvered plates.

THE copper mines of Ducktown, Tenn., were discovered about 1846, and systematic work commenced in 1850. In 1854 smelters were built at the mines, since which time the mines have been operated almost without interruption. The outcrop of these mines consisted of a ferruginous gossan first worked for iron. The country rock is mica schist, with siliceous zones of semi-schistose quartzite. The formation is presumed to be Archean. The ore occurs in zones of fracture and shearing. Below the iron gossan were found rich copper oxides and carbonates; lower in the sulphide zone occur chalcocopyrite, pyrite, pyrrhotite, zinc blende and galena, with calcite, quartz, zoisite and amphibole. The average value in copper is 3.5%. In some respects these deposits resemble those in northern Madera and southern Mariposa counties, California.

THE rich gold quartz veins of Charters Towers district, Queensland, Australia, are so flat that one can walk up and down the inclined workings without difficulty. Few of the veins have a dip of 40°, and some are as low as 10°. The country rock (syenite) is generally hard, the veins comparatively small, and the cost of mining is, accordingly, much higher than in some other fields. Most of the mines are dry, and in some of the workings the men walk along the levels ankle deep in dust, which, rising, permeates the air. The vein material is quartz carrying pyrite, galena, blende, chalcocopyrite, and sometimes arsenical sulphide. The average size of the veins is 3 feet. Owing to the scarcity of timber in the region, the walls in the larger stopes are supported by cribs of timber filled with waste rock. These are locally called "pig sties" by the miners. In some of the mines the walls swell upon exposure to the atmosphere, which makes timbering expensive.

FERRO-MANGANESE is added to the molten metal in steel making for the purpose of driving certain injurious substances into the slag, thereby purifying the steel. Manganese is also added to steel to make a metal for certain purposes where hardness or toughness are desired. Nickel is used also in making hard, tough steel, and particularly in armor plate. Some of the armor plate also contains chromium. The percentage of these metals used in steel armor plate is 3.5% nickel, 1.5% chromium and 0.25% carbon. Molybdenum is used in steel making, its use being on the increase. Tungsten is another substance used in steel making, molybdenum and tungsten acting much the same, except that less of the former is required to produce the same results as the latter. The peculiar property imparted to steel by the addition of tungsten or molybdenum is that the steel will harden, after heating, in the atmosphere without resorting to the usual tempering methods, such as plunging in oil, water, brine or other special solutions.

TANTALITE is a tantalate of iron and manganese with the formula  $\text{FeMnTa}_2\text{O}_6$ , and is often accompanied by small amounts of cupric oxide and lime. Tantalite contains about 84% tantalum pentoxide. It is retailed at \$9 to \$10 per gram. The metal is insoluble in mineral acids, including aqua regia, but dissolves slowly in hot hydrofluoric acid. The color of tantalite ranges from cinnamon-brown to brownish-black, with a sub-metallic luster. It occurs in crystals and also massive in granite and schist. To test for tantalum Ohly gives the following: Take 5 grams of the finely powdered mineral, moisten with 5 c.c. water in a platinum capsule; treat with 10 c.c. of fuming hydrofluoric acid, which decomposes the mineral in ten minutes; heat on water bath until the excess of acid is expelled, when 30 to 40 grams of water are added and the mixture filtered; the residue is washed, adding one or two drops of hydrofluoric acid. The filtrate contains all the metallic acids present, beside iron and manganese, and the residue remaining on the filter contains the earths, yttrium, cerium, thorium and uranium oxides. Carbon dioxide passed through the filtrate, obtained as above, precipitates anhydrous tantalate; hydrochloric acid precipitates tantalum pentoxide at first, and then redissolves it by addition of acid; ammonium chloride or sulphate precipitates tantalate hydrate.



## Producing Mines of Eastern Oregon.\*

[FROM A STAFF CORRESPONDENT.]

The gold fields of eastern Oregon are in the north-eastern part of the State, in a complex mountain group known as the Blue Mountains. These consist of an irregular sequence of apparently detached mountain ridges, the whole forming a spur from the more pronounced system of Idaho. This region extends from the Snake river on the east to the eastern watershed of the Deschutes river on the west, and from the Columbia lavas on the north to the deserts of the Malheur river and Harney lake on the south. The Columbia river drains the whole.

Geologically, these numerous smaller mountain ridges are cores of older rocks, surrounded and partly covered by more recent lava flows. They consist of various sedimentaries, chiefly argillites, with their strata folded, compressed and shattered by different intrusive granular rocks. The enveloping lavas are various in their composition. The geological history of the region has apparently been similar to that of the Sierra Nevada mountains of California. During Paleozoic and Triassic times various argillaceous muds, together with lavas and tuffs in the latter end of the period, were unconformably deposited upon an Archaean gneiss under the sea. Later these deposits were uplifted, folded and compressed by the intrusion of granular rocks, consisting of grano-diorites, diorites, gabbros and peridotites. An active period of erosion ensued, only to be checked and diverted by great intrusions of rhyolite and flows of andesite and basalt, which covered the lower levels and left the higher mountains as islands in a sea of lava. Subsequent erosion modified the region to its present condition.

Economically, the above account of the formation of the country is necessary for a proper understanding of the various mineral occurrences which are closely connected with the geological changes. In the first place, no important gold or silver deposits are found in the recent lavas. They are confined solely to the older rocks. Moreover, all veins containing gold or silver appear to be massed near the contacts of the sedimentary rocks with the granular intrusives. They do not necessarily follow the line of contact, but are found indifferently in either the sedimentaries or intrusives, continually branching and crossing the contact, the fissures dying out at one place only to be replaced by other parallel fissures. They are usually found as a number of local aggregations of rather short, irregular veins, and not as a well-defined and continuous belt. It is these separate occurrences that constitute the districts. Each district may consist of several mines, usually similar in formation. It is the object of this paper to describe in detail a few of the producing mines of the more important districts.

The principal workings in the immediate vicinity of Baker City are at the old Virtue property, 8 miles east of Baker City. This mine is one of the pioneer properties of eastern Oregon, having been worked intermittently since 1863, producing over \$3,000,000 in that period. In June, 1904, the Virtue Mines Development Co. acquired this and adjoining properties and has finished the installation of a hoist with a capacity for 2000 feet, preparatory to further development of the property.

The present holdings consist of five parallel veins, three of which—the Virtue, Palmer and Chicago—have been worked more or less extensively in the past, but hampered by water from deep mining.

These veins strike northwest and dip 45° to 80° southwest, being simple fissure veins with a quartz filling, in a fine-grained greenstone, probably an altered volcanic tuff. The ore is mostly free milling, the gold being remarkable for its fineness, mint reports showing an average above 900. Small amounts of chalcopryrite, pyrite and a trace of tetrahedrite, argentite and stibnite make up the sulphurets.

A new shaft has been started near the center of the property for the purpose of working these main veins. This new shaft has three compartments, two for hoisting and one for manway, pipes and pumps, the hoisting compartments being 4½x5 feet and the other 5x6 feet. The shaft has been sunk 375 feet, with two stations, that at the 350-foot level having been cut to work the Palmer and Chicago veins.

A direct-acting double-drum hoist has been installed by Allis-Chalmers for this shaft. It is designed to hoist a load of 6000 pounds at a speed of 1250 feet per minute from a depth of 1500 feet. Steam is used as motive power in Corliss engines. Station and sinking pumps are on the ground ready for installation. The hoist is further equipped with two 80 H. P. boilers, Ingersoll air compressor and dynamo for lighting.

Within the past eighteen months the 20-stamp mill at the 600-foot Virtue shaft has been completely overhauled. The ore is mostly free milling, yet five 4-foot Frue vanners have been installed.

At present steam is used for power; but with the completion of the electric power plant at Sanger the company contemplate putting in a complete electric plant. When ore is hoisted from the new shaft it will be hauled in wagons to the mill until the installation

of a new tramway from hoist to mill. J. K. Romig of Baker City, Or., is manager. (See engraving front page.)

At the Emma, Manager W. L. Vinson of Baker City reports that the 5-foot Bryan mill installed in May is running steadily.

A gasoline hoist is in use in sinking a 1000-foot winze 700 feet from the mouth of the main tunnel. The 10-stamp mill is also run by electricity. It is located at the mouth of the 1000 foot tunnel, which taps the pay shoot at a depth of 500 feet.

The White Swan mine is situated 3 miles east-southeast of the Virtue. Here the vein is nearly vertical, consisting of quartz and calcite in a country of soft black argillite near contact with altered diorite. The property was sold for debts contracted by the older management to the White Swan M. Co., Ltd., C. H. Stuller manager. A year ago the pumps were removed and the mine permitted to fill with water; but it is intended to sink a new shaft, using electricity to run the hoist and mill.

A small amount of work is intermittently done upon the other properties of the district—the Mammoth, Brazos, Friday, Cyclone, Flagstaff and Cliff.

The Sparta, Sanger and Cornucopia districts lie to the east of Baker City. Considerable work has been done throughout these regions, but at present the Sanger mine is the most important producer. The Sanger mine and 10-stamp mill are near the head of Goose creek. (See engraving front page.) It is owned by the Sanger Gold Mines Co. and is under the management of J. K. Romig. It is proposed to install a large electric power plant on Eagle creek to

property the ore bodies have been opened up both to the northeast and southwest by a series of drifts.

On the Excelsior side the two tunnels have each been driven 1000 feet; upon the Eureka side 1400 feet. Winzes, shafts and connecting levels give a total of 15,000 feet of development work. The vein consists of a shattered zone in black siliceous argillite. The ore body is well defined, existing as three shoots, with narrow division areas. On August 1, 1904, a new three-compartment shaft was started in an attempt to recover some of the old workings. Compressed air is employed in hoisting and Rand machine drills are in use. The mill is equipped with twenty stamps, ten 4-foot Frue vanners, three 6-foot Frues, one Johnson and two No. 5 Wilfleys. Water, with auxiliary steam, furnishes power.

Six to seven carloads of concentrates are being produced monthly, the tailings being banked. Considerable experimentation has been done with regard to cyaniding these latter, but thus far without much success, owing to the basicity of the ore.

The Columbia M. Co. owns the Columbia and Apomattox claims, to the south of the E. & E. A 750-foot shaft has been sunk on the Columbia, opening up the ore bodies through 8000 feet of workings. Electrical power, with auxiliary steam, is used for the hoists, pumps and 10-drill compressor. The mill capacity has been enlarged to eighty tons. A 60-ton cyanide plant is working the tailings. F. S. Baillie is manager. The Climax property, to the east, is being developed in a small way under the bond of E. L. Linns of Houghton.

The mines of the Cable Cove district are 11 miles



E. & E. Mill, Bourne, Baker Co., Or.

furnish power for the Sanger and Virtue mines. Considerable development work has been done, showing the country to be a black clay slate. The ores are mostly free milling.

The Cracker Creek district, with Bourne as a center, lies about 7 miles north of Sumpter. The "mother lode" of this district extends strong and unbroken for 5 miles southwest from the North Pole mine, through the E. & E., Columbia, Golconda and other claims, and is accompanied by smaller veins parallel to the main lode. The country rock consists of various argillites, the veins occurring in shattered zones with a quartz gangue containing gold and sulphurets. Lindgren states it to be the most strongly developed and persistent vein in the Blue mountains.

The North Pole mine is owned by the Eastern Oregon M. Co., under the management of Emil Melzer. The mine has been developed and stoped through a crosscut of 1000 feet and drift of 1700 feet and four smaller tunnels and drifts, giving a depth of 450 feet. The surface ore was oxidized and easily treated, but the sulphuret ore met in depth is difficult of treatment. Two Hallidie tramways, 10,500 feet in length, convey the ore from the mine to the mill.

The mill is equipped with thirty stamps, twelve Frue vanners, four Johnson, six Overstrom and two Wilfley tables.

The pulp is pumped from the vanners and distributed by Butter's distributors to the main cyanide tanks, each 24x6½ feet, the slimes being treated in six agitation tanks. Two 48-inch Pelton wheels and an auxiliary steam plant furnish power. Sixty tons are being treated daily. Seventy-five men are at work.

The Eureka & Excelsior, or E. & E., lies between the Columbia and North Pole mines upon the main lode. (See accompanying illustration.) Since August 1, 1903, it has been continuously worked by the Bourne Gold M. Co., under the superintendence of J. S. Wyatt.

From the sides of the creek flowing through the

north of Sumpter, on the divide between the north fork of the John Day and the Powder rivers. In general the deposits are normal fissure veins in grano-diorite with northeasterly strike, most of them being located on the hanging wall of the Eagle vein—a strong lode traceable for over 2 miles. The prevailing dip is to the southeast. The ores are arsenical sulphides, carrying iron, lead, copper and zinc, with but little free gold below 50 feet from the surface. Many prospects have been worked in a desultory way since the discovery of the district in 1872; but at the present writing the California, Imperial, Overland, Alpine and Valley Queen are the only mines being actively operated.

The California is being worked by the Turnagain Arm G. M. Co. The mine is opened by six tunnels and a crosscut of 1360 feet. Tunnel No. 1 has been driven 93 feet; No. 2, 143 feet; No. 3, 200 feet; No. 4, 322 feet; No. 5, 880 feet and No. 6, 255 feet. The workings give a depth of 990 feet. A Hallidie gravity tram carries the ore 4280 feet from the mine to mill, where a 200-ton Austin gyratory crusher, two sets of Cornish rolls, two Standard concentrating tables, and Sturtevant shaking screens treat the ore. A reverberatory roasting furnace and two 300-ton cyanide leaching tanks and accessories treat the tailings and oxidized ore. An 80 H. P. steam plant supplies power. L. R. Bellman is manager.

The Imperial has been in operation since the middle of August under the management of John Arthur. Over 4000 feet of development work has been done on the group of twenty claims. A stamp mill and jigs have been installed to treat the lower-grade ore for shipment. (See illustration front page.) The ore is washed in water boxes to remove the clay and mud and then hand sorted, the waste and the rich shipping ore being taken out and the remainder run through a 7x9 Dodge machine, crushing to 1 inch. Together with the screenings this product is automatically fed into a trommel with ¼-inch screens. The product not passing this is crushed in the 3-stamp

\*See illustrations on front page.



mill. Perhaps 10% of the values can be removed by amalgamation, and the remaining value is concentrated ready for shipment by three hand jigs, each with a capacity of five tons per day.

In Grant county, the Blue Bird mine, at Lawton, has been under the superintendency of George J. Barrett since July 15, 1904. The property contains three veins, which have been opened up by about 2000 feet of development work. A 5-stamp mill and rolls have been installed and a cyanide plant is planned to handle the base ore. This will be crushed in three sets of rolls and then run to the cyanide plant over copper plates.

This account is in no way complete or finished, but embodies an outline description of some of the properties visited by the writer. A large number of important mines have been left out, simply because unforeseen circumstances prevented a visit to them. It is hoped to remedy this omission in a future paper.

This part of the country is prosperous, as a whole. In contrast to the condition of two years ago, the producing mines are running steadily.

### Pumping Water on the Comstock.

TO THE EDITOR:—The capacity of the electric pumps on the 2150 level of the C. & C. shaft on the Comstock, Virginia City, Nevada, is 4500 gallons per

### A Free Gold Mine.

Written for the MINING AND SCIENTIFIC PRESS.

In the Black Hills of South Dakota are many varieties of ore bearing gold, silver, lead, tin, copper and other metals and minerals of value, and among them are some which are typically free milling gold ores. Originally the Homestake yielded a large percentage of its values to amalgamation and was considered free milling, but the change from the oxidized zone to that of the normal sulphide resulted in the necessity for changes and elaborations in the treatment. In Pennington and Custer counties, however, are veins and deposits of gold ore which are practically free milling, though there are many where the values in depth are associated with sulphur, arsenic and other substances which render the ore base and difficult of treatment. Prominent among the free milling mines is the Uncle Sam, owned by the Clover Leaf Gold Mining Co. The mine is situated on a low ridge on the south side of Elk creek, near Perry station. The formation is the crystalline slates, mica schist, amphibolite schist, and a dense, fine-grained quartzite which has been recrystallized by the infiltration of silica. No intrusive rocks occur with or in

vicinity of the main ore body the schists are worked, as it were, about the irregular quartz lens.

From the surface an inclined stope extends to the 250-foot level, a distance of about 300 feet on the dip. A horizontal section of the quartz mass on this level has the shape of the letter U, the arms diverging slightly. This occurrence is described as resembling somewhat the saddle reefs of Bendigo, Australia, and those of Nova Scotia. The summit or apex of this flexure has a strike south 64° east. The northern arm strikes north 40° west and the southern south 75° west. Over this ridge-like dome the schists curve in conforming lines. The limbs of this curious fold of gold-bearing quartz thin out as they gain distance from the crest of the anticline.

The rocks immediately inclosing these peculiar saddle-shaped masses of quartz are mica and hornblende schists, graphitic schist, chlorite schist, etc. It is possible that the hornblende and chlorite schists are ancient eruptives (Archaean). In the quartz pyrite is abundant and galena is usually associated with the pay ore. The ore is remarkably free milling considering the large percentage of sulphide present, it being claimed that 90% is saved by amalgamation. A peculiar occurrence of coarse gold is noticed in the center of the largest quartz mass. Here is a strip of galena about  $\frac{1}{2}$  inch thick in a milk-white quartz. In the center of this streak and entirely surrounded by galena is a continuous string of nuggets of gold.



Clover Leaf Hoist and Mill, Perry, South Dakota.

minute, against a pressure equivalent to a head of 430 feet. Two and one-half of these pumps are now running and are lifting about 3750 gallons per minute. This water is raised 220 feet to them by the hydraulic elevator, while is now using 1240 gallons per minute under a pressure of about 1130 pounds to the square inch.

The pumps are, therefore, lifting at the present time about 2510 gallons per minute of mine water to a height of 650 feet. This capacity just holds the water a few feet below the 2350 station. The temperature of the mine water is 127° F. In addition to the water pumped, there is about 300 gallons per minute that drains into the Sutro tunnel, so that there is about 4050 gallons per minute flowing through the tunnel.

We are just about to begin pumping at the Ward shaft, but the quantity will not exceed 200 gallons per minute for the present.

LEON M. HALL.

Nov. 23.

### Gold in Coal Mines.

The latest gold mines are in coal mines in Africa and America. Gold and silver are present in small quantities in the coal fields of Wyoming, says Fuel. From the occurrence of iron pyrite, which is distributed throughout the coal seam, it is suspected that this mineral carries the precious metal. The coke made from the coal is used in the smelting works at Deadwood, S. D., and averages from 1 to 2 pennyweights of gold a ton, which is enough to compensate for high ash content. In South Africa the gold occurred in small seams running through the coal and in places was quite rich in gold, the ash being colored a bright purple by the finely divided particles of metal.

the immediate vicinity of the ore bodies. The nearest eruptive rock known is a large dike about a mile west of the mine, where a light-colored acid rock forms a bold outcrop. Four miles to the southwest is Custer peak, an outburst or "neck" of igneous rock (phonolite). So far as known, the Uncle Sam mine is an instance of valuable ore deposits absolutely independent of igneous intrusions, unless some of the amphibolite schists were originally intrusive in Archaean time, and have since been metamorphosed together with the sedimentaries—slates and quartzites.

The mine was discovered in 1878. The outcrop was a vein of iron-stained quartz, in which was a small, rich pay streak. From this latter the discoverers recovered several thousand dollars by means of a spring-pole and mortar. They then ingeniously rigged up a 1-stamp mill, using a horse for power to operate it. With this outfit they took out several thousand dollars more, and bought an idle 15-stamp mill. Of this, five stamps were run intermittently, with satisfactory results, but the appearance of a considerable amount of water—more than they could handle by simple means—induced them to sell out. The buyers operated it for a year or two and sold to a corporation, which moved a 60-stamp mill from the Esmeralda, a conglomerate mine in Blacktail gulch, near Deadwood, to the Uncle Sam. After several years of doubtful success in mining, the property was closed in 1889 and remained shut down for ten years, being reopened in 1899 by the present owners, the Clover Leaf Gold Mining Co., O. B. Amsden superintendent. (See accompanying engraving.)

One very remarkable thing about this mine is the extremely variable strike of the slates and schists of the vicinity. About 1000 feet west of the main shaft the strike of the schists is east-west and dip south at 44°. About 1000 feet north of the shaft the strike is north 15° west, with dip 53° east. In the immediate

Accumulations of galena in bunches or pockets is of common occurrence throughout the quartz mass, and the galena is always accompanied by visible gold, but not as a rule as rich as the streak first referred to. This galena-gold ore runs from \$40 to \$400 per ton, with merely a trace of silver, which is unusual in the presence of so much sulphide of lead, outside of the limestone lead districts of the Mississippi valley. The average value of the large mass of quartz is stated to be \$6 to \$7 per ton. The rich streak that made a fortune for the original discoverers and their grubstake partners, continues to the lowest level thus far opened, specimen ore being found on the 600 level of the mine as rich as any found nearer the surface.

### Temperature of Deep Mines.

At a recent meeting of the South Staffordshire and East Worcestershire Institute of Mining Engineers in England, R. A. Redmayne, in speaking of the temperature of deep mines, said:

In respect to the question of temperature, though no very definite practical conclusions can be said to have been arrived at, the best and fullest information yet to hand is undoubtedly that contained within the pages of the minutes of evidence of the first and second reports of the Royal Coal Commission at present sitting; but based on such data as we do so far possess, I do not think any formula for determining the heat at any depth can be of any practical value. For instance, we find that at Pendleton Colliery, in Lancashire, the increase in the temperature of the air was only 28.5° F. in a depth of 3483 feet—that is to say, a gradient of 1° F. for every 122 feet, whereas Prof. Dixon stated that at the deep boring at Schladebach the temperature at a depth of 5630 feet was 133.9° F., which, taking as the starting point a



temperature of 51.8°—the temperature at 118 feet—would give an increment of 1° F. for every 67.1 feet. The first instance is, however, much the more valuable as tending to show the probable temperature of the air under actual working conditions. I do not think we can take the data obtained from boreholes as helping us much in this direction. In the case of the Bezuidenville borehole on the Rand, the rise in temperature worked out at 1° F. for every 208 feet in depth over a depth of 3251 feet. The Turf Club Syndicate began the boreholes before the war and have completed them since the war. The west borehole cut the Reef series at 4743 feet and the east borehole at 4825 feet; experiments as to heat gradient have been made in the west borehole, though not to the full depth, and definite and conclusive results have not yet been obtained, but are not expected to be materially different to the results obtained in the Bezuidenville borehole—so writes Hennen Jennings, of whom I had inquired. In 1895, at the Calumet & Hecla copper mine in Michigan, the increase was 1° F. for every 223 feet calculated over a depth of 4580 feet, at which the temperature was only 72° F. When I visited this mine in 1902 the temperature in the Red Jacket vertical shaft at a depth of 4900 feet was said to be 87.6° F.

## Volumetric Standards for Technical Work.\*

Written by W. J. SHARWOOD.

The choice of materials available for standardizing volumetric solutions is so large as sometimes to be embarrassing, and the object of this note is to point out how very limited is the number of fundamental substances which are actually required to standardize the more important solutions in ordinary use. The metals obtainable in a nearly pure condition are sufficient for almost all technical purposes, and for most of the determinations necessary in investigation.

The scheme following indicates how the solutions, which are shown in prominent type, may be most directly referred to, or checked by, metallic standards; the principal determinations which can be made by them are shown in smaller type. All the numerous determinations by oxidation and reduction methods are thus based on iron; while the standard acid and alkali are obtained preferably from silver, though the oxalic acid may also be based on iron.

Ferrous ammonium sulphate crystals, normally containing 14.25% of iron, are in common use for checking permanganate and bichromate solutions, and are extremely satisfactory for the purpose. They are not, however, absolutely constant in composition, the water content being apt to vary by two tenths of 1% or more, though there appears to be no tendency to oxidize when kept closely stoppered. The variability in water content is much more marked in most of the other crystalline salts which are available as standards, especially when kept in loosely stoppered bottles, and in climates where extremes of temperature and humidity prevail.

Metallic iron is sold in the form of wire, containing from  $\frac{1}{10}$ % to  $\frac{1}{5}$ % of impurity, but subject to no such fluctuation as the salts, any oxide which may form on the surface being readily removed by emery cloth. Iron of this degree of purity, which can be readily checked by gravimetric estimation, can generally be taken as exactly 100% when used as a volumetric standard, the impurities themselves having a reducing effect on permanganate averaging near to that of iron itself, provided that solution of the metal is effected in a small flask, the air of which has been displaced by addition of a little sodium bicarbonate, and that freshly boiled water is used for dilution.

For instance, a sample of iron wire was found to contain 99.8% to 99.85% of metal by solution as chloride and precipitation of the oxide. A permanganate solution was first standardized absolutely on ferrous ammonium sulphate, free from ferric iron, the actual iron content of which had been similarly determined by precipitation. When estimated by this permanganate the apparent percentage of iron in the wire averaged 100.1.

The error introduced by assuming this wire to be absolutely pure would, therefore, be only one-tenth of 1%, causing a variation of only 0.07% in titrating a 70% iron ore, an error which would be nearly doubled if the iron were taken at its true value of 99.83%.

At another time a permanganate solution gave the following results per cubic centimeter:

Iron value based on pure ferrous ammonium sulphate. 14.25% Fe.	Iron value based on 99.7% wire, assuming wire to be 100% Fe.
.005577 gram,	.005563 gram,
.005560 gram,	.005566 gram,
.005565 gram,	.005577 gram,
.005574 gram,	

the averages of the two methods being almost identical.

Electrolytic copper, sold in thin sheets or in the form of high conductivity wire of over 99.9% metal, is almost universally used as a standard for the copper assay, the exception being in such cases as the

\*Cal. Jour. Tech.

cyanide titration of mattes or ferruginous ores, when the interference of iron must be corrected by the use of a standard matte or ore, the copper content of which has been most accurately determined. Thio-sulphate solutions may be standardized by it with slightly less accuracy than by permanganate.

Silver may be obtained or prepared of equal purity, but a much cheaper source is the commercial fine silver of guaranteed fineness (about 99.8%), the alloy present being without effect when it is used in analysis. Either the calculated weight of this or of recrystallized and fused silver nitrate may be used with thiocyanate to standardize other solutions, or to directly prepare standard silver nitrate if chlorine-free distilled water is obtainable.

Metallic zinc of almost absolute purity is produced at a very few works, operating on favorable ores, the metal containing less than 0.02% iron and negligible traces of arsenic and lead. The special assay lead prepared by several smelters is almost equally pure. These metals deserve preference as standards over the zinc oxide or lead sulphate usually recommended, the former of which is quite hygroscopic.

The great advantage attending the use of metals as fundamental standards is their permanence, allowing of their being indefinitely preserved with comparatively little trouble, while the fact that they can for nearly all purposes be assumed as being of 100% purity, and can be weighed out on an assay balance, is of additional convenience. For the attainment of the highest accuracy it is generally advisable to so adjust the solutions, and the amount of metal taken, that from 20 to 50 cubic centimeters of solution shall be used. The error in weighing the metal must be less than 1 part in 1000. For instance, if about 0.2 gram of iron is taken, it should be weighed with an error not exceeding 0.1 milligram. The precision attained is sufficient for the most accurate work in nearly every case, the principal exceptions being in acidimetry and alkalimetry of great refinement, which are best based on hydrochloric acid or sulphuric acid determined by precipitation as silver chloride or barium sulphate, and in such work as the cyanide assay of copper above referred to, where the presence of interferents and the incompleteness of reaction must be empirically corrected by the use of special standards.

Although gold can be estimated volumetrically with considerable accuracy, there is no apparent advantage in doing so when an accurate assay balance is available, since the metal is so easily isolated in a weighable state, as is also the case with silver and mercury in ores. For alumina, magnesia and silica no satisfactory volumetric method has been found. Silica and sulphur (in sulphates) are both very readily and accurately determined gravimetrically, but some of the indirect processes for titrating sulphates, based on the insolubility of barium chromate, can be used in certain cases with advantage. The following are some of the applications of metal standards to volumetric solutions:

## IRON.

- |  |  |
|--|--|
| I. STANDARD PERMANGANATE<br>Fe'' in H <sub>2</sub> SO <sub>4</sub> solution or with HCl + MnSO <sub>4</sub><br>Oxalic acid and oxalates.<br>Ca, Pb, Cu, etc., as oxalates.<br>U, V,<br>H <sub>2</sub> O <sub>2</sub> , peroxides, percarbonates, nitrates.<br>With oxalic acid by difference: PbO <sub>2</sub> , MnO <sub>2</sub> , Au.<br>With FeSO <sub>4</sub> by difference: oxidizers of Fe'', Cl, per-sulphates.<br>With ferric alum, reducers of Fe'''.<br>Reducing agents generally, in acid solutions.<br>Mn'' and Co in neutral solutions. | → + KI + H <sub>2</sub> S <sub>2</sub> O <sub>8</sub> = STANDARD IODINE<br>As'', Sb'', -CN, thio-sulphates, sulphites.<br>Reducing agents generally.                     |
| STANDARD FERROCYANIDE<br>Zn, Mn, Cd, Pb.   | STANDARD THIOSULPHATE<br>Iodine; oxidizing agents with KI: Cu'', Sb'', Fe''',<br>Cl, Br, hyochlorites.<br>With KI + I by difference, H <sub>2</sub> S, SO <sub>2</sub> . |
| STANDARD OXALIC ACID<br>Alkalis generally.   | STANDARD ALKALI<br>Acids generally.  |
| II. STANDARD BICHROMATE<br>K <sub>2</sub> Fe(CN) <sub>6</sub> indicator:<br>Fe'', in acid solutions.<br>With FeSO <sub>4</sub> by difference: oxidizers of Fe'', Cl,<br>hypochlorites, nitrates, chromates, MnO <sub>2</sub> , etc.<br>With FeCl <sub>3</sub> : reducers of Fe''', Cu, Cu <sub>2</sub> O, etc.<br>S, Ba and Pb by different methods.   | → + KI + H <sub>2</sub> SO <sub>4</sub> = STANDARD IODINE<br>Thio-sulphates, etc. (See above.)   |

## SILVER (OR SILVER NITRATE).

- |   |  |
|---|--|
| STANDARD SILVER NITRATE<br>STANDARD SILVER NITRATE<br>With K <sub>2</sub> CrO <sub>4</sub> indicator in neutral solution: -Cl, -Br,<br>-I, -CNS, -CNO, -CN, etc.<br>Alkaline cyanides (best with NH <sub>3</sub> + KI indicator).<br>With KCN by difference (NH <sub>3</sub> + KI indicator) Ni,<br>Ag, Hg. | ← STANDARD THIOCYANATE<br>With ferric alum indicator: Ag in HNO <sub>3</sub> solution.<br>S (as Ag <sub>2</sub> S), As (as Ag <sub>3</sub> AsV <sub>2</sub> O <sub>4</sub> ).<br>By difference with AgNO <sub>3</sub> : -Cl, -Br, -I, -CNS,<br>-CN, etc. |
| STANDARD SODIUM CHLORIDE<br>Ag, in alloys soluble in HNO <sub>3</sub> .   | STANDARD ALKALI<br>Acids generally.  |
| STANDARD HYDROCHLORIC ACID<br>Alkalis generally.  | STANDARD NITRIC ACID<br>P <sub>2</sub> O <sub>5</sub> in "yellow precipitate."   |

## COPPER.

STANDARD THIOSULPHATE: Cu'', I, etc. (See above.)

## ZINC.

STANDARD CYANIDE: Cu, in ammonia solution.

STANDARD FERROCYANIDE: Zn, Mn, Cd (uranyl acetate indicator).

## LEAD.

STANDARD ZINC SULPHATE: Alkaline sulphides (NiSO<sub>4</sub> indicator).

STANDARD FERROCYANIDE: Pb, S (as PbS or PbSO<sub>4</sub>).

STANDARD MOLYBDATE: Pb, S (as PbS or PbSO<sub>4</sub>).



their explanation according to physical and chemical principles. Chapter VII treats of the belt of cementation, which is defined as extending from the belt of weathering to the bottom of the zone of fracture. Each of the cementing substances is considered, and an explanation is offered as to why cementation rather than solution is a general process in this belt. The zone of anamorphism, which is the zone in which rock flow occurs, is the subject of the eighth chapter. Full explanations of the meaning of rock flow and of the development of such secondary structures as slatiness, schistosity, and gneissosity are offered. In the ninth chapter a classification of the sedimentary rocks is given, their genesis is discussed, the series of transformations through which each of the rocks passes is traced out, and the resultant rocks are indicated. It was not found possible to discuss the igneous rocks in a similar manner. With the ninth chapter the subject of metamorphism proper closes, but the results contained in the nine chapters have an important bearing upon other parts of physical geology. The remaining chapters consider these relations.

The relations of metamorphism to stratigraphy are discussed in the tenth chapter, the relations of metamorphism to the distribution of the chemical elements in the eleventh chapter, and the relations of metamorphism to ore deposits in the final chapter. The last two chapters will probably receive more attention than any others, as the attempt made in the eleventh chapter is the most daring generalization in the treatise, and the subject of the twelfth chapter is of interest not only to geologists, but to all who are concerned in the mining industry. Dr. Van Hise believes that the majority of ore deposits are produced by metamorphic processes, but he gives a new classification of ore deposits, the fundamental divisions of which are the same as those of rocks.

It is not possible in a summary to give an adequate idea of the scope of this treatise on metamorphism. A very broad range of facts, extending far beyond what might first be regarded as the field of a treatise on metamorphism, is considered from the viewpoint of energy. The volume, which is listed as Monograph XLVII in the Survey's publications, is for sale at the price of \$1.50. It contains 1286 pages and is illustrated with thirteen plates. Application for copies should be made to the Director of the United States Geological Survey, Washington, D. C.

### To Decrease Accidents in Mines.

At a recent convention of mining men, held in Pittsburg, Pa., the great increase of accidents in and about mines was discussed, and it was agreed that many of these accidents were due in a great measure to the carelessness of those injured, and in view of this fact it was considered advisable to formulate a code of rules which, if enforced, would have a tendency to greatly decrease these fatalities and serious injuries resulting from ignorance and carelessness. The most important regulations adopted were as follows:

All persons not employees are forbidden to enter any mines or loiter around mines or the machinery connected therewith, without permission of the management of the mine, and accompanied by an employee designated by the management.

All employees are forbidden to enter or travel around old works, or visit the working places of others where duty does not call them.

Machine runners are forbidden to cut any place unless the soapstone has been taken down from the previous cut.

Loaders after machines are forbidden to load coal under soapstone or draw slate under any circumstances until it is made secure by ample posting whether there is any apparent danger or not.

When the working place of any miner or loader has been securely posted, and it is necessary for any machine runner to remove any posts for the purpose of conveniently cutting place or for other cause, the machine runner positively must replace the posts before leaving such place.

Trappers, switch boys, or other boys employed in and around the mines positively must not leave their places during working hours to go where duty does not call them; they shall not run around with drivers or ride on loaded or empty cars or trips under any circumstances, unless it is a part of their duty.

All employees are forbidden to ride on loaded cars or trips. This rule not to apply to drivers, trip riders or motormen.

Drivers trapping their own doors must close them after passing through, and not prop them open until they return from the outside or from the inner workings.

Under no circumstances shall drivers ride with their feet on the tail chain and on a down grade must not even ride on the front end of a loaded car.

The trip rider or motorman or somebody designated by the mine management shall attach to the rear end of the rear car of both loaded and empty motor or locomotive trips a signal (light preferred).

No explosives shall be taken into or out of any

part of the mine, in mine cars when propelled by electric power.

No person shall fire any shot until he has given warning to all those working near him, and know that they are out of danger.

Neither miners nor any other person shall keep blasting powder or explosives dangerously near the electric wire or power cable in any part of the mine where electric wires are in use, and in preparing cartridges no lighted lamps nor fire of any kind shall be used within 6 feet of where such cartridges are being prepared.

All employees are forbidden to leave doors open, commit nuisances, block air ways, or in any respect violate or ignore the provisions of the mining laws; or to use other than the proper legal test oil for illuminating purposes.

### Rate of Solution of Gold in Potassium Cyanide.\*

Written by T. H. PLUNKETT.

Authorities on the use of the cyanide process as an extractor of gold from its ores, while being unanimous in the opinion that potassium cyanide can only be used on fine gold, have made few attempts to define the exact limits of fine and coarse gold. These terms, fine and coarse gold, so commonly used in discussing the merits of the several methods of gold extraction, are very indefinite. While authors do not hesitate to assign certain processes of extraction for fine, and others for coarse gold, no one seems to have endeavored to find a limit so as to be able to state definitely to what extent certain processes can be used to advantage.

Having had occasion to use this process on different ores, the writer has made several experiments to find what effect cyanide solutions have on particles of gold of varying sizes. This effect varies greatly with the manner in which the solution is applied. Elsner made it clear that oxygen was an essential element to enable the potassium cyanide to do its work. It has also been suggested, by recent writers, that temperature played a part in the extraction.

With these points in view the writer has treated the gold in three ways. First, by allowing the solution to percolate around the gold. The gold bead was placed in a porcelain dish containing the solution and the latter was drawn off at intervals of an hour or two to enable it to absorb oxygen from the air. Second, air was made to bubble through the solution while in contact with the gold. Third, the solution, with air passing through it, was heated to about 100° Fahrenheit.

In preparing the gold particles a known weight of the metal was dissolved in aqua regia and diluted with water to 500 cubic centimeters. Certain volumes of the solution were then taken, and the nitric acid boiled off, after which it was evaporated to dryness on troughs made of pure lead foil. The lead was then cupelled, leaving beads of gold, spherical in form. These were carefully weighed and their diameters measured under a microscope.

A .3% cyanide solution was used in the following experiments:

#### RESULTS OF EXPERIMENTS.

Weight of Bead. Mg.	Average Diameter. Mm.	Process.	Time.	Weight Dissolved. Mg.
.800	.455	Percolation.....	16½ hours	.040
.800	.455	Agitation.....	16½ "	.180
.800	.455	Agitation and Heat	16½ "	.250
.300	.399	Percolation.....	7 "	.007
.300	.399	Agitation.....	7 "	.080
.300	.399	Agitation and Heat	7 "	.060
.170	.260	Percolation.....	3 days	.100
.170	.260	Agitation.....	16 hours	.070
.170	.260	Agitation and Heat	7½ "	.080
.130	.247	Percolation.....	3 days	.080
.130	.247	Agitation.....	20 hours	.130
.130	.247	Agitation and Heat	16 "	.130
.110	.208	Percolation.....	16 "	.060
.110	.208	Agitation and Heat	7½ "	.050
.100	.201	Percolation.....	3 days	.088
.100	.201	Agitation.....	16 hours	.070
.100	.201	Agitation and Heat	12 "	.100
.070	.195	Percolation.....	3 days	.070
.070	.195	Agitation.....	16 hours	.070
.070	.195	Agitation and Heat	10 "	.070

From these results it would seem that agitation and agitation aided by heat have a decided advantage over the percolation process, while agitation aided by heat has a less decided advantage over agitation alone. To obtain an extraction in a reasonable time, beads of about .100 mg. in weight, with an average diameter of .201 mm. seem to be the maximum size.

### Problems in Hoisting.

The hoisting problem has several phases closely related and no one of them can be settled irrespective of the other two. These phases are, the problem in relation to the underground requirements—its engineering and mechanical features—and the financial end of the problem, which usually dictates the final decision, said James R. Thompson before the Lake Superior Mining Institute.

The loads hoisted have varied from one ton in the

\*Trans. Can. Min. Inst.

early days of shallow mines to a maximum of five tons in the iron mines and of seven and one-half tons in the copper district. It has evidently been found wise to increase the product by increasing the load hoisted, rather than to increase the rate of hoisting. It may be stated, then, as a result of Lake Superior experience, that in general the underground requirements are that it must hoist its load in a minute and make a round trip in three minutes, no matter what the load or depth of the mine.

### THE PROSPECTOR.

The average prospector has some fixed ideas, the result of learning from the other members of his craft, and occasionally these ideas are erroneous. On one occasion a mining engineer visited a prospect and went down into the mine—a shaft nearly 100 feet deep. On his return to the surface one of the workmen asked, "Did you see the granite down there—what do you think of it?" The engineer replied, "I saw no granite, though there is trachyte there." "Oh, no," said the prospector, "that rock at the bottom is granite—I know granite all right. I've worked in it for years and ought to know." "True," responded the engineer, "so you should; now, what is granite?" "Why, it's granite," said the miner. "Yes, I know, but what minerals are necessary to granite?" "Why," said the miner, in some astonishment, "everybody knows granite—it's a gray, hard rock—granite, you know; something like syenite, but not so hard." "Well," said the visitor, "granite is composed of quartz, feldspar, of a certain kind, and mica—when you have this combination you have granite. If the combination of minerals is not of these three, the rock is something else." "Well," said the miner, "I have been mining for twenty-five years, and I'll be blamed if that ain't news to me—quartz, feldspar and mica, hey? I know quartz, but I don't know the other two."

This is merely an instance of how the prospector is sometimes led astray, and for years calls things by names which do not properly describe the ore or rock, or whatever it may be. Throughout the West, and particularly the Northwest, many miners and prospectors mistake azurite, the blue carbonate of copper, for bromide of silver. In Dana's "Mineralogy" are given descriptions of several silver bromide ores, of which the following are the principal ones: Embolite, a silver chloro-bromide, color grayish-green and yellowish-green to yellow; bromyrite, silver bromide, color bright yellow to amber yellow, and iodo-bromite, a composition of bromine, iodine and silver, color sulphur yellow to greenish. No silver bromide of blue color is mentioned. It is probable that the idea that silver bromide is blue comes from some of the Mexican ores where bromides occur, which also contain the blue carbonate of copper, and this has been mistaken for the silver mineral. Chloride of silver is sometimes, though rarely, violet blue, but this in no manner resembles the bright, beautiful blue of azurite so often erroneously called "silver bromide."

The rock from Sanger, Cal., is serpentine, of which there is a vast amount in California, both in the Coast Range and in the foothills of the Sierra Nevada.

The mineral specimen from Rich Gulch, Plumas county, Cal., has the appearance of gold-bearing quartz. The dark mineral is sphalerite (zinc sulphide). It is often gold and silver-bearing.

The rock specimens from Tonopah are undoubtedly andesite, but whether of an earlier or later flow can only be told by an examination of the rocks in situ in the district from which they came. Andesite is a name applied to volcanic rocks containing predominant andesine (feldspar). The rock from Tonopah contains no quartz; hornblende, if ever present, is altered to other minerals and is also probably scattered through the rock in dust-like particles. Biotite (black mica) is abundant and the feldspars are all much decayed. Still, the rock shows the habit peculiar to andesites in the distribution of the feldspars.

The mineral specimen from Placerville, Cal., is quartz containing limonite (brown iron oxide) and siderite (a translucent iron carbonate). The rock also contains a small amount of chalcopryite (copper sulphide) and traces of arsenic. It may also contain gold.

The dark colored crystals from Cranbrook, B. C., are garnet, and the light yellow ones are zircon.

The mineral specimen from Ophir, Utah, is mostly quartz in crystals and grains. The brown, earthy mineral is a mixture of the oxides of iron and manganese and known as "wad." The bright metallic scales are micaceous iron, a variety of hematite. It is magnetic.

The rock specimens from Mazama, Wash., are: No. 1, amphibole rock; No. 2, a granular quartz rock containing streaks of amphibole similar to that



forming No. 1. It also contains several per cent iron sulphide, some limonite (iron oxide) and a trace of copper. It may also contain gold and silver. No. 3 is apparently a much altered eruptive rock, now consisting largely of quartz, carrying iron and copper sulphide. No. 4 is similar to No. 3.

The pulverized mineral from Kansas, and sent from Leadville, Colo., is volcanic ash—neither fuller's earth nor kaolin. It might be used as an abrasive material. It consists of microscopic plates and threads of volcanic glass, with a very small amount of mica and feldspar.

### Auriferous Bench Diggings of Bonanza, Yukon Territory.

Written for the MINING AND SCIENTIFIC PRESS by  
A. W. KIMBLER.

I have taken as representative of the locality that portion of the channel situated on Cheechaco hill, it being about the center of the known channel, and the conditions herewith presented can be taken as approximately those of the whole channel, with the exception that the fine gold is more uniform farther down the stream.

The richest body of gravel is composed of white, water-worn quartz, grading from immense boulders to a fineness of slickens, the balance of the channel filling being a stained red gravel and clay, especially on the western shore, which is a distance, in some places, of 500 feet from the edge above the modern creeks. The red color is derived from decomposed feldspar, proving that the channel headed in some immense belt of granite or kindred rock. As far as I can discover, the nearest locality of a granite belt is the Rocky mountains, a distance of 100 miles. At the same time, there are no granite boulders, or, at most, very few, disseminated through the mass of gravel. In fact, in the numerous diggings I have observed but very few pieces of granite, and these were very much decomposed.

Bedrock is various and appears as belts of country rock crossing the channel at nearly right angles. It is of such a decomposed and friable nature in the majority of places as to be difficult of determination. It clearly shows there has been an immense pressure from the accumulated superimposed body of gravel, about 150 feet in depth, combined with subsequent movement—proven by the ice seams, somewhat similar to faulting, that extend in all directions—owing to which causes the bedrock in the majority of cases is ground into an impalpable clay, especially those rocks of a schistose nature. The following are the principal belts of bedrock observed, named in the order of importance: Hydro-mica schist, manganese slate and chlorite schist, with here and there a few streaks of mariposite, observed on the Lynch claim. Some few pieces of basalt and kindred rocks, belonging to the Plutonic series, are occasionally seen in the gravel, but the white quartz exceeds other rocks about 95%; hence its name of White Channel.

It appears on all prominent points—at an approximate elevation of 300 feet above the modern creeks—from the mouth of Bonanza to 29 above discovery, a distance of 13 miles. At Grand Forks it branches and also follows the course of El Dorado creek for 1½ mile, with some traces found yet farther up, notably at Gay gulch. The same characteristic gravel is also found on Hunker, Dominion and Sulphur creeks carrying varying pay.

The channel appears at one time to have been filled with the aforementioned red gravel, that a subsequent slight elevation of the country produced a greater fall, and, consequently, a swifter running current and a larger area of watersheds. That this increased watershed and elevation contributed the white quartz gravel, and probably the gold, with velocity of water sufficient to cut a new channel deep into the old gravel bed, and deeper yet into bedrock, thus defining the white channel so clearly from the red gravel, which also would account for the pay being found only in the white quartz gravel, and, it being deeper, into the bedrock, proves conclusively that it was cut and deposited subsequent to the red gravel. It is supposed by the majority of the miners in this district that this old river bed was the ancient Yukon river, and certainly, judging from its immense width, it was as big or larger than the present Yukon in the same locality.

PROBABLE SOURCE OF THE GOLD.—The gold has very evidently not been moved a great distance—proven by its rough and angular form. In fact, I have found a number of pieces that, looking at one side, one would surely suppose they had just been taken from a quartz vein. Now the country rock, being a heavy schist traversed by small seams and layers of quartz, it is my belief that these small veins are the source of the gold. It is, I believe, a well-established fact that gash veins and veins of segregation are usually very much richer proportionately than an adjacent larger vein. Also, that such small veins usually carry coarse gold—for instance, the pocket veins of California, and, notably, those of Tuolumne county. It is well also to call to mind that wherever

in this northern country placer gold has been discovered in quantity, the bedrock has invariably been mica schist—as, for instance, at Nome, Bluff City, Golovin bay (Fish river), Dawson and Yukon river points. Indeed, it is understood that at the new diggings at Alsek (White Horse), the bedrock is also mica schist. Of course, there are numberless other localities with a mica schist bedrock where no gold has been discovered; but I can not believe otherwise than that the source of the gold is as stated above.

In a few years from now, when the white channel gravel has been hydraulicked off, I think an era of pocket prospecting will commence. At present the country, being so heavily covered with moss, muck and slide, it is impossible to prospect for quartz with any degree of certainty, although there is considerable work being done in that line, but in the majority of cases there is very little promise of success. Most of the men with quartz locations appear to be very inexperienced in that respect and anything that looks like quartz is located. I know of but one locality that gives fair promise—namely, Stampede Hill—on which is one claim with considerable surface work done, showing up a broken ledge of good size, the rock carrying gold, galena, carbonate of copper and some silver. In my opinion, should the owner find the vein in place, he will have a good property. On the same range is located the Violet mine, on which they are down 80 feet. The rock is a ferruginous quartz; the ledge is 3 feet wide and said to assay over \$100 a ton.

### Methods of Saving Flour Gold.

Written for the MINING AND SCIENTIFIC PRESS by  
DENNIS H. STOVALL.

Above the blue and gray strata of the old channel placer deposits of northern California and southern Oregon there is often a capping of from 4 to 10 feet of red clay—and in this red clay, as well as through all parts of the "pipe clays" of the lower strata, is distributed the fine or flour gold values of the diggings. Sometimes these values run as high as 8 and 10 cents to the yard, and as the dirt and gravel containing it must be washed down and carried through the sluices in the usual way, in order to clear the banks for the main work, it is for the placer miner

across the sluice floor the entire width. A wide trough is fitted beneath, and the water, or a large part of it, is drawn down through the grizzly and into the trough, pouring out on either side and spreading over a wide sluice table. On either side of the sluice box is set a gate which can be raised and lowered to regulate the flow of water through the grizzly into the trough and over the wide sluice. (See accompanying illustration.)

The wide sluice floor, or table, is 8x10 feet in size, and has a drop of about 12 inches. Its riffles are made and its bottom composed of 2x8 planks nailed together edge up, every alternate one having a drop of 2½ inches, thus making a crevice and likewise a riffle. Still another and, perhaps, better way, is to have the floor of the riffle table smooth, and spread over it a thick sheet of burlap.

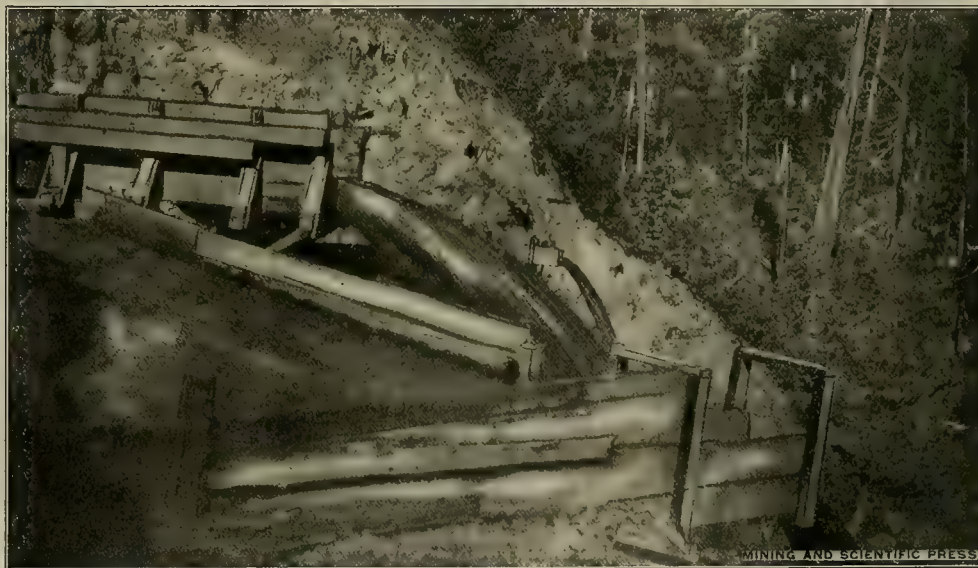
The principle on which the undercurrent operates is as simple as the contrivance itself. As before stated, by the time the minute particles of flour gold reach the end of the sluice they are down near the bottom of the current, and so are drawn down by the part of the water which passes through the grizzly. The water is then spread out thinly over the riffle table of the undercurrent, and the fine gold is given an opportunity to settle into the riffles of the burlap. To clean the riffles the burlap is lifted gently and dipped into a large vat of clear water and washed thoroughly; the gold settling to the bottom. The cloth can then be placed back over the riffle table floor.

Not only flour gold, but the very fine particles of platinum, if present, are caught by undercurrents of this kind, thus adding to the miner's receipts a considerable revenue that would otherwise be lost.

### The Tallerday Plant.

The Tallerday plant at Dolgeville, a suburb of Los Angeles, Cal., is built especially for making sheet steel pipe and tanks. Mr. Tallerday, the moving spirit in this company, is also president of the Tallerday Steel Tank & Pipe Co. at Waterloo, Iowa, but the Dolgeville, Cal., plant now receives his personal attention.

The factory utilizes such special devices as the Tallerday steel rolling machine that rolls pipe from 4 inches in diameter up to any required size, in 10-



Undercurrents in Operation, Seen Below the End of the Upper Sluice.

to save as great a percentage of these values in flour gold as possible, in order to secure the best returns.

This is best done by a system of undercurrents—a simple contrivance attached to the sluices, the attachment being made near the end of the sluice line and directly over the dump.

The ordinary bedrock race, and the sluices with their riffles of blocks, steel rails, or Hungarians, though well adapted to catching and saving coarse gold, and gold of ordinary fineness, will not save the minute, dust-like particles that constitute a large part of the values of the upper strata of the diggings. Flour gold particles are very thin and flat, and when caught by the current of the sluice they float very readily, and before they get to the bottom and in reach of the riffles, they are well out toward the end of the sluice and ready for the final plunge over the dump where they are forever lost.

Hence, some other system aside from that of riffles had to be devised to save the flour gold, and the undercurrent was happily hit upon. A California miner, whose name is unknown, is said to have been the first one to apply the undercurrent system of saving fine gold.

Out, within 8 or 10 feet of the end of the sluice box, is placed a grizzly in the sluice bottom. It is usually made of ½-inch steel bars set up edgewise, and a half-inch apart, thus giving a long ½-inch opening. This grizzly should be about 2 feet in length and laid

foot lengths, from 20, 16 or 14-gauge steel. Among the advantages of pipe in 10-foot lengths are the smooth interior, increasing carrying capacity and decreasing friction—fewer joints adding strength and increasing the life of the pipe. Numerous minor points of manufacture, as described, are interesting. The long seams are riveted on a special mandril and the rivets are swelled to completely fill the hole before they are headed down. On the round seam used to join two 10-foot lengths, the holes are drilled instead of punched, to do away with the burr on the inside.

These methods are designed to apply both to the pressure pipe and the pipe for surface irrigation. A form of galvanized surface pipe introduced by this company for use in place of troublesome and unsatisfactory flumes is a special slip-joint pipe, easily and quickly fitted water tight and readily taken apart. One end of each length is reinforced with a heavy band; the other carries a taper metal collar riveted and soldered to the pipe, designed for use where transportation is difficult, surface of ground irregular, and for temporary lines.

In the construction of the steel storage tanks manufactured by this company small sizes are usually shipped set up ready for use; tanks of 1200 gallons and larger are shipped knocked down; all seams are made water tight at the factory except two—one side seam and one bottom seam—designed to effect



saving in cost of setting up the tanks at destination.

The Tallyday Manufacturing Co. makes a specialty of wagon tanks for hauling water, oil, etc. An oil company that had been using tank wagons of 860 gallons capacity which weighed 2400 pounds was equipped with Tallyday tank wagons weighing only 700 pounds, making a saving of 1700 pounds on every tank of oil hauled.

### The Kaffir as a Miner.

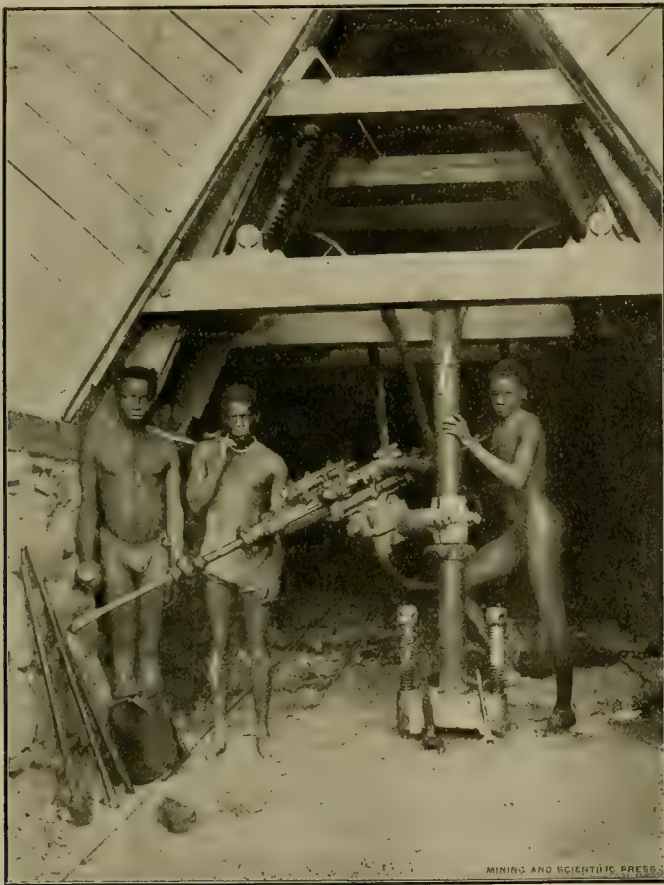
WRITTEN FOR THE MINING AND SCIENTIFIC PRESS.

Ever since the discovery of diamonds and gold in South Africa the labor problem has been one of importance. Up to the time of the Boer war this problem was satisfactorily solved by the employment of the Kaffirs and other native Africans, whose work, if not efficient, was sufficiently cheap to offset any shortcomings of skill or physical ability. Since the war, however, it has been difficult to secure enough of these natives to perform the unskilled labor in the mines of the Rand. During the war the natives left the country in great numbers and they have since not returned in sufficient numbers to meet requirements. The Kaffir's idea of work is not very liberal. He has barely emerged from condition of savagery and barbarism, notwithstanding his long years' contact with white men and their ways. He was not obliged to labor to live before the mines were

above or below ground during summer months, unless compelled to. They are cared for in large fenced or walled enclosures, within which are the sleeping and eating houses and large tanks for bathing, etc. The enclosures, or compounds, as they are called, often cover several acres of ground. The houses are built for most part of corrugated iron, as a preventive against fire, and the place is lighted by electricity and provided with every precaution against the spread of contagious diseases.

No natives are employed at the larger mines unless he signs a written contract in which he agrees to work steadily at a stated occupation for a period agreed upon at a stipulated rate of wages. He also agrees to live in the compound and to observe all of the rules and regulations provided for its government. When the contract expires he may either renew his term of employment or leave for his home, where he may resume the habits of indolence and savagery.

In the Kimberley mines the men each wear a band on their wrist on which is inscribed his number, for the purpose of identification should he be killed or seriously injured. The men are lowered and raised from the mine workings in cages or skips, thirty or forty at a time. All work underground is done under the direction of white bosses, and it is seldom that a native is permitted to handle dynamite or other explosives. The natives are particularly useful in shaft sinking and as muckers. In drilling "down holes" by hand they become adept, but they do not often become equally proficient in drilling breast holes or



A Kaffir Drill Crew, Robinson Deep, Johannesburg, South Africa.

opened and he sees no advantage to himself in laboring now. At Kimberley there are 10,000 to 12,000 natives employed in the diamond mines, and on the Rand there were, prior to the war, upwards of 50,000 natives in and about the gold mines. Many of these natives came from the lands to the northward of the Zambesi and Limpopo rivers, as well, also, as from the more southerly States and colonies. Nearly every tribe in South Africa is represented in this motley army of black men. Often those coming from great distances arrive at the mines footsore and sick, mere skeletons, from starvation. The African native is like a child in many respects. He needs some one to care for him constantly and to anticipate and supply his wants should he ever leave his native kraal. Supply a native with abundant provisions for a ten day's trip, and tell him he must use it with care, endeavoring to impress upon him the serious consequences to himself should he fail to act according to instructions, and all is forgotten in a few hours. He will gorge himself the first day and throw away the greater part of his load the second, if he is not watched, and the remaining days he is with little or no food. All African travelers agree that this is characteristic of the native.

When the natives arrive at the mines in this half-starved, emaciated condition they are totally unfit for work for days, and sometimes for weeks, until they have recovered their strength. They are comfortably housed and well fed, though it cannot be said clothed, for, as a class, they wear few clothes, either

uppers. Occasionally the natives become good machine runners. The accompanying engraving shows a Kaffir drill crew in a Rand mine. They have set up a machine at a loading chute for the purpose of having their photographs taken—evidenced by the drill being pointed into a hole in a dry wall. The crew is composed of the runner, the chuck tender and the water boy. Often the machines are run by white miners who have natives for assistants. The Kaffir usually becomes expert in the use of the churn drill in surface work, as this requires no great skill. The place of the native African is now being rapidly taken by the Chinese coolies in the mines of the Rand, and although the Chinese, when first set to work, are in no way superior to an African recruit, they learn quickly and bid fair to make a good substitute for the Kaffir, and they may possibly excel him. At any rate the Chinese coolies seem destined to prove the solution of the labor problem on the Rand.

THE methods of ore treatment in Australia are often ingenious and complicated, but successful in most instances, though, judging from official reports, less effort is made to extract as high percentages of values as in America. This is probably due largely to existing economic conditions, and in ten years from now the tailings piles, at present valueless, will probably be worked at good profit. This has repeatedly been the history of metallurgical processes in America, and there is every reason to believe it will be duplicated in Australia.

### The Production of Precious Stones.

The report entitled "The Production of Precious Stones in 1903," which G. F. Kunz has recently prepared for the United States Geological Survey, contains a summary of the most recent discoveries of gems throughout the world and descriptions of their latest uses in jewelry.

Within the year important and extensive developments in diamond mining have been made in the Transvaal district, and it is clear that diamond deposits of a character similar to those of Kimberley and of very promising richness exist throughout a wide area lying east of Pretoria. Many mines have been located and about 100 prospecting shafts have been sunk to different depths to test the nature and the extent of the deposits. Among the mines actually in operation, the most important is the Premier, which should not be confounded with the De Beers Premier. Its output is superior in yield per load to that of the De Beers property; but the diamonds bring only about \$6.75 per carat, while the De Beers and Kimberley stones are worth \$11.62 per carat.

Mr. Kunz incorporates into his report abstracts of a paper written by T. L. Carter on diamond mining in the Vaal district and one by C. V. Allen on the mechanical equipment of the Kimberley mines. He also quotes an article by S. C. Rudra as authority for interesting data about the diamonds of India, the country which once produced all the diamonds of the world.

Considerable interest has lately been manifested in the mining of beryls and tourmalines in the province of Minas Geraes, Brazil, where a number of remarkable blue and green beryls have been obtained. One of the green beryls was a crystal that weighed 18½ pounds—more than twice the weight of the great beryl in the Imperial Berg-Academy Mining School at St. Petersburg, Russia, which is valued at \$13,000. During 1903 a remarkable discovery of blue beryls was made near Rio de Janeiro. These were deep-blue crystals, from which single gems were cut that weighed 100 carats each. At Villa Rica two dozen magnificent crystals of euclase were found which measured from ¾ inch to 1½ inch.

Among the various green minerals used by the ancients for decorative purposes, compact fuchsite must now be included.

The peridotite dikes of Elliott county, Ky., which at one time were considered a possible source of diamonds, because of special resemblance in their occurrence to the rock at Kimberley, South Africa, have recently yielded some fine pyrope garnet and olivine of gem quality. Some pyropes have also been obtained from a similar peridotite dike at Highland street, Syracuse, N. Y.

Considerable space is given to a discussion of the recent discoveries of jade described in a book by A. B. Meyer, director of the Royal Saxon Museum.

The chapter on spodumene, hiddenite and kunzite is one of the most interesting in the report. The finding of the new variety of the transparent lilac spodumene in California (which was christened kunzite, after the author of this report), is one of the most notable discoveries of a gem mineral that has been made in a long time. These large and beautiful crystals were first obtained early in 1903, close to a deposit of colored tourmaline, itself of notable interest, 1½ mile northeast of Pala, in San Diego county, Cal. In habit the California crystals resemble the spodumene from North Carolina, but for beauty, transparency and great size of perfect material they are not equaled by those obtained from any other known locality.

A discovery has lately been made in the Sunrise mine, near Hartville, Laramie county, Wyo., of a beautiful mineral association, consisting of a brilliant coating of quartz crystals over a blue or greenish blue copper silicate. This quartz is generally thick enough to take a polish and makes a very pleasing ornamental stone.

A series of agate and chalcedony specimens, ranging from 2 inches to 6 inches in length and 4 inches across, beautifully polished, was shown in the exhibit of the State of Texas at the Louisiana Purchase Exposition. These agates were found in a great many places in the counties of Pecos, Brewster, Presidio, Jeff Davis and El Paso. Large masses of moss agate have been discovered in the Hartville mining district, about 130 miles north of Cheyenne, Wyo. More than seven tons of it were mined during the year 1903 and sent to Germany for cutting.

Crocidolite opal has been discovered in the Bulgaroo opal mine, West Australia. Minute crystals of moonstone were found at Rialto, in Inyo county, Cal. An occurrence of saganitic moonstone has been noted near Bakersville, Mitchell county, N. C. Moonstones have also been found on the old beach at the mouth of the Bows river, West Australia.

The precious stones of Peru and Bolivia are discussed by Mr. Kunz.

Mr. Kunz's report is an extract from the Survey's forthcoming volume "Mineral Resources of the United States, 1903." It is also published in separate form and may be obtained on application to the Director of the United States Geological Survey, Washington, D. C.

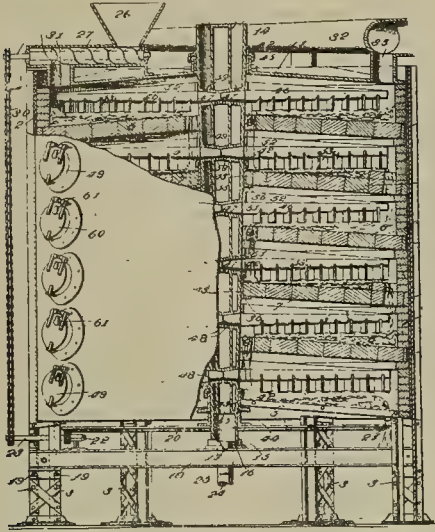


## Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 22, 1904.

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE ROASTING FURNACE.—No. 775,147; A. P. O'Brien, Richmond, Va.



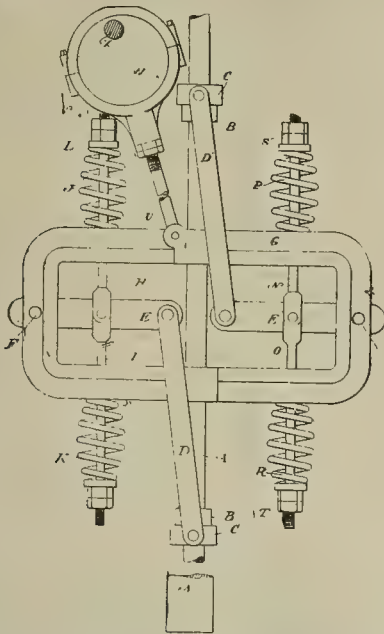
Roasting furnace comprising casing, hollow shaft mounted therein, vertically arranged parallel flat partitions dividing shaft into vertical compartments, rattle arms extending into shaft and through compartment walls, rattle arms having internal air passages for leading air from one compartment in shaft through rattle arms to another compartment in shaft.

APPARATUS FOR TREATING FINELY DIVIDED MATERIAL FOR THE RECOVERY OF METALS.—No. 774,736; D. C. Boley, Deadwood, S. D.



In apparatus for treating material by upward flow of fluids, combination of tank having bottom perforated for upward passage therethrough of fluid, of lining of textile fabric secured to bottom of tank by means of folds of fabric itself, whereby overlying battens above fabric are dispensed with and perforation of fabric obviated.

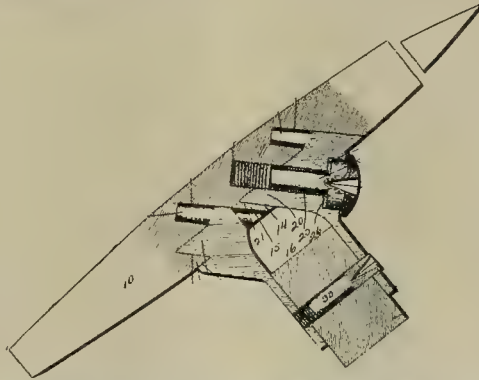
STAMP MILL.—No. 775,151; B. T. Scott, Los Angeles, Cal.



In stamp mill combination of stamp having stem, collars rigidly secured to stamp stem, sliding collars on stamp stem one above the other below rigid collars; frame slidably mounted on stem intermediate rigid collars; levers pivotally secured to frame and extending inwardly toward stem; links pivotally connecting inner ends of levers with sliding collars on stems; rods pivotally connected to levers intermediate ends thereof and projecting through frame both above and below same; nuts on ends of rods; springs

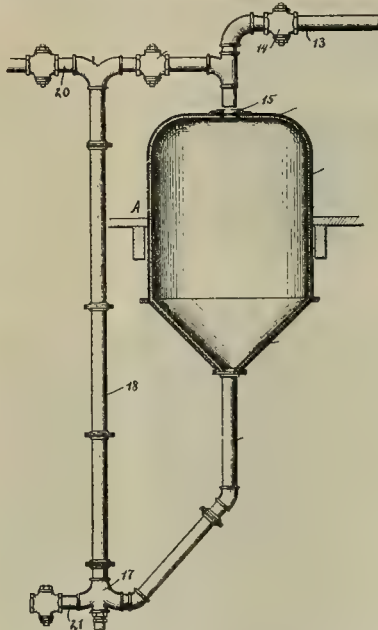
on rods, outer ends of which bear against nuts and inner ends against frame; means to reciprocate frame.

MINER'S PICK.—No. 775,325; W. Ashert, Des Moines, Ia.



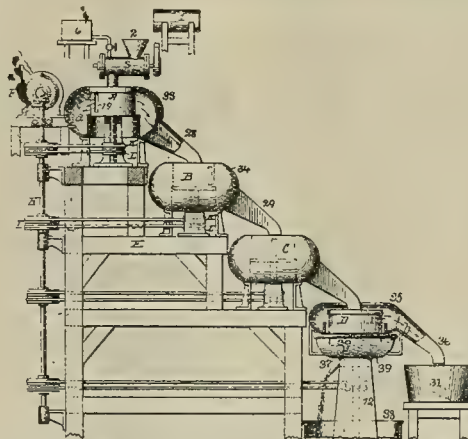
Combination of tool formed with sockets obliquely in its trend, stem formed with projections obliquely to its trend and screw arranged parallel with sockets and projections and connecting tool and stem.

PROCESS OF EXTRACTING METALS FROM THEIR ORES.—No. 775,405; F. H. Long, Chicago, Ill.



Improvement in cyanide process of extracting precious metals from their ores by effecting passage of entire charge of mixed ore and cyanide solution in successive portions through contracted channel by injecting into channel air blast of sufficient force and volume to maintain flow of charge and to revivify cyanide and clear ore.

PROCESS OF EXTRACTING PRECIOUS METAL FROM ORES.—No. 775,509; J. J. Berrigan, East Orange, N. J.



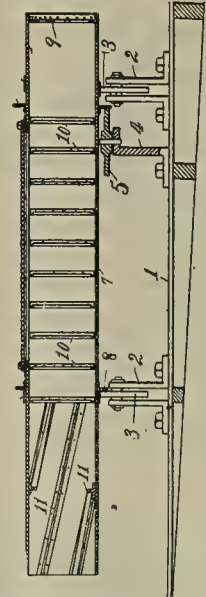
Process of extracting precious metal from ore which consists in projecting ore in comminuted form through aqueous solution chemically active to dissolve precious metal.

PROCESS OF SEPARATING COPPER OR LIKE METALS FROM THEIR ORES.—No. 775,548; P. Weiller, Vienna, and A. Weiller, Trieste, Austria-Hungary.

Process for separating from their ores copper, silver, lead and other metals adapted to be precipi-

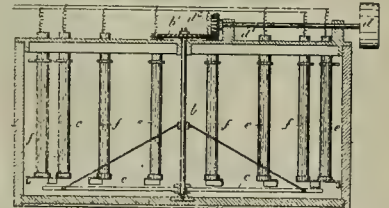
tated from acid solution by means of sulphuretted hydrogen, consisting in mixing crushed ore with iron filings and saltpeter, placing mixture in suitable small furnace and igniting mixture, whereby metal is reduced and fused down.

ROTARY SLUICE BOX.—No. 775,578; J. L. Porter, Mountain View, Cal.



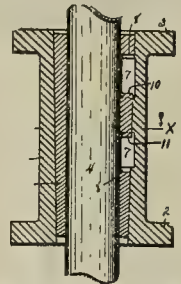
Combination of two pairs of vertical rollers, one pair being at higher level than other pair, cylinder revolving on four rollers and having circular flange, roller revolving in plane parallel with axis of cylinder and bearing against circular flange, cylinder having series of annular riffles in middle portion thereof, longitudinal opening over riffles, and tight-closing shutter for opening, cylinder extending at each end considerable distance compared with distance between adjacent riffles, and having at upper end annular internal flange and at lower end spiral ribs.

PROCESS OF EXTRACTING GOLD FROM ORES.—No. 775,597; H. R. Cassel, London, England.



Process for extraction of precious metals, which consists in gradually and continuously generating, by electrolysis at high current density exceeding ten amperes per square foot of anode surface, nascent cyanogen in pulp containing cyanide and halogen salt, simultaneously agitating pulp, dissolving and converting precious metals into soluble cyanides and retaining them in solution.

TAPPET FOR STAMP MILLS.—No. 775,625; W. E. Ingram, Stockton, Cal.



Tappet for stamp mills comprising sleeve having downwardly tapered bore, and also having lower and upper horizontal passages 7 arranged off its center and intersecting tapered bore, and downwardly tapered, vertically movable locking gibbs, one of which has upper and lower recesses 8 in outer side; lower wall of upper recess and upper wall of lower recess being arranged to be engaged by tapered device introduced through horizontal passages in sleeve.

TIMBER GROWING on south hillsides is usually better for mining purposes than that growing on slopes facing the north. The probable reason is that the north slopes being damp the trees grow more rapidly, and, consequently, are softer, and therefore less enduring than those on south slopes. It is also material as to the season in which timber is cut, both in mine timbers and in wood for fuel. That cut during the winter is harder and better than that cut in spring, after the sap has commenced to run.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

Ten months' figures (to Nov. 1, 1904) by the United States Department of Commerce and Labor through its bureau of statistics show a total value of mineral oil exported at \$66,000,000, which is a larger total in value than in the corresponding months of any preceding year, though in quantity the total is less than that of the corresponding months of 1901 or 1902. In five of the ten months of the present year the value of mineral oil exported has exceeded \$7,000,000 per month, while prior to December, 1903, the value seldom, if ever, reached so much as \$7,000,000 per month. The total quantity of mineral oil exported in the first ten months of 1904 is 823,000,000 gallons, against 872,000,000 gallons in the corresponding months of 1902 and 874,000,000 gallons in the corresponding months of 1901; but the value exported is \$10,000,000 over that for ten months of 1902 and \$6,000,000 over that for the corresponding period of 1901. Should the present rate of exportation continue during the remainder of the calendar year, the total quantity exported during the calendar year would exceed 1,000,000,000 gallons and the value exceed \$80,000,000, or an average of about 8 cents per gallon for the total exportation. Of the 823,000,000 gallons exported in the ten months ending with October, 629,000,000 was illuminating oil, 81,000,000 crude oil, 69,000,000 lubricating and paraffine, 17,000,000 naphthas and 26,000,000 residuum. Comparing exports with production, the growth in exportation has been justified by production in the United States, which has grown from 21,000,000 gallons in 1860 to 220,000,000 in 1870, 1,104,000,000 in 1880, 1,924,000,000 in 1890, 2,661,000,000 in 1900, and 4,219,000,000 in 1903, according to the preliminary figures of the Geological Survey.

## ARIZONA.

### Gila County.

The Inspiration M. Co., of which J. D. Coplen is manager, has had two carloads of high-grade ore from the Woodson tunnel, near Globe, tested at the Old Dominion smelter and reports satisfactory results. Experiments are under way to determine best method of treatment. The company has men driving the Martin tunnel, which is in 300 feet. It will have to be driven 800 feet farther to bring it in line with the proposed main working shaft which it would meet at a depth of 500 feet. The Mercer tunnel, started on the opposite side of the hill, if driven to connect with the shaft, would reach depth of 300 to 350 feet.

### Mohave County.

The Blue Ridge M. Co. reports making strike of ore in the Tom Reed mine, near Kingman, and proposes building a milling plant. The shaft is down 100 feet and crosscuts and drifts have been driven on the vein. The Ben Harrison is on the same lead.

## CALIFORNIA.

### Amador County.

The mill of the South Eureka mine, near Jackson, is nearing completion. The galvanized iron covering is on and work of placing the machinery is progressing. Superintendent Haven expects to have the mill running by January 1.

The 40-stamp addition to the Kennedy mill at Jackson is completed. The full capacity of 100 stamps will be running this week. The ore bins have been filling with rock. Additional machines have been put to work in the mine breaking rock.

The Whitmore mine, near Volcano, is operating. The 4-stamp mill is idle temporarily. Rock is being accumulated.

### Calaveras County.

C. B. Engstrom of the Hanby mine, near Fostoria, is moving the remaining twenty stamps of the Balliol mill at Sutter Creek, Amador county. The stamps are to be used by the Hanby Co., instead of the Lamphear (as previously reported). The Hanby mine is on the mother lode between Mokelumne Hill and Fostoria.

D. P. Gray has bought the Ginocchio mine, at Lower Calaveritas, and will begin development work this week. He has bought the Hagerman mine, near San Andreas, and has men at work there.

### El Dorado County.

The B. & M. Gold M. Co., which bought the W. H. Coleman group near Omo Ranch last summer, is working eight men and expects to increase the number. One tunnel being run in gravel gives encouraging results. A second tunnel will be started.

### Inyo County.

Near Poleta, J. E. Dunlap, running 160-foot tunnel on the Dunlap group of claims

north of the Poleta mine, reports a ledge struck and has been cut for 13 feet without showing foot wall. Samples run \$8 per ton. It shows free gold.

R. Curtis of Denver, Colo.; F. J. Campbell, manager of the Vindicator mine at Cripple Creek, Colo.; C. M. Hobbs, L. B. Curtis and C. F. Potter are preparing to build an electric plant on Bishop creek, near Bishop, to supply power to the mines of Tonopah and Goldfield districts in Nevada. L. B. Curtis is chief engineer in charge. Power locations have been made on Bishop creek and preliminary surveying is under way. It is expected that a line 12,000 to 15,000 feet long will be required, in which distance about 1000 feet fall will be secured. The unit to be first installed will be of 3000 H. P. capacity. The transmission line will run direct to Goldfield, following the general course of the Bishop & Goldfield toll road across the White mountains.

### Nevada County.

At Willow Valley, near Nevada City, the Cyane quartz mine has been started up. It adjoins the Federal Loan Constitution, Posey, Bellefontaine and Le Compton. A tunnel 150 feet in length on the vein and a crosscut tunnel 200 feet long will be reopened and driven ahead. C. H. and A. J. Kistler and G. M. Carey have a bond on the property.

Headway is reported being made at the Siberian quartz mine at Badger Hill, near North Columbia, and the 4-stamp mill is running steadily. A raise is being run to connect the lower tunnel with the one above to give better ventilation, says Superintendent Bigelow.

The Con. Nevada G. M. Co., which has bought the Julia quartz mine on Deer creek, near Nevada City, is cleaning out and retimbering the tunnel, which is in 300 feet. S. A. Gilmore of San Francisco is superintendent.

### Placer County.

(Special Correspondence).—At the Soldan mine at Towle the flume is completed, the compressor is running, and other improvements at mine and mill are about finished. A new tunnel 250 feet vertically below the present adit tunnel will be started. C. G. Dennis is superintendent.

Towle, Nov. 29.

The Elite mine of Shady Run after running a tunnel 1800 feet struck gravel in a raise of 35 feet last week. The Blue Canyon M. & Dev. Co. mines are in same section.

### Santa Barbara County.

At Santa Maria the Barca Oil Co. has been organized by J. B. Bonetti, S. Fleisher, S. A. Johnson, T. R. Finley, M. Grossmayer, C. F. Bramming, J. Smith. The property consists of a 250-acre lease on the Barca tract, adjoining the Graciosa Oil Co.'s ground on the west and being  $\frac{1}{2}$  mile north of Purissima well of the Union Oil Co., which is flowing 500 barrels of oil daily. Lumber and machinery will be put in and it is intended to begin drilling this month.

The Graciosa Oil Co.'s well No. 3, near Santa Maria, continues to flow at the rate of 900 barrels per twenty-four hours. No. 2 yields 425 barrels.—The Final Oil Co. is shipping 1500 barrels daily, being the production from five wells. It expects to have at least three more on the beam by Jan. 1st.

### Shasta County.

Operations are to be resumed at the Mt. Shasta, and the 550-foot shaft is to be sunk 500 feet deeper.

Contract for the 2 $\frac{1}{2}$ -mile tramway, to be built at the Mammoth mine, near Kennett, will be let. The United States M. Co. of Salt Lake City, Utah, is owner, with A. F. Holden, managing director.

The Nigger mine has been bonded to J. H. Thain. The Nigger mine is west from Keswick. Thain says that he will unwater the mine and work it.

Ore from Tonopah, Nev., is being shipped in carload lots to Keswick and treated at the Mountain C. Co. smelter, says the Searchlight. Ore is also being received from Mojave, in southern California. The ore from Nevada is used by the Mountain C. Co. for flux in smelting its sulphide ore from the Iron Mountain mine. The company has been paying \$2 a ton for quartz for fluxing purposes, even if barren of gold.

### Sierra County.

Near Forest City, men are at work extending the South Fork main tunnel, in 3400 feet, to tap the lower part of the Ruby lava-capped channel, about 900 feet beyond them. About 2000 feet of this ancient river bed and auriferous gravel lead is undeveloped on the Bald Mountain Extension, 4000 feet on the South Fork and 2000 feet on the Maple Grove locations. In what was known as 45 incline on the Bald Mountain ground gold was obtained from the Ruby channel. The extension of the South Fork main tunnel is expected to be completed in six months. A branch tunnel will be run north from

the main tunnel for a block of payable gravel on the South Fork ground, not worked by the Bald Mountain Extension Co. There are timber and water privileges on these claims.

### Siskiyou County.

J. B. Scott, manager of the New York quartz mine on Indian creek, near Fort Jones, reports success in taking out ore. His men have sunk 700 feet and found a ledge 10 inches to 4 feet in width. The mill is running steadily.—A. C. Brokaw of the Golden Eagle quartz mine on Indian creek, is doing development work in sinking shafts and extending tunnels. Ore is crushed with his small mill, which he intends replacing with a large one.

### Stanislaus County.

La Grange M. & Hydraulic Co., of which T. Donohue is superintendent, has begun hydraulicizing in the Patrickville placer diggings near La Grange.

### Trinity County.

The Red Mountain mine, near Weaverly, under management of M. A. Senger, has begun sluicing for the season. The owners have a 60-foot bank of payable gravel.

### Tuolumne County.

Contract to drive 200 feet of tunnel has been finished at the Presonta (the Precious Roost) mine, 2 miles above the Mohican mine on the main Tuolumne river, near Groveland. The vein is 18 inches in width, showing ore values. The mine is owned by Groveland men, as the Presonta G. M. Co. Contract to run the tunnel an additional 200 feet will be let.

### Yuba County.

The head dam of the Bay Counties Power Co. on the Yuba river, near Bullard's bar, is finished and water is flowing from it through 8 miles of flume to Colgate. The dam was washed out last winter and since then water was pumped from the river to the flume.

J. Moore & Son have begun boring on the Colmena Colony tract of 3100 acres, half way between Marysville and Wheatland, to prospect for gold for dredge mining.

## COLORADO.

### Boulder County.

The Fourth of July mine has resumed work at its main tunnel on Arapahoe Peak, near Eldora. The company has started to drift on the vein of concentrating ore cut at the 1700-foot point.

### Chaffee County.

Near Buena Vista, the strike in the Latchaw tunnel, Mt. Princeton, is showing the vein 22 feet between walls. A foot and a half of black sulphurets runs through it. President Torpy says the contractors will continue driving the tunnel and begin to drift and raise on the mineral. Ore will be treated in the company's mill at the foot of the mountain, which they will build this winter. The stoping ground from which they can take out mineral will be 1300 feet from the tunnel to the surface of the mountain.

### Clear Creek County.

C. I. Burt, interested in the Vulcan mine, near Silver Plume, will start work in the mine again and will let a contract to run a crosscut from the Pay Rock lode on the Silver Bank level to intersect the Vulcan vein at that depth, which it is estimated will be reached by driving 1600 feet. This will open the Vulcan at 300 feet deeper than the former workings.

Superintendent B. J. Martelon of the Silver Leaf M. Co. reports progress being made in the tunnel being driven to develop the Liberty Bell group of claims on McClellan mountain.

### Gilpin County.

Near Central City the Elizabeth G. M. Co. reports opening a streak of high-grade smelting ore in the 200-foot level. They are crosscutting in the 300-foot level to open into the ore body at that point. Development work is being carried along and shipments of milling ores gave two and one-half ounces gold to the ton.—The Lamberson & Warren vein has been cut after crosscutting in the third level of the King mine, on King flats, in Nevada district. The crosscut was driven south under direction of Manager T. Cornish and the vein shows 5 feet of concentrating ore. Drifts are being driven both ways on the vein.

Near Black Hawk the Robert Emmet mine is being developed. The vertical shaft has reached a depth of 525 feet and is completely timbered. The expense of the shaft was \$17,000. Drifting shows an ore body 125 feet high and 750 feet in length. No ore is being shipped except what is broken in extending the levels, making raises and sinking winzes. Plans are being made to sink the shaft 200 feet deeper and to extend 1500 feet of new levels at the 600 and 700-foot stations. The vein has paystreak 2 feet wide. Shipments to the local mills average  $4\frac{1}{2}$  ounces gold to the cord and the smelting ore \$43 per ton. The property is equipped with

boilers, hoists and air compressor. H. J. Stephens of Denver is manager.

Denver men are interested in lease and bond on the Pride group, near Central City, and they have the shaft down 175 feet. They have started running drifts on both sides of the shaft and are opening up mineral. Development work is slow on account of hoisting with a horse whim.

### Larimer County.

Near Pearl, J. F. Johnson, with D. C. Huling, owning the Viking group of five claims on Big creek, near the Cox mine, reports the main tunnel, under the Mayflower claim, has been driven 105 feet into a 34-foot lead, carrying payable values.

### Ouray County.

The Continental S. & R. Co. plant at Red Mountain is progressing. The main building for smelting purposes is completed and ready for machinery. A 52-foot brick Stetefeldt furnace and dust chambers, resting on heavy stone foundations, are in position. They will have a 150-ton daily matte furnace in operation and will treat low-grade gold and silver ores. The company owns, in addition to the smelting plant, three developed patented mines and controls, under ten-year bond and lease, the Saratoga group of mines, containing  $1\frac{1}{2}$  mile of tunnels, drifts and raises.

### San Juan County.

The Big Colorado mine has reached 3000-foot point with its tunnel in Boulder mountain, near Silverton, and an additional 2000 feet of drifts has prospected the several veins cut by the tunnel. The electric drills used have done satisfactory work, says Manager Bloodgood.

### San Miguel County.

Operations on the Ophir Con. group, near Ophir Loop, have been temporarily discontinued. The thirty stamps of the 50-stamp mill which have been dropping steadily for several months past have hung up.

At the Butterfly-Terrible mines and mill, near Ophir Loop, Manager J. F. Keating says steady work continues. Driving the mill crosscut tunnel will start near the mill building, and it will be 2000 to 3000 feet in length when completed. It will cut the Ida vein, the objective point, between 750 and 800 feet below the lowest of the upper workings. The tunnel will be driven on a vein most of the distance.

It is expected that G. W. Pierce et al. of Denver will build a plant for milling low-grade ores in Sawpit district, 17 miles down the San Miguel river from Telluride. Pierce has an option on a group of mines near Sawpit.

### Summit County.

Another ore shoot has been opened in a drift from the 180-foot level of the Old Union M. & M. Co. shaft No. 1, near Breckenridge. The ore carries galena and will be shipped. Development work is under way through two shafts, which are equipped with hoisting plants, and a tunnel being driven from the mill level. Work on the separating and concentrating mill is progressing. Superintendent G. C. Smith is opening up and blocking out ore. With completion of the mill-level tunnel, which will be 1000 feet long, the ore will be more cheaply taken out than by means of the shafts, says Manager A. E. Keables.

The Hancock M. & M. Co., of which C. F. Fry of Keystone is an incorporator, has been organized to operate at Montezuma. The Hancock and other claims of the company's group are on Glacier mountain, Montezuma.

Near Breckenridge the Gold Run M. & M. Co. has extended its tunnel 2500 feet. The breast of the tunnel shows heavily mineralized porphyry. The tunnel is being driven to cut a vein at 3000 feet. C. L. Lighburn of Cripple Creek and West Virginia men are owners.

### Teller County.

At Cripple Creek the Elkton Con. group on Raven hill has 100 men at work and by the aid of the new washing machine profits are reported being saved. The management is confining most of its operations to the sixth, seventh and eighth levels. Shipments are sent out regularly to mills and smelters.

A bond of \$150,000 has been given on the Jefferson mine, in Victor, to A. A. Barnes, who will start operations. The Jefferson contains three and one-half acres. The claim adjoins the Strong and Independence mines and the extension of the ore-bearing dike of the former is supposed to go through the Jefferson. It is developed by a shaft 510 feet deep.—The Milwaukee Mutual M. Co., leasing on the Gold Dollar Con., is breaking ore 3 feet wide and maintaining shipments of three carloads of \$40 a week.—The Elkton Co. is outputting 100 tons of ore per day. It is also doing a great deal of development.—The air compressor of the La Bella plant at Goldfield was closed for three days last week to make repairs, causing a suspension of operations on several properties on Bull hill. Heretofore



the compressor has been furnishing air for sixty-one drills, but now it will have a capacity of eighty drills.

The Spinney mill, built in 1893, on the Colorado Springs wagon road east of Cripple Creek, is being torn down. The mill contained ten stamps and was built at a cost of \$20,000.

On Beacon hill the Exposition M. & L. Co., composed of Cripple Creek and Kansas City, Mo., men, has leased that portion of El Paso estate known as the Barbee block. It is proposed to sink to the 500-foot point. Equipment is being put in, including a 40 H. P. boiler, hoist, compressor and gallows frame.

P. Logan, lessee, will put in a washing machine and other apparatus on the dump of the Jo Dandy mine, on Raven hill, near Cripple Creek. The values run \$15 in gold to the ton; and after the washing machine is in, it is expected slimes running \$100 may be saved.

Near Cripple Creek C. B. Burch will build a 100-ton cyanide mill on the Little Giant mine in Pony gulch.

At Cripple Creek, the City of Cripple Creek G. M. Co., which has bought the assets of the Cripple Creek Enterprise Co., which held a franchise from the city to mine under the streets and alleys, has started operations through the main shaft. The shaft, which has been sunk 200 feet, has been unwatered. They expect to sink the shaft 200 feet more.

Cripple Creek reports say W. P. Dunham, manager and part owner of the Hull City placer mine at Bull hill, has effected a settlement and is starting up the property. Dunham says he will cut the property up into blocks, when it will be thrown open on the leasing basis, which will give employment to 100 miners.—Lessee McDonald & Co., operating on the Clara D. of the Lexington Co., is sending out regular shipments. The lessee is also saving one carload per week from the dump which returns values of \$17 per ton. The shipments from the mine return values of two ounces per ton.

Near Cripple Creek, the property of the Astor G. M. Co., which comprises sixteen and one-half acres on Copper mountain, has been sold by sheriff to G. R. Lewis of Cripple Creek.

At Cripple Creek, the Ajax M. Co. has twelve sets of lessees operating on its territory, besides the company is working on its own account. Between 600 and 700 tons of ore per month are being removed. The production is being made from the 900-foot level to the surface. The average ore runs \$30.

Northeast of Cripple Creek the Colorado-Quincy Granite Co. owns 160 acres of granite, which will be quarried for building purposes. The owners are F. C. Smith, F. Ferguson and H. M. Gilbert. The property is at Devil's Slide station, on the C. S. & C. D. Railway. Machinery, including a 60 H. P. boiler, a 30-horse derrick and a 40-drill compressor, is being set up. Within sixty days the company will be shipping granite.

## IDAHO.

### Boise County.

G. M. Snow of the Trapper Flat M. Co. says the company has taken up the bond on the Thunderbolt mountain mining claims, near Idaho City, in advance, development work having justified the step. A sawmill will go in this fall. The company has a stamp mill which will be taken in next spring.

### Idaho County.

(Special Correspondence).—The Imperial Corona G. M. Co. which owns the Atlas group and the Consolation group, 2 miles from Elk City, is driving a tunnel on the former and sinking a shaft on the Consolation. The working force on both properties is being decreased.

Elk City, Nov. 26.

At Roosevelt, in Thunder Mountain district, the Sunnyside has completed installation of the 40-stamp mill and it will be operating next week. The mine is working eighty men. The tramway is finished. At the Dewey the 10-stamp mill continues crushing and about fifteen men are employed. The H. Y. S.'s new sawmill is working. The Copper Mountain and the Wendenhoff properties are also working. The camp is well provisioned and many miners will remain during the winter.

H. O. Johnson, Schofield, Snider, Hamill and Sugrue are owners of twenty-five claims east of the H. Y. and Old Crater mines, near Roosevelt. They will incorporate the group, which is known as the Paragon and North Star.—M. F. Kirkpatrick, superintendent for the Co-operative Mines Association, also the Crown, Empress and East Dewey, says he has completed 200 feet of work on the East Dewey since taking charge. In an adit below the mine buildings he opened ore showing sulphurets and free gold.

### Owyhee County.

The Cleveland M. & M. Co.'s hoisting

plant at the California mine on Baxter hill, near Silver City, is in operation. The engine is of gasoline type fitted for sinking 800 feet. The Baxter shaft is being retimbered. A bedrock shaft is being sunk through the cap rock on the Helm claim of this group to determine the course of another vein 300 feet east of the California vein.

### Shoshone County.

At Wardner at the Bunker Hill & Sullivan concentrator improvements are under way. An addition to the ore bins is being made and several hundred feet of track have been laid so that the cars can be loaded direct from the bins. On account of the low stage of water the mill is partly operated by steam. The steam power will be supplanted by electric power, for two 50 H. P. electric motors are being put in. A small compressor has been put in to assist the large one. It is operated by electricity.

G. A. Rubedew and E. Desvoigne of Moscow report at Pierce City the Hunch M. & M. Co., in which they are interested, has men running a drift on the ledge. They opened up a ledge 10 feet in width with a pay streak 2 feet, giving mill test of \$40 to the ton. On the Wild Rose the cyanide plant is being worked. The tunnel is in 300 feet, with 150 feet yet to run.

The owners of the Teddy group of claims in Evolution mining district, near Wardner, are incorporating their property. The owners are J. B. Cox, J. B. McKenzie, A. H. Rambo, J. W. Branthly, J. Pelkes and L. O. Whitsett of Wardner. The upper tunnel is in 125 feet and the lower tunnel 100 feet. Work will be increased. A body of galena is showing.

Wallace reports say J. M. Burke has bonded the Cooney group and the Murphy-Kelly group which adjoins the Tiger-Poorman mine on the northeast. Each group is bonded for, approximately, \$100,000. First payment has been made and work started by Burke. The two groups are in a favorable situation at head of town of Burke. The Murphy-Kelly group consists of five claims on O'Neil gulch. On the Marsh lode, one of the claims adjoining the Tiger-Poorman group, a 100-foot tunnel has been driven and it is claimed the Poorman lead followed 60 feet. The vein on all the claims can be tapped with this tunnel. Burke is also developing the Polaris group, owned by S. Heyburn et al.

## KANSAS.

### Cherokee County.

At Galena Boughton Bros.' mill is running regular. Crowe's mill has started up after a prolonged shutdown.—The Pittsburg M. Co. shafts, Nos. 2 and 3, have been shut down temporarily on account of the large amount of dirt which was held for the mill. The same is the case with the Bonanza mines, says Superintendent Murdock. The pumps in the bottom have been shut down. The water has been lowered to the 160-foot level and will not be lowered any more until miners start to sink again.—G. McCullagh's mill been started again.

At Galena the management of the Maggie Taylor tract is starting work.—Manager Van Pelt will work his Bonanza mines. Superintendent C. Moll has placed a pump in the shaft and the ground will be drained.—The B. & E. mine is taking out payable ore, which is sent to the Marshal mill.

At Baxter Springs the Mission mines of Ford & Troupe have been sold to McCarthy & Bailey of the Baxter M. Co. for \$75,000.—Zinc ore has been found in the Joanna mine.—Haines & Co. are placing a new boiler and engine.—Kent & Co. are taking out ore at the M. K. & T. mine.—Hubbard & Co. have struck a fine run of lead ore on the Angel ground.—A new hoist and hand jigs are being put in at the Tom Clark mine.—Two shafts are being put down by Canterbury & Wilson on the Charters land.

## MISSOURI.

### Jasper County.

J. Seaton of Atchison, Kan., has incorporated his interests in Joplin district, as the Charlotte M. Co., with W. H. Condit, S. S. Winn and W. M. Garrad. The company owns a productive property near Centerville.

The Hungry Five M. Co., on the Stephenson-Moore lease, near Duenweg, has been sold to Thomas, Coyne & Weaver for \$3000.—Two strikes have been made on the 560-acre tract, owned by C. M. Wilson, north of Joplin. One was a drill hole strike on the Cincinnati-Joplin lease. The drill penetrated an ore body from 145 to 175 feet. The drill first went through 6½ feet of lead. The jack cuttings are also said to be rich. The other strike was made in a shaft at a depth of 32 feet. After going through 6 feet of lead a body of jack was cut and they are sinking in it. This development is on a lease owned by G. Lilly.

The Pim-Mays M. Co. on the Greer

lease east of Carterville is sinking its shaft, taking up lead and jack.—C. T. Orr of Webb City and J. B. Miller of Warrensburg have bought the Great Scott tailing mill. They will keep the plant busy on tailing piles near the plant.—The Hayseed mines are opening up a rich run of ore.—A drill strike of lead and zinc is reported on the Luscombe mining land at Carterville. The owner of the ground is T. T. Luscombe of Carthage.

A. B. Griffith of Cleveland, O., is at Webb City and resumed operations on the Baker land, between Webb City and Oronogo. They have a prospect in sheet ground. The company is operating as the A. B. C. Mining Co.—The mine on the Cornfield, operated by Daugherty, Wallace, Smith, Nearing, Daniels & Howard, is producing from a 6-foot face of block lead at a depth of 115 feet.

C. M. Wilson has bought a tract of land comprising 1652 acres of the Allen tract at Spring City, 5 miles south of Joplin. The developed portion of the land has been a producer of high-grade ore. The La Salle mill will be put in operation. Wilson has also secured the J. Dessoux forty acres of land at Zincite, together with the Stewart lease and 100-ton mill recently completed. That property is being opened up.

### Lawrence County.

At Stotts City the Three C mining plant, the property of H. Bromback of Mt. Vernon, was destroyed by fire last week. There was no water or means of fighting the fire. The plant was built at a cost of \$10,000.

## MONTANA.

The Montana State Bureau of Labor, Agriculture and Industry has a table in the biennial report showing the production of the coal mines of Montana for the past two years. In 1902 Cascade county led in the production of coal, the aggregate being 791,949 tons. Carbon county was second, producing 548,923 tons. The value of the coal produced in Cascade county was \$1,072,130 and in Carbon county \$676,231. The value of all coal produced in the State was \$2,222,488. In 1903 Carbon county had total of 776,234 tons, while Carbon county produced 582,497 tons. The total number of tons produced in the State was 1,553,285, value \$2,524,069. The total amount of capital invested was \$5,567,200. The amount paid for labor was \$1,712,092. An average of 2112 men were employed, as against 1974 in 1902. The report says the area of coal-bearing formation in the State is estimated to be 13,000 square miles, exclusive of the lignite-bearing formations, according to the United States Geological Survey.

### Deer Lodge County.

Near Anaconda, preparations for the winter are made at the Golden Eagle mine on Flint creek by J. Wegener and H. Moen. There are 100 sacks of ore filed to be sent to the smelter.

A gold strike is reported made in the Hidden Lake group of mines on Warm Springs creek, near Anaconda, owned by T. O'Leary, W. A. Law, P. J. Dooley and other Anaconda men. An 8-foot ledge of free-milling gold ore is showing.

### Flathead County.

The Spokane Placer M. Co. has been organized under Washington laws by F. W. Schwellenbach, president and manager, F. Bahler, R. H. Hoag, H. J. Schutte, A. Morin, W. J. Noland and H. Teichman of Spokane, Wash. The company owns 1280 acres of placer ground on Standard creek, in the West Fisher gold belt, near Libby. It is said the ground has been tested over an area of 1000 acres and that it will vary from 1 to 75 feet of pay dirt and will yield 41 cents to the yard. The company owns water rights and a mile of ground farther down the creek for dumping purposes. The water will have a fall of 500 feet on the company's ground.

### Granite County.

The Sunset M. & R. Co. has been organized at Phillipsburg to open up mining ground 1 mile north of Phillipsburg, by H. Kaiser, F. Bowen and D. Olson. The claims owned by the company are the Sunset, Great Surprise, Bay Horse and Summit. The company also owns a one-half interest in the Hello Girl group and has a bond on the Gold King, an adjoining claim. The claims are along northwest portion of Hope hill and near the Hope group. The Sunset group carries values in gold, silver and copper. The vein shows an iron cap of average width of 120 feet. It is on a contact between porphyry and quartzite, and as far as developed carries values of six ounces silver, 6% copper and several dollars in gold per ton. The company will sink a shaft and cross-cut the vein. Machinery, including a hoist, pump, etc., will be put in.

### Jefferson County.

In the Reliance mine, operated by Red Bird M. Co. in High Ore gulch, near the

High Ore mine, near Basin, and about 1 mile from the railroad, the company has expended \$22,000 in development and will develop further with a diamond drill. In taking out shipments of high-grade ore, bodies of concentrating ore have been blocked out.

### Lewis and Clarke County.

(Special Correspondence).—The Whitlach M. Co. is increasing development work on its group of mines (formerly the Whitlach-Union), near Helena. The Whitlach-Union is one of the oldest developed gold mines in the State. F. L. Sizer is manager.

Helena, Nov. 27.

### Park County.

The New World S. Co. has been organized by G. L. Tanzer, J. C. Lavold and C. R. Tuttle of Seattle, Wash., and owns 860 acres of placer ground, five quartz claims, 8,000,000 feet of standing timber and three water rights out of Clark's Fork river, near Livingston. Its Montana agent is F. C. Byrne of Red Lodge.

## NEVADA.

### Elko County.

The Trophy M. & M. Co. has been organized to operate at Mountain City by W. H. Dickson, F. E. McGurrin, A. J. Weber, W. I. Snyder, G. Gutch and J. J. Broecker of Salt Lake City, Utah.

### Esmeralda County.

At Goldfield a strike is reported in the Loftus & Davis lease in the Sandstorm mine. J. P. Loftus and J. R. Davis were prospecting on abandoned lease 5 of the Sandstorm. They secured a lease and began sinking a shaft. Three ledges have been uncovered. One of the ledges is said to average 4 feet and goes \$1000 a ton.

### Lincoln County.

M. Blake and F. Williams, owners of the Golden Crown group of mines, near Moapa, report assays of \$22 gold and 100 ounces silver per ton from a 3-foot ledge at breast of tunnel in 230 feet, with a depth from surface of 120 feet. The vein lies between quartzite and shale walls.—L. McNamee and F. Woolsey, on the Golden Dawn group of gold mines on upper Virgin river, have struck a 3-foot vein of free gold ore. The values are in white honey-combed quartz. They propose building a stamp mill. They have five claims in the group and water from the Virgin river to handle the ore. Grey & Noble of Denver, Colo., are also part owners.

G. Brown and F. Calles, owners of the Red Light group of gold claims on Virgin river, near Moapa, struck a 4-foot vein of ore. They will erect a mill and start milling ore by February 1.—L. Meyers and J. Peters, owners of the Black Bird and Fairview mines, northwest of Caliente, 65 miles, have struck a ledge 5 feet wide at a depth of 160 feet of galena, going 450 ounces silver and 23½ lead per ton.

### Nye County.

Reno reports say the Southern Pacific Railroad Co. has given notice that after Nov. 29th, until further notice, the company would not receive freight from any points along its system destined for Tonopah or Goldfield, except "such freight as is absolutely needful in the mining camps for sustaining life of man and beast"—the result of the congested condition of the freight traffic between Reno and Tonopah. According to the figures of the railroad company, there are standing on the sidings between Reno and Moundhouse 300 cars loaded with freight awaiting shipment into the mining camps. The newly built Tonopah railroad has been supplied with additional cars for relieving the congestion, and although its entire rolling stock has been kept moving all the time the supply of cars has been inadequate. It is expected that it will be twenty-five or thirty days before new freight will be accepted by the companies. A cessation of freight traffic is believed to be the only means of amply providing the mining camps with necessary food for the winter months.—Last week five mule teams of twelve mules each started from Reno with heavily loaded wagons, being the first time since the days of the Comstock that this slow mode of travel has been used. It will take the mule teams twelve days to cover the distance that a freight train can travel in one day. More teams are being put on.

Tonopah reports say the case of Porter against the North Star mine has been decided in favor of the latter. Judge Hawley held that the North Star had made prior location and was therefore entitled to the patent.

E. Hirschler, president and manager of the Tonopah-Wilmington Co. (previously known as the South Tonopah), has let contracts for work. The group comprises seven claims, 4 miles south of Tonopah on the Goldfield road. On the Needham claim a shaft is going down on the foot wall side of the vein. A 15 H. P. gasoline hoist will be put in on the Needham shaft.

T. Lynch & Co., who took an option on



the Reveille group at Reveille, east of Tonopah, have made final payment of \$50,000. The mine has cost them \$250,000.

Manager H. H. Douglas of the West Tonopah reports seven claims owned by the company, adjoining the Pittsburg Tonopah mine on the west, have been surveyed and sinking a main working shaft has started. This shaft is 2000 feet west of the Pittsburg Tonopah shaft and north of the vein which crops on the surface. A steam hoisting plant will be ordered.

## NEW MEXICO.

### Grant County.

The Mountain Key mine, at Pinos Altos, is developing into a steady producer and shipment of ore will begin this month. The number of men at work will be increased. There are 300 tons of ore on the dumps waiting shipment. Water has delayed the work.

During the ten days preceding Nov. 24 over seventy cars of freight were shipped to Silver City, of which number a large percentage were loaded with mining machinery consigned to the Burro Mountain C. Co., Comanche M. & S. Co., Ernestine M. & M. Co. and the Mogollon C. Co. The Burro Mountain C. Co. received additional concentrating tables, a Huntington mill, new boiler and other machinery for the mine and mill; also a car of lime, a car of lumber and four mixed cars of small machinery. The Comanche M. & S. Co., at Silver City, has started to receive ore, preparatory to opening its smelting plant.

### Lincoln County.

It is reported the magnificent plant at the Vera Cruz mine, south of White Oaks, in the Capitan mountains, is in full operation with its five Huntington mills.

## OREGON.

### Baker County.

Sumpter reports say the flume work and ditching for the Thornburg placers has been completed, and they will be ready for operations next spring. Steel rails are being hauled out, and these will be used as runways in the flumes. Road work to the placers has also been completed. Concentrators will be put in for handling the black sand and also a cyanide plant. The name has been changed from Thornburg to Vinson placers, says Manager W. L. Vinson. Other claims along the creek have been bought.

A. Geiser of Baker City has an option and lease on the Dell group, near Sparta, and has put men to work. The property is near the Gem mine, which Geiser is operating.—J. S. Hughes and Cleaver Bros. have sold their interests in the Standard mine, in Quartzburg district, to the Killen, Warner, Stewart Co. of Sumpter for \$40,000 cash.

### Douglas County.

W. Cochran, working mines in Bohemia, says with O. G. Gilbertson he has been opening up City creek bodies of both oxidized and sulphide ores. They expect to build a mill next season.

### Jackson County.

The Millionaire mine, 2 miles south of Gold Hill, was sold last week to W. R. McKeene of Terre Haute, Ind., for \$40,000 cash.

### Josephine County.

M. Armstrong, with T. Reid of Medford, owning a placer mine on Taylor creek, near Grants Pass, report they will start piling this week. Their equipment consists of a No. 2 giant, but another No. 2 will be put in this winter. Work will be started this week to put in another ditch of a mile in length, which will give a larger quantity of water and higher head than the present ditch, which is also a mile in length.

H. E. Booth of Pickett creek, near Grants Pass, owning the Gold Standard group of six claims, says he is developing ledges of gold and copper bearing rock, the copper assaying up to 13%, and the gold ore \$6. The copper is in a ledge 12 feet in width and development work consists of 200 feet of tunnel and a 50-foot shaft. The gold is in a porphyry dyke. The rock is decomposed, giving ore that is free milling. The group is on Pickett creek which would afford water for power and other purposes, and is 6 miles from the railroad at Merlin, with a wagon road of easy grade.

The placer season was opened in southern Oregon last week by the beginning of operations on Galice creek, near Galice. The Galice Con. has four giants at work in its diggings, and Manager J. Harvey will begin operations in the Royal group next week. The Alameda and Rand mining companies are working men in quartz mining development. The new wagon road makes the district easier of access from Merlin.

Near Grants Pass the forty-ton cyanide plant, rolls, rock crusher, engine, boiler and other machinery for the Oro Fino have been set up at the mine on Jump-

Off-Joe. The Oro Fino is owned by Portland men. S. Chase is superintendent. The property is over the divide from the Granite Hill.

A. E. Dodson and J. Bumgardner on Oscar creek, near Grants Pass, are opening up two claims, one a placer, the other quartz. The placer claim embraces the creek channel and the earth to be handled is from 1 to 12 feet deep, with a layer of gravel on bedrock that prospects well. Dodson & Bumgardner will put in a ditch 500 feet in length, which will give them a pressure of 60 feet to operate a hose in piping the earth through the sluices. The quartz claims are near the placer.

C. L. Mangum of Grants Pass owns in Silver creek district the Old Glory group of quartz claims. He says the ore will be tested by cyanide and amalgamation. It is expected a mill will be built and the mine further developed.

### Lane County.

The Treasure mine in Blue River district has 6000 feet of tunnels completed, and drilling of 1400 more on the main tunnel under way. It will connect the two watersheds of Blue river and the Calapooia, affording convenience of getting water and timber for the stamp mill, besides yielding ore. D. H. Park, manager, says work is being increased in the tunnel, and when completed the mill will be placed at the Blue river end, while the sawmill will be moved to north entrance of the tunnel on the Calapooia side. There is but little timber on the Blue river side, and lumber supply as well as water for use in the stamp mill will be brought through the tunnel. The ore is said to be easily worked, power drills not being required. The cost of working averages \$5 per foot in the tunnel. The ore is free milling. A stamp mill of 100 tons capacity will be put in next summer.

E. A. Hamilton, of San Francisco, Cal., has bought half interest in the Tate Bros.' mine at Blue River. He will begin work of running a 250-foot tunnel to tap the veins in the Tate Bros.' group, and next summer will put in a 5-stamp mill.

A 2-stamp quartz mill is being put on the Red Buck mine near Blue River. The mine has been bonded by W. H. Scott of Crawfordsville and T. P. Howard of Gervais. Buildings are being repaired for the plant. The Red Buck adjoins the Nome Con. M. Co. group on the northeast and is a half mile from the Calapooia river.

### Marion County.

Erection of the pyritic smelter and concentrator plant and the extensive development of the mines of the Gold Creek M. & M. Co. of the Santiam mining district are planned, says President O. Hansen at Salem. The property consists of eighteen claims with 1000 feet of tunnels. The main working tunnel is on the Bimetallic claim and has cut ore veins at three points. The ore ranged from 10 inches to 7 feet, the latter width being the Bimetallic ledge. In addition to the group of lode claims the company also owns 160 acres of placer ground at Gold creek, obtained and held for use as a mill and smelter site. The nearest railroad point to the mine is Gates, on the Corvallis & Eastern Railroad, 9 miles distant. Work is in progress building roads to that section.

## SOUTH DAKOTA.

### Custer County.

The Ivanhoe M. Co., operating at Camp Ivanhoe, 8 miles east of Custer, reports developing ore which chemical analyses show contains from 0.1 ounce to 0.2 ounce platinum per ton. Superintendent C. J. Sine says the company is experimenting to determine a process and equipment for profitable recovery of the platinum values. A stamp mill with a capacity of fifteen tons daily is being built. The gold values will be saved by amalgamation. The mill is going up beside the hoist, so as to use the same boiler equipment. A 1000-foot tramway is being built to connect the mill with the Chilkoot vein, and a tunnel driven to tap the vein at 200 feet vertical depth. The shaft is being sunk to 500 feet, going down between the Chilkoot and Detroit veins.

### Lawrence County.

The Puritan G. M. & M. Co., near Deadwood, proposes to add a cyanide department to its 20-stamp, concentrating mill. W. J. McGoffin is president.

The Elliptic M. Co. is putting in shipment of machinery at its mine near Maitland, including hoist, compressor, drills, two boilers, pumps, etc., and a dynamo and engine for lighting the mine and plant. Sinking will be resumed and the shaft continued to quartzite.

As showing the costs of handling low-grade gold ores in the mills of the Black Hills, the following figures have been furnished the Black Hills Review by the companies indicated. Some of the figures are for the month of October:

Plant.	Costs Per Ton.
Wasp No. 2 cyanide	\$1.03
Clover Leaf amalgamation	.71
Maitland cyanide	1.80
Imperial cyanide	1.38
Dakota cyanide	.90
Homestake (stamps)	.40
Homestake cyanide	.28
Horseshoe cyanide	1.32
Spearfish	.80

The following will show points of difference and features of the above mills: Wasp No. 2: Dry, coarse crushing mill, treating oxidized quartzite, easy of percolation. Rolls used in crushing, belt conveyors transfer ore to leaching vats, where product is treated without discrimination between sands and slimes. The plant is nearly automatic, requiring small crew.—Clover Leaf: An amalgamation mill, operating sixty stamps.—Maitland: Cyanide plant, wet crushing, with forty stamps. Ore, complex and difficult of treatment. Extreme hardness of ore in a measure responsible for high cost. Long leaching time is given—sixteen days.—Imperial: Dry crushing plant, built on level ground and equipped with elevators and conveyors. Costs based on monthly tonnage of 3500 to 4000. The mill is being enlarged by additional crushing machinery.—Dakota: Thirty-stamp, wet-crushing mill. Ore averages \$4.80 per ton. Tonnage, 120 daily. It is thought permanent improvements, repairs, etc., are not included; but the figure gives barely the cost of operating.—Homestake: In the stamp mills, by amalgamation, the ores are treated for 40 cents a ton. Sands, after separation from slimes, are handled at cyanide plants for 28 cents a ton. This latter figure represents the cost merely of leaching, discharging, cleaning up, etc., as the ore is not pulverized for the cyanide treatment.—Horseshoe: The largest wet crushing cyanide mill in the Hills, with present tonnage of 350, and 90 of its 120 stamps in operation.—Spearfish: Dry-crushing plant, handling ore of character for quick and easy treatment. Ore is crushed to size of grains of corn, dumped into vats and treated by cyanide. A high recovery is made in short time. The ore is described as a silicified lime, running \$5 to \$6 a ton.

### Pennington County.

Manager T. R. Griffith of the Bismarck mine, at Keystone, has men at work taking out ore for shipment. Additional machinery will be put into its 30-stamp mill.

## UTAH.

### Juab County.

Near Eureka, the Orient M. Co. will continue developments all winter.—J. M. Wheeler & Co. have started work on the Blue Jay group of claims, near the Orient and Scotia mines, in West Tintic.—Development will begin on the Prairie Bell group of claims in West Tintic. They have a vein of ore opened to a depth of 70 feet and have drifts on the vein for 100 feet. The vein has values of 100 ounces silver and a high per cent in lead.

The stamps at the Mammoth mill, at Robinson, have been hung up, pending a more satisfactory solution of the milling problem, says the News.

### Kane County.

Kanab reports say operations are resuming at the Coconino copper mines, on Buckskin mountain. The company has been reincorporated and is putting in machinery for treatment of the ores.

### Salt Lake County.

In the Continental-Alta, at Alta, Manager H. M. Crowther says that, after driving sixteen months in lower Grizzly tunnel to cut known ore bodies, they have opened an extra vein 100 feet from objective point. This vein carries 15 ounces silver, 10% lead, 5% copper and 20% excess of iron, including \$1 in gold, and is about 18 inches wide. This ore is encountered at a depth of 200 feet below any point previously mined and at a depth of 1000 feet under apex of the vein. They have thirty-five out of sixty-two tram towers erected and the upper terminal is framed. The first carload of pipe for mill power line has arrived. This pipe line will be 14 inches in diameter and 4000 feet long.

### Tooele County.

At Stockton the Galena King M. Co. reports the faulted vein which was lost has been recovered and with it a good body of lead carbonates and galena. Into this the level is being extended.

### Utah County.

The Utah County L. & P. Co. will put in an auxiliary plant at the head of American Fork canyon, near American Fork, for furnishing power for the mines of Bingham, Alta, Big Cottonwood and other camps. The plant will be 1500 H. P.

At Lehi the Lehi Clay & Silica Co. has been organized with S. W. Ross as manager. The company owns clay beds in Cedar valley and also silica beds in Rush valley, both of which will be opened up and the products shipped.

## WASHINGTON.

### Ferry County.

H. W. Vierich and H. P. Schul of the American Onyx & Marble Co., whose properties are on the Colville reservation, 15 miles southwest of Northport, report they are taking out building stone and will start shipments.

J. L. Harper of Republic, interested in the Belcher mine in Belcher camp, the Mountain Boy mine at Park City, and the Manila mine, near Keller, says Republic camp proper has one mine a regular shipper, Belcher camp has two shippers, Orient has one shipper and several which could ship. Park City, 25 miles from the railroad, has one shipper and Mountain Boy and two others will be added to the list. The Manila mine, on which the Jupiter-Ammon M. Co. will place men to work this week; the Congress mine, the Gold Cord in Summit, and other mines on Silver creek have ore blocked out for shipment. He says an American smelter will be built near West Fork and that preliminary work will begin in January. A railway will be built down the San Poil valley by the Republic & Kettle River Railway Co. The Washington S. & R. Co. has been organized to build a smelter. The initial capacity will be 600 tons daily, two copper matting, hot blast furnaces of 200 tons each and one lead stack. One matting furnace will be utilized in producing a nickeliferous-copper matte from ore from the Congress mine. E. R. Fraser of Spokane and R. McCaig of Rosalia are interested.

### Lincoln County.

Davenport reports say a wagon road is being built from the Spokane river, north of Davenport, to the Cedar canyon mining camp. The old road from the river to the mining camp was 20 miles long, and the grade heavy in places. The new road is 12 miles long, and at no place is the grade expected to be over 7%. This makes the total distance from Davenport to the Turk smelter 32 miles. It is intention of the smelter company to put on traction engines to haul coal and supplies. Coal for the smelter is being hauled from Davenport by teams at a cost of \$9 per ton. This cost will be reduced by use of traction engines. The smelter company has bought an iron mine 4 miles from the smelter site. A lime quarry has also been secured 1 mile distant and teams are hauling the fluxes. Wagons are also transporting ore from the mines of the camp. The Turk group and the Silver Queen and Silver Seal are being operated by the owners of the Turk property and much ore is being taken out. Many of the dumps have accumulated smelting ore that was not rich enough to stand transportation. These dumps are being utilized. They run in values from \$40 per ton down. In the past it cost \$40 per ton to mine, transport and smelt the ores of the camp.

### Snohomish County.

At Monte Cristo the trams at the Golden Chord and Rainey mines are completed, and the Northern Pacific railroad is preparing to extend its tracks. A shaft house and hoist, the latter to be operated by air from the Justice M. Co.'s plant, is about ready for operation at the Rainey. Superintendent Brown is working nineteen men at the Philo mine.

### Stevens County.

Under the supervision of A. J. Dunton, the Chewelah Marble Co. is shipping white marble from the company's property on Deep creek, 5 miles east of Northport. Machinery is being put in. F. O. Streed of Minneapolis, Minn., is part owner of the Chewelah Marble Co. The company works twelve men and owns 480 acres of marble land, a millsite and a water power right on Deep creek.

Near Northport the Last Chance mine, on Deep creek, has completed the shipment of the galena on the dump and the ore in the upper tunnel, and has laid off several teams until development work in the lower levels justifies a renewal of shipments. One six-horse team is hauling ore.—The Le Roi smelter is being overhauled and the double-deck calcine furnaces coupled up, preparatory to further increasing the capacity of the plant for the treatment of custom ores.

H. H. Baker, manager of the Nellie S. mine, at Chewelah, reports a drift of 80 feet from the 100-foot level in the shaft is showing payable ore. The miners are crosscutting for the parallel vein. The mine is equipped with boiler, engine, hoist, steam drill, steam pump and ore bins.

## WYOMING.

### Carbon County.

Dillon reports say a trench being run on the Octavia group cut a vein carrying galena 20 inches in thickness. The trench is 300 feet north from portal of the 900-foot tunnel. It is 4 miles from Dillon. The Octavia group comprises thirty claims, and E. W. Honchen is principal



owner. A tunnel has also been started on one of the group adjoining the Congo and Independence. While driving the main tunnel they packed supplies in from the Saratoga road at a point 6 miles distant.

#### Crook County.

H. C. Stillwell of San Francisco, Cal., has bought the Barrett coal properties near Aladdin and will put them on a producing basis. The Stillwell Coal Co. has been incorporated and W. A. Remer of Deadwood, S. D., is vice-president and manager. The mines are on the Hay Creek beds. Several workable veins of a good quality of coal are said to be developed.

## FOREIGN.

### AFRICA.

#### Rhodesia.

G. Mitchell, president of the Rhodesian Chamber of Mines at Bulawayo, says the first eight months of 1904 yielded 162,507 ounces of gold, 39,979 ounces of silver, 276 tons of lead and 38,308 tons of coal. Comparing this with similar period in 1903, the production then was 160,749 ounces of gold and only a small quantity of silver—the total value for that period being £576,668—whereas the total value of mineral productions for the eight months of 1904 is £624,935. If, however, the figures for the five months from April 1st are taken, the date when the Chamber's financial year starts, and when the fiscal year of the Administration also begins, the comparison is more favorable as regards the total mineral production.

### AUSTRALIA.

#### New South Wales.

The New South Wales gold yield for October is reported at 15,719 ounces, valued at £59,395, as compared with 32,319 ounces, valued at £119,246, in the corresponding month of 1903. The yield for the first ten months of the year was 247,495 ounces, valued at £899,512, as compared with 269,373 ounces, valued at £985,707, in the first ten months of 1903.

#### South Australia.

The Northern Territories M. & S. Co. reports via Adelaide that the returns for the month of October were low on account of coke being exhausted. Wood blocks and charcoal were used, but they were not satisfactory. A further supply of coke arrived Nov. 12th. At the smelting works the water jacket smelter was run on charcoal and wood twenty-three and one-half days, treating 1495 tons, an average of 63 tons daily, including 498 tons of slag, the production being 47 tons of matte of an assay value of £3775. In the Iron Blow mine the main shaft has a total depth of 205 feet. The Mount Ellison mine main shaft has a depth of 146 feet, the winze on the 120-foot level being down on the lode 19 feet in payable ore.

#### Queensland.

Gold returns of Queensland for the month of October were:

	Tons	Crushed.	Yield in Ozs.
Charters Towers.....	17,100		20,600
Croydon.....	2,800		900
Gympie.....	19,000		9,700
Mount Morgan.....	30,700		9,800
Ravenswood.....	3,200		3,600
Other fields.....	3,400		2,400
Alluvial.....			1,200
Totals.....	65,700		48,200

### BRITISH COLUMBIA.

#### Nelson District.

At Ymir the Hunter V mine has doubled its rate of output and is shipping 200 tons of ore a day. This product is divided between the smelters at Northport, Wash., Nelson, Trail and Granby. The aerial tramway which connects the Hunter V with the Nelson & Fort Sheppard R. R. track is running.—The Broken Hill M. & Dev. Co. has bought an additional mill to replace the 4-stamp mill at the Wilcox mine. The 10-stamp mill previously owned by the Oro M. Co. to work the Golden Wedge mine on Six Mile creek, near Nelson, has been bought.—On the Foghorn mine the high-grade ore opened on surface has been uncovered in the drift 500 feet in from portal of crosscut. This gives a depth of 400 feet.—Placer mining is reported progressing in Ymir district. The gravels at the junction of Hall creek and the Salmon river were worked for placer gold by Colville Indians in 1880. Hall Bros. also worked them and Chinamen have also worked at various times. All this work, however, was done with primitive appliances. An area of 400 acres has now been leased from the Government for hydraulic mining and a company formed by E. Fellowes of Portland, Or., to put in a hydraulic elevator and other machinery.

#### Slocan District.

The lessees of the Blackburn mine at head of Ten Mile, near Slocan City, will keep men at work during the winter.—The American Boy at McGuigan resumed shipments last week. Several cars of ore are being loaded at the mine.

The following are ore shipments from Sandon for the year to November 17th:

Mine.	Tons.
Ruth.....	416
Slocan Star.....	2,468
Ivanhoe.....	1,246
Reco.....	772
Last Chance.....	348
Payne.....	1,031
Sunset.....	813
Mountain Con.....	200
Idaho.....	476
Rambler.....	777
Cinderella-Medford.....	175
Nine others, total of.....	278
Total.....	8,477

#### ZINC.

Ivanhoe.....	873
Payne.....	974
Idaho.....	30
Total.....	1,877

H. M. Stevenson of the Highlander mine says a portion of No. 1 mine at Ainsworth has been leased by Jones, Stearns & Scott, and they have started stoping in a body of high-grade ore, taking out two sacks of native silver. The Highlander mine is working seventeen men on development. The Black Diamond T. Co. is developing the Black Diamond, Donnell and twelve other claims, but the chief work is being done on the first two properties, under Stevenson's direction. The men are drifting on two ledges. On the Highlander mine the tunnel is in 2605 feet and work on it has been discontinued for the present, as it has cut the ledge on the Black Diamond claim, for which it was run. This tunnel gives a vertical depth of 1500 feet.

#### Vancouver Island.

(Special Correspondence).—The Tye Copper Co., Ltd., has declared a dividend of 2 shillings per share, payable on Dec. 15. This brings the total dividends paid since starting smelting operations in January, 1903, to 4 shillings per share, or \$180,000. Besides this distribution a large reserve fund has accumulated, which is invested in Government stocks. Extensive improvements have been made in the plant and buildings at both mine and smelter, all of which has been paid out of profits.

Duncans Station, Nov. 27.

#### West Kootenay District.

Nettie L. mountain, near Ferguson, has been taken over by Forbes & Morton of Minneapolis, Minn., acting through R. H. Battey. The plan calls for spending \$100,000 in driving a tunnel for 1½ mile on Nettie L. mountain. The claims in the deal are Rattler, Rantler No. 1, Morning Star, Jumbo, Florence, Union Jack, Independence, Gloosecap A, 2 and 3, Kootenay group of three, May Queen group of four and Lardo.

### CANADA.

#### Alberta.

Gold will be dredged from the bottom of Saskatchewan river, near Edmonton, by a company headed by G. W. Keith of Toronto. The Saskatchewan river is crossed by a branch of the Canadian Pacific railroad on the company's placer ground, placing the workings within easy reach, and on the watercourse veins of coal crop. The company has several miles of gravel. On the average the gravel is said to run 45 cents to the yard.

### INDIA.

The output of the gold mines of India for October was 51,238 ounces. The production in ounces for 1904 to Nov. 1st, compared with 1903, has been:

	1904.	1903.
January.....	51,588	48,080
February.....	50,151	46,298
March.....	51,634	48,327
April.....	50,509	48,271
May.....	51,142	48,628
June.....	51,606	48,950
July.....	51,283	50,571
August.....	51,517	50,286
September.....	51,666	51,452
October.....	51,238	52,724
November.....	52,016	
December.....	54,457	
Totals.....	513,334	600,060

### MEXICO.

#### Chihuahua.

El Continente M. Co. has been organized at Chihuahua by W. K. Ryan, president; T. Dale, treasurer; L. J. Gandara, R. M. Dudley and H. Anderson, manager, to develop mining properties in Santa Eulalia district, where they have bought 16 pertenencias of the third group of El Continente and 40 pertenencias of La Isla. They have also taken over the bond and option which H. Anderson has on the Ibera mine. This will give the company 106 pertenencias surrounding the 9 pertenencias which comprise the Santa Juliana, owned by the Hearst estate. They will start sinking a shaft on the Ibera, about 50 feet from the Santa Juliana line, and will resume work on the tunnel.

#### Durango.

W. S. Benton of Inde says that camp is shipping between 300 and 400 tons of high grade gold-silver ore per month to the smelters. The principal shippers are La

Cruz, Terrible and San Carlos mines. The first mentioned belongs to E. Avila. He ships a carload per week of ore that runs three kilos of silver, ten grams of gold and 10% lead. The other two are owned by W. S. Benton, A. Bereyra and J. Silvayra. They are shipping two carloads of ore per week which runs fifty grams of gold, 300 grams silver, with lead values. The ores of the camp have to be hauled 60 miles to the railroad.

#### Sonora.

A. Patterson and P. Scott of Port Huron, Mich., operating placer mines at La Canada, Alamos district, report the Golden River Placer M. Co. organized, with Patterson as manager. The company owns forty-three hectares of placer ground on the Arroyo Canada, near the lines of Chihuahua and Sinaloa. They say the pay dirt averages 15 feet in depth. Most of the gold is in the form of nuggets and coarse gold, which can be caught on rifles, though there is some fine gold which can only be saved by amalgamation. It is intended to put in a dam and giants for hydraulicking. A dam 40 feet high and 60 feet long at the top will give them a head of 280 feet above the highest point on their ground. They also expect to put in four giants.—The Cenizas mine, 6 miles from La Canada, has extensive antigua workings. The vein is said to be 70 feet wide and to carry high gold values.—E. R. Tufts and others are operating a gold and silver mine near the Chihuahua line in same vicinity. They have a 10-stamp, amalgamating mill in operation.—Butterhoff Bros. of Denver, Colo., are developing a gold and silver mine 5 miles from La Canada. They are experimenting on a process of treatment for their ores, which are said to run \$200 per ton.—Bay Bros. of Baboyhua, Sonora, are developing a copper property adjoining La Canada placers. They have several veins of copper ore, one of which is 20 feet wide. The Kansas City, Mexico & Orient Railroad will pass a few miles east of the district.

La Bufo M. Co. at La Bufo in Sahuaripa district has started shipping matte from the smelter via Torres, says the company's agent, R. B. Cunningham.

### VENEZUELA.

United States Consul E. H. Plumacher at Maracaibo reports that the Government of Venezuela has decided to give no titles to coal mines in the future, but to exploit all such mines under its own supervision and ownership.

## Obituary.

W. S. BUCKLEY of Telluride died of consumption at Denver, Colo., on November 25th. He was manager of the San Juan G. M. Co. and Ophir Con. M. Co., and a State Senator.

C. W. SMITH, a pioneer mining man of Plumas and Trinity counties, Cal., died at Burke, Cal., Nov. 22. At one time he owned the Bailey and Chloride mines, now owned by the Chloride M. Co., near Dedrick, Cal. Deceased was born in New York, February, 1839, and was a graduate of Lawrence University, Appleton, Wis.

W. H. CLARY, a pioneer mining man of California, died at Stockton, Cal., Nov. 27th, in his eighty-third year. Deceased, who went to California in 1850, is said to have built the first mining ditch in the State. In 1864, in company with the late A. J. Moulder et al., he incorporated the mining stock board in San Francisco. He was for several years superintendent of the Sheep Ranch mine in Calaveras county, Cal.

## Commercial Paragraphs.

The New England offices of the Allis-Chalmers Co. were consolidated on Dec. 1st and removed to the State Mutual building, 50 Congress street, Boston. Geo. H. Berg is manager in charge of the consolidated offices.

W. P. SWART is the Oregon representative of Chas. C. Moore & Co. of San Francisco, Cal., with offices at 321 East Morrison street, Portland, Or. Chas. C. Moore & Co. also have branch offices in Seattle, Wash., Los Angeles, Cal., Salt Lake City, Utah, and New York City.

GAYFORD & CALLOW of Charlotte, N. C., have formed a copartnership with C. C. Morgan, M. E. and C. E., and C. C. Beddoes, C. E. The firm will be known as Morgan, Beddoes & Co., with temporary offices at 26 West Fifth street, Charlotte, N. C., the old office of Gayford & Callow.

## Personal.

W. H. BLACKBURN is manager of a group of mines at Goldfield, Nev.

F. L. SIZER is general manager of the Whitlatch M. Co. at Helena, Mont.

J. REDDING is superintendent of the Gum Tree mine at Idaho Springs, Colo.

J. D. HOSKING has resigned as superintendent of the Franklin mine at Hancock, Mich.

G. M. ROBERTS is manager of the Associated G. M., at Kalgoolie, Western Australia.

W. S. JENKINS has resigned as manager of the Idaho-Alamo mines, at Sandon, B. C.

H. D. CROWDER is superintendent of the Victoria y Anexas mine, at El Oro, Mexico, Mex.

J. THOMSON has resigned as master mechanic for the Daly-West mines, at Park City, Utah.

SUPERINTENDENT DOBLER has resigned from the Brown Bear M. Co., near Weaverville, Cal.

J. SUTHERLAND is superintendent of the Brown Bear M. Co., near Weaverville, Cal., vice Dobler, resigned.

JESSE SCOBEE is resident manager of the Cieneguita Copper Co., Distrito de Sahuaripa, Sonora, Mexico.

F. WAGNER, recently of Searchlight, Nev., is in charge of the Menifee mine at Perris, Riverside county, Cal.

O. H. FAIRCHILD is examining a mining property in the Sneffels district, Colorado, for Chicago investors.

F. W. SCHWELLENBACH is president and manager of the Spokane Placer M. Co., operating near Libby, Mont.

E. H. KRAUS has been appointed assistant professor of mineralogy in the University of Michigan, Ann Arbor, Mich.

A. R. MYNOTT has been appointed assistant manager of the San Albino G. M. Co., at Jicaró, Nueva Segovia, Nicaragua.

W. J. ADAMS, E. M., of San Francisco, Cal., has returned from an examination of copper mines at Nacozari, Sonora, Mexico.

S. A. GILMORE of San Francisco, Cal., is superintendent of the Julia mine for the Con. Nevada G. M. Co. at Nevada City, Cal.

F. BUTLER of Salt Lake City, Utah, has gone to Nicaragua, C. A., as superintendent of a group of gold mines, near Bluefields.

P. SHEEHAN, formerly superintendent of the Johnnie mine and mill at State-line, Utah, has removed to Salt Lake City, Utah.

C. A. SUTHERLAND is in charge of the mines of the Iron Springs M. Co., at Iron Springs, near Council, Idaho, vice C. F. Macey, resigned.

FREDERICK BUTLER of Salt Lake City, Utah, goes to Bluefields, Nicaragua, C. A., to assume the superintendency of the Bluefields G. M. Co.

C. LAWTON has been appointed general superintendent of the Bingham County M. Co. mines at Bingham, Utah, vice R. W. Rodgers, resigned.

HARRY A. LEE, ex-Commissioner of Mines for the State of Colorado, is now consulting engineer for the Maple Leaf mine, Gunnison county, Colo.

R. EDWARDS, formerly of the Osceola copper mine, is head mining captain of the Miswabick M. Co.'s mines, near Alouez, Keweenaw county, Mich.

MANAGER WELLS, late of the Nile Valley C. Co., Ltd., has been appointed by the Egyptian Government as inspector of mines at a salary of £1400 per annum.

R. W. RODGERS, for five years superintendent of the Bingham Con. C. Co. properties at Bingham, Utah, resigned and will be succeeded by C. L. Lawton, January 1.

C. F. MACEY has resigned as manager of the Iron Springs M. Co., near Council, Idaho, and will devote his time to mining interests at Landore, Idaho, and in Nevada.

A. A. BLOW has resigned from the Smelting & Refining Co. of Australia, Ltd., to devote his time to American and Mexican practice, with offices in New York City, N. Y.

E. H. BARTON has resigned as superintendent of the Yellow Aster mines, at Randsburg, Cal., and has gone to La Colo-



rada, Sonora, Mexico, as superintendent of the Zubiate mines.

W. G. ANDERSON, formerly manager of the Compania Minera de Guanajuatillo, S. A., Guanajuatillo, Zacatecas, Mexico, is now superintendent of the Redfield M. Co., White River, Cal.

R. M. EDWARDS has resigned as assistant superintendent of the Isle Royale mine, near Houghton, Mich., to take the position of superintendent of the Franklin mine at Hancock, Mich., vice J. D. Hosking, resigned.

DR. LOUIS DUNCAN has been retained by the Allis-Chalmers Co. as an expert in electrical patent work in connection with its electrical department, the Bullock Electric Manufacturing Co. of Cincinnati, Ohio.

Books Received.

One of the chief offices of the modern professor is to digest the vast amount of literature on the subject he is teaching and present it to his students in a systematic, clear and practical manner. To those desirous of obtaining the results of such work "Elements of Mechanism," by Peter Schwamb and A. L. Merrill, offers an excellent treatise on the motions and forms of the parts of a machine and the manner of supporting and guiding them. It comprises the revised course of lectures on this branch of applied mechanics as given at the Massachusetts Institute of Technology. It will be welcomed by the student of mechanical engineering as a valuable aid in his study of machine design. It is published by John Wiley & Sons, 43 East Nineteenth street, New York City. The price is \$3.

"Coal Mining," by T. H. Cockin, is a comprehensive compilation of the principles governing the formation, occurrence and winning of the coal deposits of Great Britain. It is intended as an elementary class book for those taking the British examinations for colliery managers' certificates. It will probably fill its purpose, but the treatment seems rather general for the specific requirements of this country on the same subject. An innovation is introduced by giving the principles necessary to the generation of steam and electric power, but here, again, the treatment is very short and not specific. It would form an admirable introduction to the subject, but should be succeeded and accompanied by much practical work and supplementary reading. It is published by N. H. Henley Publishing Co., 132 Nassau street, New York City, at \$2.50.

Students in manual training schools and apprentices wishing a knowledge of commercial mechanical drawing will find "Elements of General Drafting for Mechanical Engineers," by C. E. Coolidge and H. L. Freeman, to be a good working guide. The plates to be redrawn are representative of what is met in the practice of machine design, and at the same time are so presented as to give a progressive course in this work. The working directions are concise, minute and of great benefit in delineating the best order of procedure in copying the plates. A manual of drawing describing instruments and the technique employed in commercial drafting presents many valuable details of the method used in many of the largest concerns of this country. It would seem that the book could be improved by printing the directions for the execution of drawings with the plates to which they refer, instead of separating them so widely. It is published by John Wiley & Sons, 143 East Nineteenth street, New York City, for \$2.50. It is oblong, quarto, and contains 55 pages and 21 folding plates.

Copies of any of the above books will be sent postpaid by the MINING AND SCIENTIFIC PRESS on receipt of price.

Many books have been published on "electricity," but, being a complex subject, it has usually received a complex treatment, making it difficult of comprehension. Five years ago the Cleveland Armature Works, Cleveland, Ohio, published "Practical Electricity." The appearance of a revised fourth edition of this work is the best evidence of its value to the practical man. Its main object is to give proficiency in the calculation of wiring for all electrical purposes by means of simple explanations and examples. But in so doing it gives a good idea of the design and operation of dynamo electric machinery. This is presented in simple language that gives a working knowledge of much that is essential in electrical work. It gives an especially good explanation of the calculation of the number of ampere turns required in dynamos. It gives a clear idea of the lifting magnet,

what current and size are necessary to lift a given load. On the whole, it is a practical work on direct current utilization and control. It will be sent postpaid upon receipt of \$2 by the Cleveland Armature Works, Cleveland, Ohio, or by the MINING AND SCIENTIFIC PRESS.

Much is being published by various investigators upon the determination of the various constituents of cyanide solutions. A demand for the collection of the best of these determinations into compact form is well met by "The Chemistry of Cyanide Solutions," by J. E. Clennell. This gives a comprehensive review of well-known methods, together with critical discussions of their comparative values. Various modifications of the older methods are compared largely by the results of experiments made to test the accuracy of assumptions made. The logical and systematic arrangement of the work is commendable. To the man determining the various constituents of cyanide solutions both before and after use the book will prove invaluable as a laboratory guide. It is a working manual, not a theoretical treatise on reactions. It is published by the Scientific Publishing Co., 261 Broadway, New York City, for \$2.50. It will be sent postpaid upon receipt of price by the MINING AND SCIENTIFIC PRESS.

Under title of "Mineral Resources of the United States for 1903," the United States Geological Survey has issued: "Production of Steel-Hardening Metals, Including Nickel and Cobalt, Chromium, Tungsten, Molybdenum, Vanadium, Titanium and Uranium."

"The River Terraces of the Orleans Basin, California," is the title of Bulletin 22 of Vol. 3, Department of Geology, University of California, by O. H. Hershey. It may be obtained of the University Librarian, J. C. Rowell, Berkeley, Cal., for 35 cents.

Trade Treatises.

Catalogue No. 17 of Union marine engines for 1905, from the Union Gas Engine Co., San Francisco, Cal., in addition to a detailed, illustrated description of the specific features of the Union engines, contains engravings of the various types and sizes made, and is also profusely illustrated with engravings of successfully operated motor boats and launches.

"Spiral Riveted Pipe" is the subject of a treatise from the American Spiral Pipe Works of Chicago and New York, finely illustrated and full of exact information concerning spiral riveted pipe and fittings therefor. There are also tables of pump capacities, weir dam measurements, flow of water through nozzles and pipes, loss of head by friction, pressure of water, etc.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ILLUMINATING TILE CONSTRUCTION.—No. 775,626 Nov. 22, 1904. P. H. Jackson, San Francisco, Cal. This invention consists in an improved sidewalk, floor and roof construction, comprising flat metal bars supported vertically on edge, having horizontal slots cut in line, and flat transverse bars are horizontally disposed and extend through said slots. Tiles are supported upon the transverse bars, having their lower side edges substantially abutting the sides of the vertically disposed bars, and having their upper surfaces in planes higher than the upper surfaces of said vertically disposed bars, said tiles having grooves in their side edges. A body of cement fills said grooves and the space between the upper portions of adjacent tiles, and forms a saddle across the top of said bars.

HAY PRESS.—No. 775,612. Nov. 22, 1904. E. A. Smith, Warm Springs, Cal. The object of this invention is to provide a simple and durable means for quickly and positively closing the door to the baling chamber through the medium of the sweep and of again opening it automatically after compression. It consists in a baling press, the combination with a press box of a hinged door therefor and toggles connected with said door, a sweep, and means operable by the sweep for actuating said toggles to close the door. These means include a shaft, pulleys fast on said shaft, and flexible connections between one of said pulleys and the toggles, a connection between the other of said pulleys, and an actuating means in the path of the sweep.

ELEVATOR SAFETY STOP.—No. 775,608. Nov. 22, 1904. W. T. Robinson and John Casey, Mokelumne Hill, Cal. The object of this invention is to provide a simple, practical and effective means for checking the descent of an elevator cage or bucket in mines, buildings and the like, in the event of the sudden breaking of the rope or cable. It consists in the combination with an elevator cage of guide ways between which the cage is movable, vertical flanges on the cage engaging said guide ways and a series of hooks pivoted at one end to the cage and housed by said flanges. The hooks of each series are pivotally interconnected intermediate of their ends, with a suspending rope and connections between the latter and the hooks whereby the latter are normally retracted within their housings, and stop means engageable by said hooks on the release of the tension on the rope.

Latest Market Reports.

SAN FRANCISCO, December 2, 1904.

METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59½c, refined (1000 fine); San Francisco, 59½c; Mexican dollars, 47c San Francisco, 47½c New York.

COPPER.—New York: Standard, \$14.87½; Lake, 1 to 3 casks, \$14.87½@15.12½; Electrolytic, 1 to 3 casks, \$15.00; Casting, 1 to 3 casks, \$14.75; San Francisco: \$16.00. Mill copper plates, \$17.00; bars, 18@24c. London: £67 3s 9d spot per ton.

Copper has taken another advance in London, but in New York prices remain about the same as last week. The market is quoted as less active, but there is no weakening in prices. It is now probable that no material advance in price will be made until after the first of the year, if then. It is not positive by any means that the highest prices have been reached, but no marked advance need be anticipated. At present prices every advance means so much more net profit to nearly every operating mine. There are many mines which, unable to pay with 12-cent copper, can make a handsome profit at 15 cents.

LEAD.—New York, \$4.70; Salt Lake City, \$3.50; St. Louis, \$4.12½ San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £12 18s 9d long ton.

SPELTER.—New York, \$5.87½; St. Louis, \$5.00; London, £24 17s 6d long ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$29.75@29.95; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, 32½@35c. London, £136 spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 per flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 8½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100 lb. lots, 16.75c.

ZINC.—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$15.85 @ —; gray forge, \$16.60; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$21.00; open hearth billets, \$21.00; San Francisco, bar, 7c to 12c per lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$20.00 @35.00.

WIRE.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.70; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 13½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder

in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c per set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 23@23½c, in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.20@1.40 per 100 lbs.; sks., \$1.05; chloride of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1½@2c per lb.; nitric acid, carboys, 8c per lb.

OILS.—Linseed, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, 7½c; 7c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

MOLYBDENUM.—Best, \$2.75 per lb.

CHROMIUM.—90% and over, 80c.

PHOSPHORUS.—American, 70c.

SILVER.—Chloride, ½ oz., 90c@1.00; nitrate, 55c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—½ lb., \$2.75.

SODIUM.—Metal, ½ lb., 50c.

BISMUTH.—Subnitrate, ½ lb., \$2.10.

URANIUM.—Oxide, ½ lb., \$3.50.

MERCURY.—Bichloride, ½ lb., 77c.

FIRE BRICK.—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING NOVEMBER 22, 1904.

- 775,440.—SANDAL—B. R. Bonney, Pasadena, Cal.
- 775,722.—VEHICLE TIRES—L. F. Paison, Golconda, Nev.
- 775,650.—BOTTLE—W. B. Hargan, S. F.
- 775,831.—BANK CHECK—M. A. Howe, Tacoma, Wash.
- 775,625.—TAPPET—W. E. Ingram, Stockton, Cal.
- 775,626.—ILLUMINATING TILE—P. H. Jackson, S. F.
- 775,827.—STEAM COOKER—A. J. Ketelsen, Seattle, Wash.
- 775,906.—CULTIVATOR—A. H. Kopperud, Byron, Cal.
- 775,870.—RAISING SUNKEN VESSELS—M. Lacey, Seattle, Wash.
- 775,831.—VEHICLE WHEEL—J. Leifer, San Bernardino, Cal.
- 775,838.—MANIFOLD BOOK—A. Levison, S. F.
- 775,756.—GATE—M. K. Lewis, Lompoc, Cal.
- 775,876.—BUSHING—J. Metzger, Tacoma, Wash.
- 775,476.—DRIVE GEAR—A. Mills, Ukiah, Cal.
- 775,578.—STITCH BOX—J. L. Porter, Mountain View, Cal.
- 775,608.—ELEVATOR STOP—Robinson & Casey, Mokelumne Hill, Cal.
- 775,502.—EXTRACTING OLEO-RESIN—E. J. Sheehan, Pasadena, Cal.
- 775,612.—HAY PRESS—E. A. Smith, Warm Springs, Cal.
- 775,883.—CARRIAGE TOP BOWS—C. H. Sooty, North San Juan, Cal.
- 775,410.—SANITARY CABINET—S. L. Stuart, Ventura, Cal.
- 775,711.—DRUMS—E. T. Turney, San Rafael, Cal.
- 775,712.—DRUMS—E. T. Turney, San Rafael, Cal.
- 775,616.—GRASER—F. W. Warren, S. F.
- 775,506.—ARTIFICIAL LIME—L. A. Weissner, National City, Cal.
- 775,483.—LEVEL—G. H. Whitehouse, Seattle, Wash.
- 775,882.—GARMENT SUPPORTER—M. P. Zindorf, Seattle, Wash.



## SITUATIONS WANTED.

The cost of advertising in this column is 10 cents per line of seven words per insertion. Answers forwarded to any address without extra charge.

**AN ALL-ROUND PRACTICAL MINER, TImberman and Tool Sharpener** wants position as foreman; also a good surveyor; successful in handling men; over twenty years' experience. Best of references. Address L. A. P., care of this office.

**COMPETENT ASSAYER, CYANIDE MAN AND Steam Engineer** desires position. Best of references. Address L., this office.

**COMPETENT ASSAYER, MILL MAN AND Cyanide Man** desires position. Technical education. Good references. Arizona or Mexico preferred. Address W.B., care of this office.

**CONSTRUCTING ENGINEER OPEN FOR ENGAGEMENT.** Experience in mills, mines, smelters. Address P. O. Box 2422, San Francisco, Cal.

**EXPERT MINE FOREMAN WANTS POSITION.** Competent to handle extra difficult conditions underground. Address "Limestone," Room 602, 330 Market St., S. F.

**MINING ENGINEER AND SUPERINTENDENT** with 12 years continual practical experience in engineering and assaying. Have been superintendent of iron mine for last 5 years. Excellent references from reliable people. Age 31. Address J. Lancaster, M. I. M. E., 622A Placer St., Butte, Montana.

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**SITUATION BY PRACTICAL ASSAYER AND Chemist.** Thoroughly understands mill work, cyaniding and smelting. Address W.D., this office.

**SITUATION WANTED BY THOROUGH, COMPETENT AND RELIABLE** mining bookkeeper. Four years' experience with large properties. Best of references. Address Box 52, care of this office.

**WANTED—SITUATION BY MILL MAN WHO** is thoroughly competent and reliable; seventeen years' experience in wet crushing, amalgamation and concentration; has had charge of eleven mills. Best of references. Address D.L.S., Box 133, Daggett, Cal.

**THE ENGINEERING AGENCY, CHICAGO,** furnishes free to reliable employers information leading to employment of Mining Engineers, Draftsmen, Mine or Mill Superintendents, Assayers, Chemists, Cyanide Men, Electricians, etc. In successful operation eleven years. Let us know your need and competent, high-grade men whose complete professional and personal records have been thoroughly investigated will be referred to you at once.

**YOUNG MAN OF TWENTY-ONE DESIRES** position as assayer's helper or some position which I could, if proving satisfactory, obtain desired position. Address W.A.C., care of this office.

## HELP WANTED.

**WANTED — FIRST-CLASS EXPERIENCED** Amalgamator and practical Mill Man. Must give good references and know how to handle very low grade free milling gold ore. Plant consists of five 6-ft. Huntingtons below crusher and rolls. Address, with references, L. S. Davis, Nogal, N. M.

**THE CALIFORNIA DEBRIS COMMISSION** having received applications to mine by hydraulic process from Esther Jackson and John M. Jackson, in Brown Bear Placer Mine, near New Mohawk, Plumas County, Cal., draining into Sulphur Creek, which reaches Middle Fork Feather River; from Shasta County Quartz & Placer Mining Co., in Murderers Gulch Mine, near Stella, Shasta County, Cal., draining into Clear Creek, which reaches Sacramento River; and from William Nicholls, Jr., in Duryea Placer Mine, near Red Dog, Nevada County, Cal., draining into Greenhorn Creek, which reaches Bear River, gives notice that a meeting to receive any protests will be held at Room 68 Flood Building, San Francisco, Cal., Dec. 12, 1904, at 1:30 P. M.

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MOLYBDENUM, BISMUTH AND VANADIUM ORE.

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PRIMOS, DELAWARE CO., PA.  
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all that it costs to produce it, plus what is wasted. You can lessen that cost by using a **HINE SEPARATOR** to keep water out of engine cylinder; a **SPENCER DAMPER REGULATOR** to keep steady pressure and consume gases; a **ROBERTSON-THOMPSON INDICATOR** to properly adjust engine valves, and **EUREKA PACKING** to reduce friction, save power and one-half the cost of any other.



**JAS. L. ROBERTSON & SONS, 204 Fulton St., New York.**

## DELINQUENT SALE NOTICE.

**GOLDEN WEST MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice—There are delinquent upon the following described stock on account of assessment (No. 2) levied on the 17th day of September, 1904, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Am't.
T. W. Stone	115	20,000	\$200 00
T. W. Stone	116	20,000	200 00
J. P. Mundy	41	500	5 00
D. Berlin	44	500	5 00
D. Berlin	45	500	5 00
T. P. Moore	48	1,000	10 00
T. P. Moore	49	1,000	10 00
T. P. Moore	50	1,000	10 00
T. P. Moore	51	1,000	10 00
T. P. Moore	52	1,000	10 00
T. P. Moore	53	5,000	50 00
T. P. Moore	54	5,000	50 00
Joshua Reaves	99	600	6 00
Geo. E. McLeod	107	500	5 00
W. L. Dimock	108	200	2 00

And in accordance with law and an order from the Board of Directors, made on the 17th day of September, 1904, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 207 Battery street, Room 15, San Francisco, California, on **MONDAY, the 28th day of November, 1904, at the hour of 2 o'clock P. M.** of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

**CHAS. BOVONE, Secretary.**

Office—207 Battery street, Room 15, San Francisco, California.

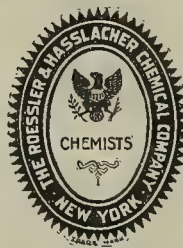
## POSTPONEMENT.

By order of the Board of Directors, the sale day of the above delinquent stock has been postponed to **SATURDAY, the 17th day of December, 1904, at the same hour and place.**

**CHAS. BOVONE, Secretary.**

Office—207 Battery street, Room 15, San Francisco, California.

**THE ROESSLER & HASSLACHER CHEMICAL CO.,  
100 William Street, New York.**



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And Other Chemicals for Mining Purposes.

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For further information, address

**WESLEY MERRITT,**

Industrial Commissioner,  
Atch., Top. and Santa Fe System,  
CHICAGO, ILL.

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# MINING AND SCIENTIFIC PRESS

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SAN FRANCISCO, CAL., SATURDAY, DECEMBER 10, 1904.

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## Tin in the United States.

Tin mines are not numerous in the United States, although spasmodic efforts have been made from time to time to develop a paying tin mine here. The fields of operation here have been chiefly in the Carolinas, the Black Hills of South Dakota, southern California and more recently in Alaska. Tin stone actually exists in each of the localities mentioned, and each place has produced tin; but until lately the financial outcome of the operations has been of a discouraging nature. Many years ago an attempt was made to operate the tin veins in northern Riverside county, Cal., but the effort failed. Again, in 1890-91, these efforts were renewed and a large sum spent by an English company. The development of the mines did not justify the extravagant outlay and failure resulted, as might have been expected. In South Dakota there are two tin-bearing regions—one about Harney Peak, in Custer county, and the other 65 to 70 miles northwesterly from this in the Nigger Hill-Bear Gulch region, on the South Dakota-Wyoming line. Several attempts were made to work the deposits at various times since 1886 and mills were built in various localities; but up to the present time none of these enterprises have been placed on a paying basis. In the Nigger Hill district, however, much encouragement has been given the development of the industry by the production of payable tin ore. A bulletin just issued by the United States Geological Survey reports that the company at Nigger Hill—the Tinton Tin Company—has been operating on a small concentrating plant the past two years and has shipped a carload of concentrates to Europe for reduction, there being no suitable fur-

naces available at the mines. The average of ore run through the mill yielded 1.16% metallic tin, which, at present prices for the metal, makes the ore worth about \$6.75 per ton as it stands in the mine. The report states that two ore bodies, 150 by 50 feet and 90 by 6 feet, respectively, have been developed, which carry values equal to those



Sluicing Pit on Buck Creek, Alaska. (See Page 395.)



Tin Streaming in Alaska, Potato Mountain in Distance. (See Page 395.)



Dam and Ditch on Buck Creek, Alaska. (See Page 395.)

above stated. If this be true, and the information is from an authoritative source, the United States has at last a paying tin mine. The tin occurs as cassiterite in dikes of granite of very coarse crystallization. In some instances certain portions of the tin-bearing veins are also gold bearing.

Elsewhere herein will be found a description of the occurrence of the known tin deposits of Alaska, together with the present method of working. In the Carolinas tin stone occurs in pegmatite dikes and also in mica schists. Stream tin—the grains resulting from the disintegration of the rocks—also occurs. Most of the tin stone obtained in the Carolinas is sluiced from the gravels of the streams cutting through the tin-bearing rocks. The first production of tin in quantity from this district was in 1903, when nearly twenty tons of cassiterite were shipped to Europe. It is a matter of some satisfaction to know that, after so many years of search and endeavor, the United States has finally developed tin deposits which actually pay to work. It is true that the work of the Tinton Company in South Dakota has thus far been of an experimental kind, but they appear to have developed a property which has the elements of success.



Majiland Mill and Hoist, South Dakota. (See Page 397.)

AS an aftermath of the recent coal miners' strike in southern Colorado, a suit has been filed in the District Court at Trinidad by the Victor Fuel Company against the United Mine Workers of America, John Mitchell and others in the sum of \$491,000, for damages alleged to have been sustained by the plaintiff as a result of the strike. This suit will probably have the effect of demonstrating how far labor organizations are responsible for their actions and for the acts of the individual members of their associations in times of labor trouble.



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## Economy in Mining.

It may be for the greater good of a community to have a mine worked steadily, but leisurely, for many years, but no one familiar with mining and metallurgical practice will contend that this procedure is of the greatest advantage to the mine owners. The policy of good mine management is to exhaust mines as rapidly as possible, while paying due regard to safety and while pursuing development at the same time, to extend the known resources of the mine even more rapidly, if possible, than they are being drawn upon. All mine managers know that there are certain unavoidable expenses all of which are charged against the output of the mine, whether it be gold, silver, copper, coal or iron. The surface crew comprises hoisting engineers, stokers, carpenters, machinists, blacksmiths, trammers, teamsters and numerous others about the mine, and in addition to these the clerical force at the offices. Then there are superintendence, taxes, insurance and other expenses which cannot be avoided, or perhaps, lessened. In view of this, mines must be operated vigorously, and as many men given employment underground as can be suitably employed. The greater the tonnage produced the less the cost per ton of surface and general expense. If a mine can output 1000 tons a day, it can probably be so handled as to increase this to 2000 tons per day, but the expense of outputting 2000 tons daily should be considerably below twice the cost of outputting 1000 tons daily. In the mill and smelter the same principle applies. Power and superintendence are often economized by increasing capacity and even by enlarging the plant in order to make this possible.

This is the reason why very large mining operations are conducted at so small a cost per ton. The Homestake mine is frequently referred to as an example of low cost in mining. The cost, due to the superior management, is very low—lower perhaps than that at any other mine similarly situated—and yet the cost at the Alaska-Treadwell is less per ton than at the Homestake, due entirely to physical conditions, and not at all to the difference in the efficiency of the management of these properties. Although the Homestake is now mining at depths from the surface to 1100 feet, the cost per ton is less than it was several years ago when a lesser—though still large amount of ore—was handled, owing to the more complete and extensive equipment. In addition to this, modern metallurgical science has made it possible to now save a higher percentage of values than in former years.

While it is desirable and more profitable to operate a mine to its fullest capacity, it does not follow that a mine having a small, rich pay streak in a large mass of ore, too low grade to pay if it were worked alone, can be made to yield a larger profit by working it on a grand scale, mining both the rich streak and the poor, because the cost per ton is less. It may be that the good ore is sufficiently rich to meet any deficiency in the output from the larger low-grade portion, but manifestly it is poor business to demand that the small, rich pay streak shall sustain the great mass of low-grade material, itself too poor alone to pay, and yet this is not infrequently seen in the management of large low-grade mines.

There are numerous instances where ore, too low grade to pay, has been kept in a mine and in after years it has been possible to mine this low-grade ore at good profit by reason of decreased expense for supplies, etc., and by the employment of labor-saving machinery, and also often by the fact that the ore can be so much more successfully and economically treated, with a higher saving of values. The West is full of such instances, but fortunately the kind previously referred to are not so numerous.

IN the State of Mexico, Mex., is an object lesson to those engaged in cyaniding gold ores. Several years ago a large tailings pile was treated by the cyanide process, successfully it was stated at the time, and the tailings were run to a lower level and reimpounded behind a wall of masonry, built for the purpose. Numerous assays showed the tailings to still contain values and an enterprising experimenter cut several holes through the wall and placed boxes in connection with these apertures. The boxes were

similar to sluice boxes, but were divided into compartments like zinc precipitation boxes, which, in fact, is what they are. In the several compartments were placed zinc shavings. When the rains fall the water percolates through the tailings and washing out the gold-bearing cyanide solutions the values are precipitated on the zinc. The solutions are strengthened by the addition of strong solution in small amounts at the head of the precipitation boxes. It is merely an illustration of the possibilities of modern metallurgy. Solutions and tailings too low to treat at a profit six or seven years ago are now being reworked in this inexpensive manner assisted by nature. Whether any chemical reactions of consequence had taken place in the tailings since their prior treatment, rendering them more amenable than before, is not known.

## Proposed Mining Legislation.

The convention of the California Miners' Association, which closed on the 8th inst. at San Francisco, Cal., was one of the most important in the history of that organization, the discussion of the several phases of the mining industry in that State and the numerous technical papers read were interesting and instructive. Among the many interesting topics which came before the convention was that of the proposed revision of the mining law, as explained at length by Mr. A. E. Belcher. In this connection the most important is probably the contemplated repeal of the extralateral right law and the substitution of a square location law with all rights bounded by the claim lines drawn vertically downward in its stead. If, however, it is the intention, as is suggested by Mr. Belcher, to make provision for a claim owner to take an additional side location at some later period when he has discovered that his ore dips into adjoining ground and he desires to follow it, complications result at once, and it were possibly better to continue with the old extralateral right law, as it is, than to start a new crop of litigation, which will certainly be the outcome of indiscreet tampering with the existing law. Mexico has apparently settled this problem satisfactorily by permitting the location of as many claims as the locator cares to pay taxes on. No discovery of "mineral-bearing rock in place" is required, but he must pay the uniform price demanded by the Government. This idea might be adopted in the United States with some necessary modifications. If we are to have square locations and no extralateral rights, let it be simply that and nothing more, for any attempt to make exceptions will involve the laws in a new period of litigation which would last for years. There is no longer need for experiment. The action and effect of the present laws are well known. There are precedents and decisions for almost every case to cover existing mining claims. Other countries where no extralateral rights obtain have furnished sufficient data upon which to base a new code, when it is desirable. The only thing in connection with square locations, some think is, perhaps, the number that one person may take. That this is material is not apparent, as the poor miner will not take more than he can pay for or represent, and the rich corporation would buy all it wanted anyhow.

Under existing laws one person may take as many claims as he cares to, and the same thing applies to corporations. The fear that the corporations would absorb all the available ground is without precedent.

LEGITIMATE MINING is the investment of money and brains in the development and equipment of promising prospects, whether these ventures be profitable or not. Because a mining venture fails is no reason to class it as illegitimate if the business has been carefully and honestly conducted. It goes without saying that the management of the operation must be in experienced hands, though unfortunately for the industry this is not always the case. Illegitimate mining is that class of mining where other people's money is obtained through the medium of misrepresentation and expended usually in an extravagant manner on a worthless proposition, and by men who have little knowledge of practical mining or just enough to enable them to hoodwink their dupes into the belief that their great expectations are just about to be realized.

THE report of another coal mine explosion—this time in Washington—in which a number of men lost their lives, goes to prove that miners and mine managers either fail to profit by experience or are willing to assume too great risks. Evidently the laws governing the inspection of mines in which there is gas are either insufficient or are lax in their enforcement.

THERE is a very noticeable rise in the Eastern prices of iron and steel, in some instances amounting to from 10% to 20%. Copper is also somewhat higher than last week; one quotation for Lake copper being 15.25 cents. The prices in the metal market are always a very fair index of the Nation's prosperity. Particularly is this true of iron and steel. The rapid fall in copper stocks on Wednesday in the Boston and New York exchanges is due to stock manipulations and not to a fall in the price of the metal, the quotations for which have not only remained firm, but actually advanced.

THE oil-producing companies of the Western United States are much interested in the recent development in the comparatively new oil fields of Santa Maria, Santa Barbara county, California, where within a week it is reported a gusher has been struck which is spouting 15,000 barrels of oil daily. The oil of that district is mostly refined and the price is somewhat higher than that of the other oil fields of California. As a rule, wells making such heavy production at the outset are comparatively short-lived and soon dwindle to ordinary pumping wells, as was the case with the Beaumont and Spindle Top wells of eastern Texas.



## CONCENTRATES.

A GOOD TRAMMER will push a loaded car at the rate of 3 miles an hour on a well graded track.

THE present price of carbons (black diamonds) for diamond drill work is about \$35 per karat.

NOT every copper mine having an iron gossan has a zone of enriched ore between the gossan and the normal sulphide ore below.

THE ore-bearing formation at Tonopah, Nev., is andesite and at Goldfield rhyolite. In both districts the ore occurs in zones of crushed rock. The ore deposits of neither Tonopah nor Goldfield bear any likeness to those on the Comstock lode at Virginia City, Nev., either as to minerals or as to geological structure.

THERE is a duty of 6 cents per pound on all catalogues, trade treatises, price lists or circulars sent to Australia, whether by post or otherwise. If the matter be weighed before sending, and the amount at 6 cents per pound be sent to the Postmaster-General at Melbourne, he will transmit it to the Australian custom house.

THE copper deposits now being developed and equipped in the Cerro de Pasco district of Peru, S. A., were originally silver mines, which were worked for years, producing a large amount of silver. A series of deep caved pits marks the line of the great lode where these mines have been extensively worked by the natives.

THE platinum which occurs in the ores of the Rambler mine in Wyoming is obtained in the form of slimes resulting from the treatment of copper ores and matte from that mine. The commercial value of platinum is about \$19 per ounce. The price varies with the purity of the grains. The Rambler mine is reported to have produced \$6000 worth of platinum in 1903.

WHERE canvas is used in filter presses, that of moderate weight (8 ounces) is generally better than the coarse heavy kinds, particularly for very slimy ores. In the coarse canvas where the grouped threads cross each other the material is so dense and firm that no solution can pass through, but in the interstitial spaces between warp and woof the slimes ooze through, rendering the process ineffective.

WHEN slimes in the form of finely divided sulphides float on the surface of settling tanks or the washing boxes of concentrating machines, and refuse to settle, if the overflow, by means of which these slimes are carried away, be conducted through a pipe and discharged under water, the result will generally be the settling of the slimes. This is sometimes accomplished by causing the slimes to flow beneath an inverted dam or partition in the settling box.

MINE fires sometimes smoulder for years, and break out violently whenever fresh air is admitted to the zone of fire. This is notably the case in some of the mines of Butte City, Montana, where the timbers burning have, it is believed, set fire to the ore, which cannot now be extinguished without flooding all the mines of the district, and this the management has not dared attempt, for fear of the consequences which would probably attend such an expedient.

DIAMONDS obtained with other minerals of high specific gravity in the diamond mines of South Africa by concentration on machines are separated from the accompanying minerals by passing the concentrates over a side-shaking table on which is a board covered with a grease of particular composition. The diamonds adhere to the greased board, while the garnets, chrysolite and other accompanying minerals pass on over the board to the tailings. The device saves within 2% of all the diamonds passing over it, and often the loss is less than 1%.

THE builders of cyanide plants should take particular pains to see that the foundations are firm and not of a character which will permit the tanks to settle unequally should the ground beneath them get wet, as often occurs. A stone or concrete foundation based on bedrock is the best foundation, but a well-arranged timber foundation will also answer for temporary use. Where the plant can be placed on exposed bedrock the expense of preparation of foundations is at a minimum. Coconut fiber matting is the most commonly employed material used for filter purposes.

ORDINARILY a shoveler will load a ton car in about forty minutes. If the material is large and requires much sledging it will require longer. Some material is much easier to shovel than others. It always pays to lay a floor of lagging for the muckers to shovel on as it greatly facilitates the work, thus saving time. Ordinarily two muckers will fill twenty-six to twenty-eight one-ton cars on a ten-hour shift, working in drift underground, where all the broken rock must be shoveled from the floor into a car about 4½ feet high. The cost per ton may be calculated from the wages paid in the

mine for this class of labor. Shoveling from the floor of open cuts, good shovelers will do rather better than this for the reason that there is more freedom of movement, better light and air.

A COLUMNAR STRUCTURE in volcanic rock usually indicates that the rock mass is a portion of a flow and not a vertical intrusion. Dikes are sometimes noticed to have a structure resembling the columns so common in basalt and other volcanic rocks, with the exception that the structure is horizontal and not vertical. This indicates the rock mass to be a dike. This structure in igneous rock is observed to always form at or near right angles to the walls of the mass. If the mass be a flat sheet, the columns will be vertical; if a dike, the columns will lie at right angles to the walls.

SHAKING amalgamated plates in amalgamation gold mills are seldom seen now, but were at one time popular in Colorado. It has frequently been demonstrated that the placing of a silvered copper plate on the spreader of a concentrator beneath the feed pipe extending downward from the launder will collect gold amalgam, thus showing that quicksilver and gold are constantly escaping from the apron plates and sluices. It is no uncommon thing to find mercury in the slimes boxes beneath concentrating machines, which is another evidence that quicksilver is escaping from both the plate and the machine.

THREE MEN are usually required to operate a diamond drill—an expert who thoroughly understands the drill and its work and two helpers. In a rock like limestone they should drill 20 feet in ten hours, and the cost for carbons will be about 30 cents to 35 cents per foot. The cost per foot for diamond drill holes varies greatly, depending on the motive power and its cost, wages, and particularly on the hardness and character of the rock bored through. The cost of twelve holes, ranging from 200 to 800 feet deep and aggregating about 6000 feet of boring, was \$2.50 per foot. In another instance, at a Michigan iron mine, the average cost of boring about 5000 feet of holes was \$2.60 per foot.

ASBESTOS is a variety of amphibole. Tremolite, actinolite, and some other varieties of amphibole, excepting those containing much alumina, pass into fibrous varieties, the fibers of which are sometimes long and silky, resembling flax. Asbestos fiber conforms to the direction of the inclosing rock. Chrysotile resembles asbestos, but is a fibrous variety of serpentine having a silky luster, and is also easily separable into fibers. It occurs in vein-like sheets in serpentine and the fibers arranged at right angles to the walls of the fissure, by which its field occurrence may be distinguished from asbestos. Chrysotile is a magnesian silicate, and asbestos is a metasilicate of calcium and magnesium.

INDIAN reservations as a rule are unsafe regions for the prospector to pursue his vocation. Many venturesome prospectors have lost their lives on reservations in Arizona, Colorado, Dakota, Wyoming and elsewhere in the West by prematurely entering Indian reservations in search of veins. As no official notice of the opening of the Navajo reservation in northeast Arizona has ever come to the knowledge of "Concentrates," it is safe to say it would be a good section for the prospector to avoid, notwithstanding the stories of fabulous richness, great copper deposits and gold veins. The Navajos are hostile to intruders, particularly to prospectors, and it is extremely risky to visit it for the purpose of prospecting.

MONAZITE is mostly obtained from placers, like gold. It occurs in regions of granite and other crystalline rocks. The concentrated mineral is of various colors and shades, as red, reddish brown, brown, yellowish brown, yellowish green and yellow, according to locality. Most of the monazite mined in the United States is from the Carolinas. It has not been reported in States west of the Rocky mountains. The monazite sands, as saved by the placer miner, contain about 60% of the impurities—thus, 1,900,000 pounds of crude sands mined in 1902 produced 802,000 pounds of clean sand. The miner received 2½ to 6 cents per pound for the crude sands, according to the percentage of thorium present.

It is reported that the nickel ores of Sudbury, Canada, contain palladium, as well as other rare metals. From 300,000 tons of nickel-copper ore treated, there were obtained 3000 ounces of palladium. This metal also occurs with certain Brazilian gold ores, where it constitutes several per cent of the ore, the metal being separated from the gold by fusing it, together with silver, and dissolving the granular alloy thus obtained in hot nitric acid, the palladium and silver going into solution. The gold is saved on a filter and the silver precipitated from the solution by salt solution or hydrochloric acid. This is also separated by filtration, and the palladium in the filtrate is then obtained by precipitation with mercury cyanide, as a yellowish-white precipitate of palladium cyanide, which, on ignition, leaves a residue of spongy, metallic palladium.

COPPER exists in solution in a condition depending upon the solvents used in its dissolution. It is present either as sulphate or cupric or cuprous chloride and may be precipitated from the solution by means of scrap iron, tin scrap, etc. The graphite present in the iron generally separates and forms a portion of the impurities

found with the cement copper. For the best practice in this process, that of precipitating copper from its solutions on scrap iron, it is desirable that the solution contain as little as possible of free acid, or iron oxide salts, or the result will be the solution of a large quantity of iron before the precipitation of the copper. Theoretically 88.8 parts of metallic iron are required to precipitate 100 parts of metallic copper from copper sulphate and copper chloride solutions, whereas but 44.4 parts of iron are necessary to precipitate 100 parts of copper from a cuprous chloride solution, but in actual practice from 200 to 300 parts of metallic iron are required to precipitate 100 parts of copper from sulphate and chloride solutions. The reason for this is that the ferric sulphate in the solution upon contact with the atmosphere decomposes into free sulphuric acid and ferrous sulphate; the sulphuric acid attacks and dissolves a portion of the iron and ferrous sulphate takes up more iron, becoming ferric sulphate.

SOME MINERALS exhibit a tendency to float like grease upon water when finely crushed. Molybdenite, graphite and many sulphides of the base metals, as well as silver sulphide and very fine gold, exhibit this property. It is supposed to be due to the aversion of the mineral particles to become wet, and if discharged into water with pulp, rise again to the surface, carried upward by small bubbles of air. It is this disposition of air bubbles to carry fine mineral particles to the surface that has been taken advantage of in the so-called "salt cake" process of concentration. It is employed chiefly at Broken Hill, N. S. W., to separate zinc sulphide from the other base metal sulphides. Salt cake is sodium sulphate, made by treating common salt (NaCl) with sulphuric acid. This salt is dissolved in water, producing a dense and buoyant solution. The mineral is discharged from a launder into a pointed box provided with an outlet at the bottom which may be varied in size to meet the conditions. All of the minerals introduced to the box with the exception of the zinc sulphide pass out at the spigot at the bottom, the zinc blende particles being carried upward by minute bubbles of gas—probably, hydrogen, resulting from the action of dilute acid on the particles of blende. These floating particles of zinc sulphide are floated off and collected for reduction.

THE usual estimate of power for the operation of 3-inch or 3½-inch rock drills is 10 H. P. per machine. At this rate, where power costs \$5 per month per horse power, the cost of operating a machine drill is not less than \$50 per month, if the drill is in constant operation, but as there is always a loss in the power delivered to the compressor in transmitting it to the machines, and as the machines cannot be operated constantly, the question of power charge is sometimes difficult to arrive at. Probably the best way to approximate this cost is to charge the monthly cost of power delivered to the compressor to the drilling cost. Divide this sum by the number of hours in the working month that the drills were actually at work in the aggregate. This will give the cost per "drill hour." Multiply this sum by the number of hours any particular drill was in operation and the result is the cost for power alone of operating that drill. Example: A compressor requires 120 H. P. for its operation; at \$5 per month per horse power = \$600 per month; there are ten drills at work in the mine which in thirty days are run in the aggregate 4800 hours; \$600 ÷ 4800 = \$0.125 cost per drill hour. A particular drill was run in twenty-six days 390 hours; \$0.125 × 390 = \$48.75 cost of power for running this one drill during the month. Each other drill on the mine may be figured out in the same manner, and a comparison of work accomplished with each observed. It is these details which make up mining costs and are to be looked after.

If the person locating a mining claim has made a mistake in his conception of the strike of a vein, or has taken too little ground, or there is any other discrepancy in his location, he may make an amended location correcting these defects if he can still do so without conflicting with the rights of others who have located claims adjoining him since the date of his original location. The States of Colorado, Idaho, Arizona, Montana, Nevada, New Mexico, North Dakota, South Dakota and Wyoming have passed laws in regard to amended locations. The provision of all these State laws, excepting of Arizona, are similar to the Colorado law, which provides: If at any time the locator of a mining claim, believing that his original certificate was erroneous, or defective, or that the requirements of the law had not been complied with before filing, or shall be desirous of changing his surface boundaries, or taking in part of an overlapping claim which has been abandoned, or in case the original certificate was made prior to the passage of this law, and he shall be desirous of securing the benefits of the act, such locator may file an additional certificate subject to the provisions of the act; provided, that such relocation does not interfere with the rights of others at the time of such relocation, and no such relocation, or record thereof, shall preclude the claimant or claimants from proving any such title or titles as he may have held under the previous location. The Arizona statute on this matter provides that location notices may be amended at any time and the monuments changed to correspond to the amended location; provided, that no change shall be made that will interfere with the rights of others. An amended location cannot be made to hold a claim upon which the assessment work required by law has not been done.



## Convention of the California Miners' Association.

The thirteenth annual convention of the California Miners' Association met on the morning of the 5th inst., in San Francisco, Cal., continuing on the 6th, 7th and 8th, there being present over 300 delegates from the various mining counties of the State.

After the usual address of welcome, C. M. Belshaw, president of the Association, delivered his annual address. The debris question is an important one in California, and one which has been the subject of much discussion, legislation and also of litigation. To this matter Mr. Belshaw referred. His address in full follows:

Gentlemen of the California Miners' Association: We are again met in annual convention for the purpose of promoting the interests of one of our greatest industries, and I trust that the deliberations of this body will contribute not a little to the welfare of mining in all its branches in the State of California. The good which may accrue to the industry here represented is incalculable, and I hope that the deliberations of this convention may add to the good work which has already been accomplished by our Association.

I desire briefly to call your attention to what has been done by the Association since our last convention. At a meeting of the executive committee which was held January 9, 1904, the attention of the committee was directed to the decision of the Supreme Court of the State of California in the case of the County of Yuba vs. Kate Hayes Mining Company, and particularly to the following sentence in that opinion:

"It is true that the evidence failed to show that defendants were mining by the hydraulic process, but admittedly they were mining by the ground sluice process, which, according to the evidence, produced the same effect in kind as the hydraulic process, only to a less degree."

It was the opinion of the committee that if this reason were carried to its logical conclusion, quartz mining and, indeed, all kinds of mining in this State were in jeopardy. Accordingly 3000 copies of this decision were printed and sent to the several mining companies in this State, accompanied by a circular letter calling attention to the above quoted sentence, with a request for an opinion as to whether or not this decision might not be made applicable to quartz and dredge mining. The universal reply in some 700 letters which were received by the Association was to the effect that there was danger that this decision might be used to the detriment of quartz and dredge mining.

While there has been no attempt made as yet to attack quartz or dredge mining under this decision, there is no assurance that it will not be made, and I am of the opinion that this Association should fortify itself so as to successfully combat any effort which might be made along the line suggested.

On March 3, 1904, a petition was received from the miners of the Tanana River district of Alaska requesting this Association to use its influence for the purpose of having Cheena, Alaska, declared a port of entry, in order that the miners of that district might receive better transportation accommodations. This matter was referred to Senator Perkins, who, upon investigation, informed the Association that it would be impossible to comply with the petition.

At a meeting of the executive committee held April 9, 1904, Messrs. Solinsky & Wehe most kindly offered to take the Polar Star case to the Supreme Court free of cost for attorney's fees, for the purpose of getting an adjudication as to the constitutionality of the Caminetti Act. Messrs. Solinsky & Wehe have already done considerable work in the case in the way of correspondence and getting it in proper shape to appeal to the Supreme Court, and are now ready to go ahead and take the appeal, and only await funds to get copies of the papers and also to print the record. It seems to me that it is of great importance to hydraulic mining that we have a Supreme Court decision on the Caminetti Act, and I hope that, since Messrs. Solinsky & Wehe have so kindly volunteered their legal services in the matter, the Association will see its way clear to provide for the necessary costs of conducting the suit.

In the early part of May, 1904, a call was made for a river convention to be held in San Francisco on the 22d of the month, and it was rumored that there might be some discussion on the evil effects of dredge mining. A special meeting of the executive committee was called and it was decided that the committee should go to Oroville and make an examination of the conditions there in order that the representatives from this Association to the river convention might be thoroughly posted on matters appertaining to dredge mining. A majority of the members of the executive committee and Colonel Heuer of the California Debris Commission participated in this investigation. We were shown every courtesy by the California Dredge Miners' Association of Oroville, and were given every opportunity to investigate the working of the dredgers of that district, both those that were working in the river and those that were working inland. It was the unanimous opinion of the committee that the dredgers of this district were doing no material damage to the river, and that dredge mining could be so conducted as to do absolutely no damage whatever.

Under date of May 16, 1904, this Association received an invitation from the California Promotion Committee to send delegates to the river convention. This invitation was accepted and our Association was represented during that convention. However, the matter of mining was not brought up in the convention, so our delegation was not called upon to acclaim or defend the mining industry.

A copy of the resolutions adopted by this Association at its last convention concerning desired Federal legislation was sent to our representatives in Congress, and the

Hon. J. N. Gillett, member of Congress from the First District, introduced the necessary bills in the House, copies of which were in due time received by this Association and are now on file in the secretary's office. We have the assurance of Mr. Gillett that he is using every effort to secure the passage of these bills, and we have no doubt that he will succeed. The Association, through its chairman of the committee on legislation, Hon. John F. Davis, has furnished Mr. Gillett with all the necessary data to show the necessity for the proposed legislation.

I desire to again call the attention of the Association to the matter of wildcat mining companies, and I earnestly urge the necessity for some legislation which will put out of business for all time these illegitimate schemes which have a tendency to cast a shadow on legitimate mining enterprises.

While the Association during the past year has had no active contests in behalf of mining on its hands, nevertheless it has been alert for the interests and welfare of mining in all its branches and has ever been ready to extend a helping hand when called upon to do so.

I am sorry to note a lack of interest in this Association by those who ought to be most interested and for whom the Association stands in a position to do the most good. I sincerely hope that this apathy will give way to an earnest, active interest in the work which the Association can do, and that the coming year will find all who are interested in mining throughout the State of California laboring hand in hand under the banner of the Association to promote our mining interests.

I desire to here publicly express my appreciation for the good, hard, faithful work which your secretary, E. H. Benjamin, has always done for this Association, and I wish to say to you, my fellow delegates, that whatever good the Association has done in the past few years has been through the untiring efforts of your secretary, and I now publicly thank him for his invaluable assistance to me.

In retiring from the presidency of this Association, I wish to thank you for the confidence which you have reposed in me and to say that I am fully aware of my many shortcomings; but, in returning my thanks, I do so with a full knowledge of the great good this Association has accomplished, and I stand ready, with all the rest, to put my shoulder to the wheel and do my best to assist in the furtherance of the mineral industry of the State of California.

R. H. Campbell read an interesting paper on working gravel mines with hydraulic elevators, by means of which deposits lying below the drainage level of the county are successfully worked.

W. C. Ralston addressed the convention, talking interestingly of his recent trip to Tonopah, Goldfield and other new mining camps in southern Nevada.

A committee on resolutions was appointed, comprised of one delegate from each county represented, as follows:

Charles G. Yale, chairman; A. H. Ricketts, Alameda county; R. C. Rust, Amador; L. J. Hohl, Butte; F. J. Solinsky, Calaveras; C. H. Dutton, El Dorado; H. Z. Osborne, Los Angeles; A. H. Ward, Mariposa; Fred Searles, Nevada; Z. J. Kendall, Placer; H. H. Yard, Plumas; J. B. Balcomb, San Francisco; Henry Chin-smith, Shasta; A. A. Tregidgo, Solano; J. W. Redden, Santa Clara; R. R. Smith, San Joaquin; W. A. Gett, Sacramento; F. R. Wehe, Sierra; John Daggett, Siskiyou; E. B. Preston, Sonoma; William Sharwood, Tuolumne; J. W. Bartlett, Trinity; F. J. Symmes, from the Merchants' Association; Rufus P. Jennings, from the California Promotion Committee; E. G. Heald, from the California Petroleum Miners' Association; F. H. Harvey, from the State Mining Bureau; John Ferris, from the River Improvement and Drainage Association.

A committee of seven was also appointed for the purpose of revising the by-laws and constitution of the Association. This committee was made up of the following: W. C. Ralston, C. G. Yale, A. Carrigan, W. P. Hammon of Butte, Thomas Clark of El Dorado, N. P. Brown of Nevada county and H. E. Bush of Shasta.

The report of the United States engineers of the California Debris Commission was read relative to the progress of work on the barriers now under construction on the Yuba river, near Daguerre Point. The report stated that the work is progressing in three sections; the first section rising 6 feet from the river bottom is completed. About one-half of the work at Daguerre Point is finished and 6000 feet of the bulkhead built by W. P. Hammon is completed. A wide cut has been about half completed at Daguerre Point for the purpose of diverting the entire flow of the Yuba river at high stages of water. On the third section, near Marysville easements on property have been largely secured and the surveying for a great settling basin has been performed.

A resolution was introduced on the necessity of good roads in the mining regions of the State.

The committee on credentials, consisting of C. H. Dutton of El Dorado, T. Rickard of Alameda, N. P. Brown of Nevada, E. C. Voorhies of Amador and W. L. Ashe of Alpine, reported the delegates present entitled to a seat in the convention were as follows:

Calaveras County—F. J. Solinsky, Harry East Miller, A. I. McSorley, George Sargent, M. W. Miller, J. S. White, D. P. Gray, Ira Hill Reed, F. F. Thomas, David McClure, J. F. Thompson, J. J. McSorley, Thomas Rooney, L. W. Shinn, Alex. Chalmers, W. C. Ralston, B. R. Prince, Otto Dolling, A. C. Harmon, C. Borger, J. C. Kemp Van Es, R. B. Parks, Alex. Brown, G. McM. Ross, Job M. Evans, C. E. Fenssler, W. E. Emery, W. H. Clay, Jr., G. Otis Pearce.

El Dorado County—A. Baring Gould, C. H. Weatherwax, M. Q. Meehan, W. F. Bray, Thomas Clark, D. H. Jackson, E. W. Chapman, Frank Mott, C. H. Dutton, W. P. Frick, H. S. Morey, H. C. Plummer, J. Snow, John Pearson, F. M. Phelps, J. H. Bradley, A. C. Mor-

rison, J. Q. Wrenn, W. C. Green, F. H. Hood, John Fern, Seymour Hill, Joseph Roylance, E. J. Crawford, H. E. Pickett, William J. Dinger, E. P. Colgan, O. R. Allen, C. M. Fitzgerald, N. W. Mountain, H. Larkin, H. N. Berger, Gee Norigesser.

San Joaquin County—J. Jerome Smith, Richard Russell Smith, Orrin S. Henderson, E. F. Cadle, S. V. Ryland, J. D. Peters, J. U. Castle, Charles Adams.

Butte County—John J. Hamlyn, F. S. Mayhew, L. J. Hohl, A. S. Grant, James H. Leggett, A. F. Jones, O. B. Perry, W. P. Hammon.

Sacramento County—W. A. Gett, A. C. Hinkson, William Schaw, Fred L. Martin, Thomas L. Enwright. Kern County—Tim Spellacy, C. A. Burcham, Robert Long.

Santa Clara County—H. R. Bradford, Thomas Derby, R. B. Harper, J. W. Reddin, R. R. Bulmore, Thomas W. Jones.

Solano County—A. A. Tregidgo, John M. Gregory, T. H. Woods.

Trinity County—J. W. Bartlett, L. M. Hoefler, George P. Ruddock.

Mono County—R. T. Pierce, R. F. Turner, R. Gilman Brown.

Tuolumne County—William Sharwood, W. J. Sharwood, John Neale, Fred Sutton, W. H. Storms.

San Luis Obispo County—Adolph Klaw, Victor Woods, J. H. Beckett.

San Diego County—Will H. Holcomb, Frank A. Salmons, M. Jacoby, George H. Clarke, A. J. Wauchope.

Mariposa County—C. C. Derby, A. H. Ward, Clarence King.

Plumas County—H. H. Yard, H. C. Langrehr, Sam W. Cheney.

Sonoma County—E. B. Preston, Alfred Abbey.

Sierra County—Frank R. Wehe, F. S. Moody.

Siskiyou County—John Daggett, F. H. Knight.

Los Angeles County—H. Z. Osborne, John Singleton, W. H. Holabird, George Kisingbury, M. H. Russell, Walter S. Maxwell.

Placer County—C. D. Akers, F. K. Devey, D. W. Lubeck, William Freeman, John Spaulding, M. L. Fulweiler, T. J. Nicholls, E. J. Kendall, M. Lebner, D. Faulkner, William Nicholls Jr., F. L. Schultze, Thomas James, A. F. Callenberg, G. W. Towle, G. G. Towle, J. B. Knapp, James A. Ferguson, A. W. McAulay, P. F. Hinst, Alfred Dixon, John Sutcliffe, B. Pelefa, J. L. Walker, William Grimmer, Thomas Hosmer, E. C. Kavanaugh, George McAulay, A. G. Read, L. Hutch, John McArrinch, H. F. Adams, B. F. Hartley, Charles F. Read, John C. Boggs, B. F. Manley.

Shasta County—Lewis T. Wright, W. L. Cole, H. O. Cummins, Grant Suider, A. H. Brown, M. E. Dittmar, Frederick Lyon, Fred King, Fred Hurst, John Fillius, Dan McCarthy, Harry E. Bush, James Sallee, D. B. Hunt, S. S. Stickley, A. A. Anthony, George Seamans, C. G. Bush, J. B. Keating, J. Sterling Wilson, L. A. McIntosh, J. O. Jilson, G. W. Scott, Luke McDonald, Ed Sanders, M. Oreweller, Henry Clinesmith, W. J. Gillespie, Almarin B. Paul, Dr. Garlick, A. J. Glass, James Gilbert, A. C. Halter, James Hulme, Dr. Heintz, Frank Panter.

Alameda County—S. B. Christy, E. H. Benjamin, Captain E. O. C. Ord, John A. Britton, Valentine Hush, Frank A. Leach, R. M. Mein, Calvert Mead, A. H. Ricketts, E. H. Simonds, A. von der Ropp, A. C. Lawson, E. A. Hersam, A. T. Eastland, Herbert Lang, Hon. Niles Searls, C. J. Heeseman, E. Lehnhardt, R. P. M. Greeley, A. E. Carpenter, Stuart W. Booth.

San Francisco—Andrew Carrigan, George A. Moore, H. C. Norton, T. J. Barbour, R. H. Postlethwaite, C. C. Moore, G. L. Belcher, C. H. Dasher, H. B. Hinckley, George Johnson, Henry Morton, Joseph Sloss, Ed Bratton, George J. Henry, John Birmingham Jr., R. S. Penniman, A. J. Ralston, Henry B. Underhill, J. H. Batchler, J. O. Harron, Alex. McCone, S. V. Mooney, William Hall, Louis Rosenfeld, J. K. Firth, John Hendy, George E. Dow, George A. Dow, F. L. Brown, H. M. Brittan, F. Gottfried, George A. Wallis, A. B. Stevens, A. A. Watkins, W. W. Montague, S. G. Irving, B. S. Shainwald, J. F. Halloran, T. B. Joseph, J. B. Balcomb, W. F. Newell, H. H. Hollidge, C. W. Adams, A. F. W. Delius, E. G. Denniston, G. W. Grayson, George Johnson, John McMurray, J. H. Mooser, William Letts Oliver, E. A. Rix, J. W. C. Maxwell, Edward Coleman, John Coleman, Tiley L. Ford, Louis Glass, Charles G. Yale, J. H. Neff, Charles Champion, H. D. Phelps.

The session of the 6th inst. was devoted during the morning hours to listening to an address by S. B. Christy, dean of the mining college of the University of California. Professor Christy expressed the belief that the debris proposition could not be satisfactorily settled by the construction of levees along the Sacramento and San Joaquin rivers, confining those streams within the narrow limits of their channels, as although these dikes would have the effect of causing a scouring action in the channels themselves, thus deepening them, the sediment would be carried onward only to be deposited at the first opportunity in San Pablo bay, and probably eventually in the bay of San Francisco. He thought that the debris could be better controlled by constructing barriers at the mouths of torrential streams, behind which a large portion of the debris would lodge, thus failing to reach the navigable streams, and by providing these dams hydraulic mining could be resumed on a large scale. In furtherance of this idea, Professor Christy suggested that the aid of President Roosevelt be sought to the end that a portion of the funds appropriated to the use of the United States Geological Survey be devoted to this experiment. The speaker expressed the belief that in their long-continued opposition to hydraulic, and now other forms of mining, the anti-debris association has "killed the goose that laid the golden egg."

A. Caminetti, who framed the bill known as the Caminetti act, by the provisions of which hydraulic mining again became possible in California, was pres-



ent and emphatically denied that he favored the repeal of the law as had been stated at Monday's session.

A paper was read by Thomas H. Leggett on "Mining Methods in Johannesburg, S. A.," in which he said South Africa would, for the next few years, be the greatest gold-producing country on the globe, and yet her diamond mines belittled even her auriferous industry. The most interesting part of his paper was that part which dealt with the question of Chinese labor. He defended the action of the mine owners in the Transvaal in importing Orientals, saying that their policy was dictated by sheer necessity. The conditions in Africa were unique, he affirmed, and not at all parallel to those existing in this country.

There are two classes of labor, he continued, one for the white man and one for the Kaffir. A white man will, under no circumstances, engage in any kind of work which is usually done by the natives. Therefore, when Kaffir labor became scarce the operators were in desperation and had no choice but to do as they did.

Other papers were read by Mark B. Kerr on the "Formation of Ore Bodies on Intersections," and by L. J. Hohl on "Gold Dredging."

In the afternoon the delegates turned from discussions of gold and precious stones and gave their undivided attention to iron, there being an excursion to the Union Iron Works on the programme. About sixty took advantage of it, and boarded the steam tug Union at the foot of Mission street at 1:30 o'clock, enjoying a pleasant outing under the direction of W. C. Ralston. At the Union Iron Works the party was divided, half going with Superintendent Dickie and the others with John T. Scott on a thorough tour of the plant. Afterward the battleship Ohio and the torpedo boat Perry were inspected, and the party returned, reaching home about 4 o'clock.

The convention was called to order at the usual hour Wednesday morning and a paper by E. A. Belcher on the "Mining Law and Its Needs" was read. Mr. Belcher stated that a commission had in charge the revision of the Federal statutes providing for the sale of public lands and had already prepared its report on the pre-emption and homestead laws, and is now about to take up that portion of the statutes relating to public mineral lands.

Mr. Belcher has been in communication with Gifford Pinchot, secretary of the Commission on Public Lands, and has made a number of suggestions to the Commission, one of which, if carried into effect, would substantially accomplish the segregation of the mineral lands so far as may be done without the aid of a geological commission in the field. It will do away with the spoliation of unpatented lands covered by mining locations. It will accomplish a great part of the good intended to be accomplished by the "mineral lands bill," toward which there was such active hostility that it could not be enacted into a statute.

Among other things, Mr. Belcher suggests the advisability of a uniform code of Federal statutes, which will do away with the present local laws, rules and regulations of districts, and have the mining laws universal in all of the mining sections of the West. To accomplish this some existing laws must be repealed and some new ones passed. Concerning the Mineral Lands bill, he proposed a new method of recording mining locations, and said that if the suggestion could be embodied in legislation it would furnish a greater safeguard than the miners have had. "It will," he said, "connect their locations with the paramount source of title—the general Government—hitherto impossible under the system of recording in use, and thus give notice to the general Government that the land is claimed as mineral. A mining location so recorded would prevent the selection or location of the land under other laws without the knowledge of the miner. It would give the honest miner what he has not had. It would prevent the spoliation of his mine by others without notice to him."

Other suggestions were offered by Mr. Belcher as follows:

1—The extralateral right should be utterly abolished. It is a thing of evil. Within my reading no one statutory provision has been so productive of endless and costly litigation as this. No mine owner can say with assurance that his title is quieted for all time. At any stage some new development may start a new suit; at any depth his vein may intersect another and be lost to him if he chances to be the junior locator; at any point his vein is liable to develop into a complex fissure and involve him in endless controversy over the doctrine of underlap and connecting veins.

2—The rules for perfecting a mining location require radical changes; nevertheless, changes should be advisedly considered so as not to handicap too severely the honest miner.

3—The new Federal law should be comprehensive. It should provide for a record in the land office and should provide, negatively, that no other record be required. That, so far as concern mines not patented, would do away with the record of the county recorder and the record of the local mining district and their accompanying expenses and dangerous uncertainties. Such provision, of course, would not be retroactive, it would apply to future conditions and would not disturb the chain of any title already initiated.

The proposed legislation should also, in exact terms,

do away with that continuing source of infinite perplexity, the local rules and regulations of miners. The tenth census report contains Clarence King's compilation of the local rules and regulations of miners, but it does not contain all of them, for many exist only in tradition and can be proved only through that dangerous medium—parole. A matter so important as a rule that is to affect conduct ought not to be left to parole. Besides, there is no good reason why there should not be uniformity of procedure. The necessity for the uniformity of procedure is daily becoming more and more exigent in all affairs, particularly those of a legal nature. The proposed new system, therefore, should be a complete system and it should be exclusive. If a mine is worth working, it is worth patenting.

He also referred to the recent mining legislation relative to mineral lands in the Philippine Islands, where a mining claim is 1000 feet square with no extralateral rights. In discussion of the extralateral right, Mr. Belcher said:

It is easily perceivable that if a ledge should chance to run beyond the vertical planes of the boundaries at a depth still permitting work, then, as the only discovery possible would be by the owner at the place of crossing, he could make a side location based on his own discovery at the place of crossing and protect himself. His would be the only valid location as being the only location founded upon discovery. In almost any contingency the owner of the original location would be in a situation to protect himself against the "jumper," because the "jumper" could make no discovery upon which to found a valid location of the ground lying to the side of the original location into which the ledge projects on its dip after crossing the vertical boundary of the original location. The only possibility of any trouble accruing to the owner of the original location, where the ledge crosses his boundary and he desires to continue to work it, would be where a side location embraced an apex of its own from which to the lode of the original location there might, at the depth of the boundary crossing, be a crosscut. But such a contingency would be provided against by giving to the owner of the original location the right to make a side location calculated to embrace the dip of his original ledge at any feasible depth. Ordinarily, however, within the perpendicular planes of the location the vein could be worked as deep as would be desired or as practicable.

Referring to the conditions which have attended the patenting of mines, he said:

Save in the occasional instances where patents to mines have been obtained, as compared with the vast number of mining locations in which no land office proceedings looking to patent have been taken, there is no definite segregation of mineral lands from agricultural. The fault is that of the system. In no other land than ours would such a system be tolerated. Under the Federal law the mere location, together with the required expenditure for labor and improvement, gives permissive title for an indefinite period—that is, it is supposed to do so. The statute does not compel the locator to procure a patent. It does not even require him to record his location. Only State or mining district laws require a record.

As a consequence, under the Federal law, unless proceedings to obtain a patent are initiated, there is nothing to connect the mining location with the land office—the place provided by law for disposition of the public lands. In the absence of an application for patent no one can know anything about a mining location save the locator, those whom he has informed, those who may chance to be on the ground and see the stakes, and those who are constructively informed by the record of the location in the office of the recorder of the mining district or the office of the County Recorder.

Such record is supposed to give constructive notice, but its capacity in that direction is limited. Confessedly, it is no notice at all to the paramount proprietor—the United States. The United States knows of nothing relating to its public domain, the specific grants of the Congress excepted, save such matters as, under its laws for the disposal of the public domain, appear in the United States land offices where the public domain is sold. The land office is for the General Government the recording office. It knows what is there of record, but it does not know what is of record in the offices of mining recorders or the offices of county recorders, and does not, in the nature of things, cannot take any constructive notice therefrom.

As it is the owner of the land it cannot take notice of anything affecting the title save what is of record in the place it has provided for that specific purpose. The laws of mining districts and of some of the State require a record of mining locations, but the reason for requiring a mining location to be recorded in a local office antedating the enactment of the Federal mining law long since lost its force because Federal surveys of the public lands have since been widely extended. General withdrawals of wide regions supposedly mineral in character, such as the withdrawals in accordance with the report of J. Ross Browne in the seventies, have been set aside as conflicting with the policy of the Government for the disposition of the public domain as a means of increasing the national wealth and resources, and because the real policy of the Government, notwithstanding the imperfect provisions of the law, is that the mineral lands shall be sold as such and not reserved as such.

In instances known mineral lands have been returned as such by the deputy agricultural surveyors in the field and platted as of that character; but otherwise than as they are so platted from casual examination or information, and otherwise than as segregated by deputy United States mineral surveyors in patent proceedings, the Government maps give no information as to what are mineral lands. Some of the best mines have been discovered upon lands surveyed, returned and platted as being agricultural in character.

In places, public lands returned as agricultural in character, or at least as not mineral, are, in fact, covered by mining locations, duly recorded under local rules, of which the United States land offices have no

knowledge. This condition of fact is not merely bad; it is shocking. It is time the law was changed. Yet any change that would put too severe a burden upon the hardy prospector and honest miner would fall short of attaining the object desired.

The present system does not protect the honest miner. Where the land in which his mine is situated has been returned as agricultural, unless he initiates patent proceedings, he is at the mercy of the scripper, the purchaser from the State under school selections, and even from purchasers under the timber and stone acts.

In the matter of recording claims, Mr. Belcher said:

The Federal statute should require mining locations to be recorded in and noted upon the records of the United States land offices. Such a system would end many of the miners' troubles, because it would connect his location with the paramount source of title. Such a system would prevent any disposition of the land covered by a mining location without notice to the miner. A general mineral affidavit that certain land is mineral in character is of no practical efficacy, as has been clearly shown, because a notice to disprove mineral, published in some obscure newspaper, might never be seen by the miner.

His mine is frequently far removed from any post-office, and his means of information as to what is going on in the outside world scanty. His location, so recorded, would import certainly, would require a personal service upon him of any process affecting the title to his claim, and thus he would be given his day in court.

Where the location should be of a placer it would conform to legal subdivisions and be readily noted on the plat books, but where it should be of a lode claim, it would require a survey in the first instance to establish relation to subdivisional lines, so as to make a proper segregation from contiguous non-mineral lands. In the land office it would be merely a matter of bookkeeping.

There are other feasible means of segregating the public mineral lands. By the system of recording proposed they would be segregated, and the land office, the only place provided by law for the disposition of the public lands, would have precise and first hand knowledge of the status of the lands subject to sale. In Mexico and British Columbia nothing is left to chance as here. An official segregation of each mining location is made at the outset.

By the system proposed the plats of the deputy mineral surveyor of the district and of the land office would always agree, and conflicting locations, now so easy to make and so fruitful of litigation or blackmail, would not be permitted without a showing under oath, nor unless it should appear that the conflicting party had some substantial litigable interest not merely negligible.

Doubtless this procedure would reduce the number of locations recorded, but it would have a tendency to make prospecting more thorough and extensive, as is the case in Canada and Mexico. The statute could provide that a miner should have a definite time after discovery within which to make and file his location.

The law should also require a locator to procure a patent within a specified period, say, within five years after recording the location in the land office. If a mine is worth working it is worth patenting, and there is no reason why the owner of a mine should not be required to get a patent while the owner of a farm is. The period of five years is suggested by analogy to the homestead law.

Other papers were read by G. W. Kimble, "Prospecting Auriferous Gravel With Drilling Machines;" H. E. Miller on "Explosives," and Prof. A. C. Lawson of the University of California on "The Needs of a Geological Map of California." Other papers were read by title, among them one by W. H. Storms on "The Strength and Life of Mine Timbers."

A. A. Tregidgo of Solano county addressed the convention on his experiences in Alaska and the Klondike.

One of the most important matters coming before the Convention was a revision of its constitution and by-laws. Considerable discussion resulted over this proposed change, particularly in the matter of increase of dues, but the new constitution and by-laws were finally unanimously adopted, as follows:

#### ARTICLE I.

SECTION 1. This organization shall be known as the California Miners' Association.

SEC. 2. The objects of this Association shall be to protect, develop and foster the mining and mineral industries of the State of California in all their branches and to particularly protect the mining industry in matters pertaining to legislation and to influence and develop scientific research.

#### ARTICLE II.

SECTION 1. The officers of this Association shall be a president, vice-president and treasurer, to be elected at the annual meeting, and a secretary, to be appointed by the executive committee, as hereinafter provided.

SEC. 2. All officers are to serve for the period of one year, or until their successors are elected or appointed.

SEC. 3. The president shall appoint an executive committee, to consist of seven members of this Association, which shall have full power to transact all business of the Association, except such as may be transacted at any general meeting of the Association. The executive committee shall appoint a secretary.

SEC. 4. The president shall appoint, subject to the approval of the executive committee, such committees as are prescribed by the constitution and by-laws of this Association and such other committees as may be authorized by the executive committee. The president shall be ex-officio member of all committees.

SEC. 5. The elected officers of the Association shall be ex-officio members and officers of the executive committee.

SEC. 6. There shall be an annual meeting of this As-



sociation held in San Francisco at a time to be fixed by the executive committee; and there shall be regular meetings of the executive committee on the second Saturday in the months of January, April, July and October of each year.

#### ARTICLE III.

SECTION 1. The president shall preside at all meetings of the Association and of the executive committee. He shall sign all warrants drawn on the treasury and perform such other duties as herein prescribed, or as usually pertain to that office.

In the absence of the president the vice-president shall perform the duties of that office.

SEC. 2. It shall be the duty of the secretary to keep full and correct minutes of all meetings of this Association and of the executive committee and to render annually to the Association a full report of all the transactions of his office, and to the executive committee when requested to do so by the president; receive all moneys of the Association, paying the same to the treasurer, and taking his receipt therefor, and perform such other duties as may be required of him, either by the Association or the executive committee.

The secretary shall give bonds in such sum as the executive committee may require for the faithful performance of his duties, such bond to be approved by the president.

SEC. 3. It shall be the duty of the treasurer to receive all moneys of the Association and deposit said money in a bank designated by the executive committee, and pay the same only upon warrant drawn by the secretary and signed by the president. He shall render an annual report to the Association, and upon request of the president or the executive committee shall at any time furnish to the committee a statement of the condition of the funds of the Association.

The treasurer shall give bonds in such sum as the executive committee may require for the faithful performance of his duties, such bond to be approved by the president.

SEC. 4. All accounts against the Association must be approved by the auditing committee before being paid.

SEC. 5. All warrants of this Association must be drawn by the secretary, and signed by the president and secretary.

#### ARTICLE IV.

SECTION 1. The headquarters of this Association shall be in the City and County of San Francisco.

SEC. 2. The president shall appoint an election committee to consist of five members who shall pass upon the name of any candidate for membership in this Association, and two dissenting votes of said committee shall prevent the election of said candidate. A majority of the members of the committee shall constitute a quorum for the transaction of business.

SEC. 3. All persons, firms or corporations engaged in, directly interested in or friendly to the mining industry are eligible to become members of this Association, provided their election is held in accordance with Section 2 of Article IV.

The annual membership dues of this Association shall be as follows, viz.: Individual membership, \$5.00 per annum; mining companies, \$25.00 per annum; mercantile or manufacturing firms or corporations in San Francisco and Los Angeles directly interested in the mining industry, \$50.00 per annum; mercantile or manufacturing firms or corporations in San Francisco or Los Angeles friendly to, but not directly interested in the mining industry, \$25.00 per annum; mercantile or manufacturing firms or corporations outside of the cities of San Francisco and Los Angeles directly or indirectly interested in the mining industry, \$25.00 per annum.

SEC. 4. Any County Association of Miners within the State of California shall be entitled to representation at the annual meeting or any special meeting of this Association, in proportion of one representative for each five members that it may have; provided that on or before the first day of October of each year such County Association shall notify the secretary of this Association of its desire for such representation for the ensuing year, and pay into the treasury of this Association five dollars (\$5) for each representative that it may claim; and provided further, that each delegate so appointed shall be an elected member of this Association.

SEC. 5. The Association year shall run from the first day of October in each year, and dues shall be payable in advance, and if not paid within three months shall become delinquent. Any member so delinquent shall be suspended from the Association and his name dropped from the list thereof. Any member so dropped may be reinstated by the election committee upon the payment of his back dues previous to the time of his suspension.

SEC. 6. Every member of this Association in good standing shall be entitled to vote at all meetings of the Association.

All mercantile or manufacturing firms or corporations, members of this Association in good standing, shall be entitled to a representative with power to vote at all meetings of this Association, provided, however, that said representatives must be furnished with duly accredited credentials from the mercantile or manufacturing firm or corporation that he represents.

No member or delegate shall be allowed to vote by proxy.

SEC. 7. This constitution may be amended at any general meeting of the Association upon a vote of the majority of those present.

#### BY-LAWS.

SECTION 1. The executive committee shall authorize the appointment by the president of an auditing committee to consist of three members of the executive committee; a finance committee to consist of three members, who need not be members of the executive committee.

SEC. 2. The executive committee shall fill all vacancies of the officers of the Association. They shall have power to remove an officer of this Association who is derelict in his duty, upon a two-thirds vote of all the members present at such meeting, provided that no officer shall be removed until he shall have been notified

of the intended action of the committee and afforded an opportunity to be heard.

SEC. 3. All parliamentary questions shall be determined in accordance with Reed's Rules, unless otherwise ordered by the Association.

SEC. 4. Meetings of the executive committee may be called by the president whenever deemed advisable, and upon written request of any three members of the executive committee the president shall call a meeting thereof.

SEC. 5. At all meetings of the executive committee four members shall constitute a quorum for the transaction of business. Whenever practicable, each member of the committee shall be notified personally or by mail of each intended meeting at least three days before said meeting.

SEC. 6. The secretary shall receive such compensation for his services and office expenses as the executive committee may from time to time determine.

These by-laws may be amended at any annual meeting of the Association, upon a vote of a majority of those present.

On Wednesday afternoon the delegates visited the large reduction plant of the Selby Smelting & Lead Co. at Vallejo Junction, Contra Costa county, escorted by Messrs. Ralston and Underhill, and were shown through the large establishment by Superintendent A. Von Der Ropp. This trip proved to be highly interesting and instructive.

On Thursday the convention reconvened and the report of the Committee on Resolutions was received and read by J. B. Balcomb. Following are the resolutions in full:

#### REPORT OF COMMITTEE ON RESOLUTIONS.

We, your Committee on Resolutions, submit the following report:

WHEREAS, The present and constantly increasing magnitude of the various mineral products of the United States entitles these industries to specific recognition by the National Government, and

Whereas, In our opinion the establishment of a Department of Mineral Industries, with its secretary a member of the Cabinet, will best subserve this end; therefore, be it

Resolved, That Congress establish such a Department, to be known as "The Department of Mineral Industries."

Resolved, That the president and secretary of this Association be authorized and instructed to transmit copies of these resolutions to the members of the California delegation in Congress, and respectfully urge their co-operation and request that a suitable bill be introduced to carry out such object.

Resolved, That the president and secretary of this Association be authorized and instructed to transmit a copy of these resolutions to every member of Congress, to officials of other States, kindred associations and interested individuals, and request their co-operation.

Resolved, That we urge that Section 1183 of the Code of Civil Procedure be so amended that, taken in connection with the other sections of the statute concerning miners' and material men's liens, the owner of a mine may bond it, or enter into agreements or working agreements with reference to the same, and still be able to protect himself and his property against liens for labor and materials for the contracting of which he is not personally responsible.

WHEREAS, The lapse of time frequently renders it difficult and sometimes impossible to prove with certainty the date of a mining location upon which a mineral land patent has been based, thus giving rise at times to expensive and vexatious litigation; therefore, be it

Resolved, That Section 2325 of the Revised Statutes of the United States should be amended by adding thereto the following words: "All patents for mineral lands hereafter granted or issued under or by authority of the United States shall contain a statement of the date of the location of the claim or claims upon which the granting or issuance of such patent is based, and such statement shall be prima facie evidence of the date of such location," and we therefore heartily endorse House Bill No. 8892, now pending in the Congress of the United States, and urge the California delegation to accelerate as speedily as possible the adoption of the bill. We also recommend that the said Legislature adopt:

"An Act Providing for the Admission in Evidence of Certain Statements of Facts Contained in Patents for Mineral Lands Issued or Granted by the United States of America.

"The people of the State of California, represented in the Senate and Assembly, do enact as follows:

"Section 1. Wherever any patent for mineral lands within the State of California, issued or granted by the United States of America, shall contain a statement of the date of the location of a claim or claims upon which the granting or issuance of such patent is based, such statement shall be prima facie evidence of the date of such location."

WHEREAS, There is an absolute, urgent and immediate necessity for the segregation of the mineral lands within the railroad land grants of the State of California in order that such mineral lands may be restored to the public domain, and thus be made available to the mining prospector, and

Whereas, These mineral lands were especially excepted from the railroad land grants and have never been granted by the United States Government to any railroad company, and were intended to be specifically preserved as a part of the public domain, open to exploration and purchase under the Federal mining laws, and to that end a bill was introduced in the last session of the Congress of the United States and is now pending in said body; now, therefore, be it

Resolved, That we heartily endorse House Bill No. 8893, commonly known as the Mineral Lands Bill, and earnestly request that the Senators and Representatives

from this State use all honorable endeavor to secure immediate passage of the bill.

Resolved, That, in addition to procuring a segregation of the mineral lands within the railroad land grants, the California Delegation in Congress be requested to propose and use all honorable means to obtain the necessary legislation to have a new segregation of the mineral lands of the public domain in this State, such segregation to be made under the direction of the Director of the United States Geological Survey, and that such classification shall be accepted as prima facie evidence of the mineral character of such lands in all cases appearing before the Land Department and Courts of the United States.

Resolved, That the California Delegation in Congress be requested to propose and use all honorable endeavors to secure the passage of a law providing that:

A true copy of the notice of a mining claim, which notice shall have been first posted upon the lands, as now provided by law, may be filed in the office of the Register of the United States Land District in which Land District the lands claimed are located, such filing to specify or be accompanied by a specific description of the lands claimed in such form that the same may be platted upon the Land Office records; and, that upon such filing being accepted, notation shall be made upon the records and maps of the said Land Office.

WHEREAS, The mining industry has, in common with other industries, suffered much and been greatly hampered by unjust exactions and discriminations in transportation charges; and

Whereas, The present laws do not give the Interstate Commerce Commission sufficient power to properly regulate such transportation charges; and

Whereas, It would be of manifest benefit to the mining industry to have an effective means for adjusting disputes and correcting abuses in transportation; and

Whereas, Congress is, at its present session, to take up the matter of enlarging the powers of the Interstate Commerce Commission; therefore, be it

Resolved, That we urge upon Congress the passage of a law as will provide that hereafter, when the Interstate Commerce Commission shall, in any case pending before it, under the Act to Regulate Commerce, approved Feb. 4, 1887, as amended or supplemented by other Acts of Congress, decide that a rate for the transportation of freight or passengers is unreasonable or unjust, it shall be the duty of the Commission to fix a rate in lieu of the rate it has found unreasonable and unjust.

WHEREAS, The Mining Bureau is the only duly accredited organization in this State for the accumulation of all data, records, maps and geological specimens for the general welfare of the mineral industries; therefore, be it

Resolved, By this Association, that we again earnestly urge the Legislature to make a sufficient appropriation to extend its scope and usefulness.

Resolved, That we are heartily in favor of any movement looking to the improvement of the navigable waters of California and the reclamation of waste lands, that may be accomplished without injury to the mining interests of the State.

WHEREAS, It is the sense of the California Miners' Association that the construction of a geological map of the State and the investigation of the various problems in economic geology, which the making of such a map involves, would greatly contribute to the development of the natural resources of the State; and

Whereas, The work of the United States Geological Survey, being spread over the entire territory of the United States, proceeds slowly in any one State; and

Whereas, Most of the State of the Union favored with geological formations of economic value have established State Geological Surveys without in any way duplicating the work of the National Survey, but rather in a spirit of co-operation with the National Survey; and

Whereas, Several of the more successful of these State surveys have been conducted through the Universities of such States; therefore, be it

Resolved, That this Association heartily indorses the making of such a geological map of the State, and respectfully suggests that the detail work be done by the State University through its geological department, in co-operation with the United States Geological Survey, and respectfully draws the attention of the Governor and Legislature to the desirability and propriety of making the necessary appropriation to carry out this important work.

Resolved, That we approve of all organizations to improve the forestry conditions and the conservation of the water supply throughout the State.

Resolved, That we approve of the efforts of the recent Good Roads Convention held at Glen Ellen, and the efforts of all similar organizations, to obtain proper legislation to the end that our present road system may be improved.

WHEREAS, The petroleum interests of California have become one of our great mineral industries with vast possibilities for the future; and

Whereas, The present National laws for the selection and location of mineral lands are insufficient for the protection of the petroleum miner; and

Whereas, Much of the oil territory of California is still Government land; therefore, be it

Resolved, By the California Miners' Association, in Convention Assembled, that they will co-operate with the Petroleum Miners' Association of California in urging Congress to act expeditiously in passing such laws as will remedy the present evils, and afford the citizen locating oil lands the same security and protection as is now enjoyed by the locator of lode and placer mining claims, and giving a reasonable length of time in which to make a discovery of oil.

Resolved, That we urgently request our representatives in Congress and in the State Legislature to secure appropriations for the purpose of building restraining dams and barriers for mining debris upon the tributa-



ries of the Sacramento and the San Joaquin rivers, viz.: upon the Bear, American, Cosumnes, Mokelumne and Calaveras rivers and their respective branches.

Resolved, That our thanks are hereby extended to the San Francisco Hotel Company for its many courtesies and kindness in gratuitously providing us with convention and committee rooms in the St. Francis Hotel during the session of this, the thirteenth annual convention.

Resolved, That this Association holds itself greatly indebted to the public press of San Francisco and the mining counties for the assistance it has given, not only to the Association, but to the mineral industries of California, during the past year.

Resolved, That a vote of thanks be extended to the Union Iron Works, United States Navy officials and the Selby Smelting & Lead Company for their many kindnesses shown the delegates on their various excursions.

Respectfully submitted,

CHAS. G. YALE, Chairman.

In accordance with the suggestion of Prof. Christy, the committee on resolutions prepared the following memorial, to be forwarded to President Roosevelt:

SAN FRANCISCO, CAL., December 8, 1904.

To the President of the United States, Washington, D. C.:

WHEREAS, The placer and hydraulic miner who originally developed the resources of California and opened them to the world obtained title from the Government of the United States to his placer lands, with the common understanding that they were to be worked and their gold content recovered in accordance with methods of sluicing and hydraulic mining publicly known to have been devised and used for the purpose from the earliest stages of placer mining;

Whereas, Many deposits of gold to the value of millions of dollars are now idly buried in the ancient river channels of California, under such conditions that they can be profitably worked neither by dredging nor by drifting, nor by any other process than that of hydraulic mining;

Whereas, The gold extracted by the hydraulic miner was generously poured into the treasury of the United States Government in the dark days of the Civil War, when the national currency was worth only fifty cents on the dollar, thus materially assisting in maintaining the credit of the Government and in saving the Union;

Whereas, The hydraulic miner has been restrained by the United States Courts from discharging boulders, gravel, sand, clay and other matter in suspension into the navigable waters of the State, whereby the industry of hydraulic mining has been destroyed and property to the value of over \$100,000,000 has been rendered idle and unproductive since 1884, the natural wealth of the State rendered unavailable, and a deadlock has resulted between the fundamental industries of agriculture and mining;

Whereas, While admitting the injurious effect of mining debris where not effectually restrained, the unavoidable effect of natural erosion and sedimentation has been ignored in the minds of the courts as well as of the farmers, and all the injury due to natural causes has been charged to hydraulic mining;

Whereas, Should hydraulic mining forever cease, to the injury of the miner, the natural process of erosion and sedimentation would still continue to the injury of the farmer and the navigable waters of the State;

Whereas, We are firmly convinced that by a rational application of the laws governing the deposition of sediment from torrential streams, the industries of hydraulic mining and agriculture can both be carried on in this region, not only without prejudice to each other, but to their mutual advantage; and

Whereas, This question is primarily a geological one and can be solved only by geologists who have devoted their lives to the study of erosion and sedimentation, in mountain as well as in valley regions; therefore, be it

Resolved, By the California Miners' Association, that we beg you, as President of the United States, to assist in the solution of this problem affecting all the interests of a great commonwealth, by instructing the Director of the United States Geological Survey, through the Secretary of the Interior, as part of his study of the storage of flood waters and the reclamation of waste lands, to undertake a particular study of those portions of the Sacramento and San Joaquin valleys affected by the detritus from torrential streams.

The points we wish particularly considered are:

First—The most favorable sites for reservoirs for water, whereby destructive floods may be averted and the waters stored and utilized for the benefit of agriculture, mining and other industries.

Second—The selection of suitable tracts of waste lands and of the most suitable means whereby the detritus from torrential streams may be deposited on such waste lands, so as to reclaim them and convert them gradually into lands suitable for forestry and other agricultural purposes, and at the same time to remove from such streams their burden of detritus so that they may cease to be a menace to the navigable waters of the State.

In view of the importance of this inquiry to the three great fundamental industries of agriculture, mining and commerce, we beg that this inquiry be undertaken at the earliest opportunity and pushed to completion as rapidly as consistent with thoroughness.

Chairman A. Caminetti of the committee on impounding dams read his report.

J. F. Davis, chairman of the Committee on Legislation, rendered his report, and the nomination of officers then being in order, Niles Searles placed the name of E. H. Benjamin in nomination as president of the Association for the ensuing year. The nomination was seconded by C. H. Dunton of El Dorado county and Mr. Benjamin was unanimously elected to the presidency.

C. H. Dunton was also elected vice-president by acclamation and S. J. Hendy similarly re-elected treasurer.

The convention then adjourned sine die.

## The Great Eastern Quicksilver Mine.

Written for the MINING AND SCIENTIFIC PRESS.

Mining for quicksilver continues to be one of the leading branches of the mining industry in California, and while the output of the metal is not so great as at one time the demand for it is not so great. Large amounts of mercury are employed in metallurgy, and in the arts, but the adoption of other processes than free amalgamation of ores has resulted in diminishing the requirements for quicksilver. At least, the demand is not in proportion to the growth of the mining industry, as in many districts amalgamation

southward. The sandstone is heavily charged with pyrite, and in some places fire damp is abundant in the mine and the danger of explosions is always imminent. The wall rocks are unusually hard and the stopes stand well without timbers. This is only possible owing to the fact that generally between the ore bodies and the serpentine is found a hard gray rock—silicified sandstone. Serpentine does not stand well, as a rule, and the conditions at the Great Eastern are considered a great advantage in the economy of mining there. The metallurgical equipment consists of a 12-ton coarse-ore furnace and a 16-ton fine-ore furnace. In October this mine produced 190 flasks of quicksilver. The accompanying engravings



Hoist Great Eastern Quicksilver Mine, Near Guerneville, Sonoma County, Cal.

has become of less importance than formerly, or is not practiced at all. While the demand for quicksilver is, therefore, out of proportion to the increasing magnitude of mining for gold and silver, still the amount used is large.

The principal producing quicksilver mines of the United States are confined to the Coast Range of California and to the mines of Terlingua, Brewster county, Texas. The most common occurrence of quicksilver in California is in the form of cinnabar and as native metal in sandstones at and near con-

illustrate the mine and furnace buildings at the Great Eastern.

A GREAT DEAL of the sulphur of commerce is obtained from mines in Sicily, of which there are nearly 300 in operation. The sulphur, as mined, contains a great amount of earthy impurities. The crude material is piled up in heaps, passages for air being provided. The heap is then covered with earth in the same manner as wood piled for making charcoal is covered, and the sulphur



Ore Furnaces of Great Eastern Quicksilver Mine, Near Guerneville, Sonoma County, Cal.

tact with serpentine. The Texas mines occur chiefly in limestone, accompanied by intrusive dikes, said to be phonolite. These Texas mines form a striking exception to occurrences of cinnabar elsewhere.

The Great Eastern mine is near Guerneville, Sonoma county, California, A. Abbey superintendent. The mines of this group are many miles from other known cinnabar deposits, and occur, as is usual with California quicksilver mines, at contact of sandstone and intrusive serpentine. The strike of the vein is easterly and westerly, dipping northerly in depth, but almost vertical at the surface, where is a bold outcrop, the foot wall sandstone having been eroded. The mine is opened by inclined shaft sunk in the foot wall sandstone, the vein being reached by crosscuts on each level. No serpentine has thus far been cut in the foot wall. One of the peculiar features of this mine is that of an isolated ore body in the foot wall sandstone, which has a pitch to the

fired. A portion of the sulphur burns, creating sufficient heat to cause the balance of the sulphur to melt and collect at the base of the heap, where arrangements have been provided to tap it and draw off the brimstone into moulds. If the pile of crude material were burned without the cover of earth, all the sulphur present would burn, passing off into the atmosphere as sulphurous anhydride. The crude brimstone obtained in the manner described is distilled and the refined product sold as roll brimstone and flower of sulphur. There are numerous sulphur deposits in the Western United States, but the most of them are situated at points too distant from the railroad to make them commercially valuable. These sulphur deposits are found about fumaroles and volcanic vents. Sulphur is sometimes found in mines as the result of the oxidation of pyrite, but it is rarely found in large amount under these conditions.



## Mineral Resources of North China.\*

Written by A. J. G. DENNEY, E. M.

Little has been written about the mineral resources of China, and to a large extent the information that has leaked through to the outside world has been through the medium of missionaries, whose source has been the unreliable native reports and their own inexperienced observations. The following pamphlet is not a missionary report, but has for its foundation the results obtained through personal experience, while inspecting mines and reporting on properties for various foreign and Chinese companies.

As the field is so large, I shall confine this article to the province of Chili. Up to the present time there have been no maps or plans published of the country outside the Great Wall. This district, however, bids fair to be the coming mining center of Chili Province, especially for gold. The outlook is not so promising for alluvial workings, but is exceptionally good for deep mining operations, of lode formations and quartz veins, for the development of which a large amount of capital is required.

Few locations are more favorably situated for successful deep mining operations than the mountainous region in the north of Chili. When the Chinese authorities have proper mining laws enforced, and protection guaranteed to foreign capital, this particular field will be the first to claim the investor's attention.

Heretofore the gold mines of this district have been very carelessly worked; so much so that only the most prolific mines could pay for working them in the primitive way of the native. In many places the mines have been worked to water level, which varies from 20 feet to 200 feet in depth, and, not having the necessary machinery to cope with the water, they have been abandoned. The geological structure of the country is similar to parts of Victoria and New South Wales, Australia. There are the usual igneous and metamorphic rocks, in all their varieties. These rocks are traversed by quartz beds and veins, but all of the lodes and quartz veins are not auriferous, for there are long stretches of barren reefs, besides those that are productive.

In many quartz reefs and lodes the gold is usually associated with iron gossan or pyrites, and passing through hornblende and porphyritic rocks, also schists and diorites. Some of these reefs and lodes have been productive to a depth of 300 feet or more, and are now abandoned owing to the want of capital and machinery.

**GOLD OUTPUT.**—In the absence of any authoritative statistics, it is impossible to state definitely the amount produced from each mine.

The following is the annual export of gold from the port of Teintsin, Chili Province, China:

1901—Gold bar—Hai-Kwan taels .....	†2,849,139
1902—Gold bar—Hai-Kwan taels .....	4,645,430
1903—Gold bar—Hai-Kwan taels .....	

†The Chinese tael is 13.30 oz.

The above table shows an increase of nearly double the amount from 1901 to 1902, but whether this is mostly in bars, leaf or coins, or whether they come from the Chili gold fields or from other provinces, it is impossible to ascertain, as no statistics are kept by customs or local authorities.

The table represents only what passes through the customs officials' hands, which can be safely estimated as only a small portion of the actual amount of gold produced. These bars as a rule weigh ten Chinese ounces.

**YIELD.**—From various mines at work in North Chili, the average yield, employing native methods, is about 7 dwts. (30 shillings) per ton, to make a profit; but, with up-to-date crushing machinery, the cost should not exceed 5 dwts. per ton on free mill-ing ores.

The Chili gold fields have lodes and reefs from 6 inches to 15 feet in width, varying in character and still more in richness, and a great majority will yield payable gold.

These quartz reefs or lodes cannot be classed amongst the largest in the world, nor can a rough estimate of ores in sight be given. In one district alone the auriferous belt extends a distance of over 20 miles, and numerous quartz veins carrying gold have been opened by small native shafts and open-cut workings. This is only a very small section of North Chili, which is hundreds of square miles in area, and it can be readily understood that until proper plans and surveys and practical development have been carried out to a sufficient depth, no proper estimates can be given of the value of the field.

Although several outcropping quartz reefs containing gold have long been known to exist, the natives are prohibited from working them by the local authorities. The high officials demand and export so much money from Chinese holders of mining rights, or small syndicates holding permits from the Imperial Government to work these mines, that Chinese speculators will not invest any money in machinery or to carry on development work.

In Chili there is a field awaiting exploitation which

may be expected to yield exceptionally profitable results.

Many a reader may enquire, "Why should this rich mineral country in Asia also be so poor? Why, in other words, has China benefited so little from her vast mineral possessions?" The question is pertinent, but it is not the "poser" that it may appear at first sight. As a matter of fact, China has never mined to her own benefit. From the earliest discoveries, the natives have only scraped on the surface for the much-coveted metal. At the same time they have been afraid to let the foreigner in with his capital and experience, unless they could gain something themselves. Chili is open to foreigners for mining purposes on the condition that the concession be half foreign and half Chinese. The principal terms on which concessions are granted stipulate that the application must first be placed before the Governor-General at Jehol, according to the Jehol mining rules and regulations, which are attached hereto, and the Chinese Government shall receive 6% of the amount of gold yielded. A local mining board has been established at Jehol, where all the mining business of that district is transacted.

Two concessions have been granted on the above basis. An American made an application conjointly with a Chinese subject for a concession named the Chang-tze-kou, in the Lan-ping-hsien district, North Chili. This was granted by the Way-wu-pu in July, 1903, and the proclamation was issued to the people by the Governor General in August, 1903. About the same time another concession, also in the Lan-ping-hsien district, was granted to a German and Chinese subject conjointly. Both concessions are governed according to the Jehol mining rules and regulations.

It is evident to those in this country that the long delayed interest in its mineral resources has set in, and it is with considerable confidence that one predicts an enormous boom in the industry, as soon as some of the gold-bearing districts are systematically exploited and regular returns forthcoming.

The native methods of working the reefs and lodes are primitive. Small shafts are sunk to a depth of 20 to 50 feet and overhand and underhand stopings are then commenced. The ore is carried to the surface by baskets on the backs of coolies. These shafts are nearly always sunk within 20 feet of each other, and little or no timber is used. Sometimes a 3-inch diameter prop will be found here and there in the workings, where it is utterly impossible to get up or down the stopes without some support; or a small pillar is left to support the ground. Most of the old workings, however, have caved in. This does not refer to mines that are under foreign management.

The ore, after it is carried to the surface, is picked and carried to a stone mill, or arrastra, for pulverization. The mill consists of a circular granite slab, 10 feet in circumference and 15 inches thick. In the center is an upright pole, to which is attached a roller of granite in such a manner that it revolves on the granite slab, and trams are attached to the roller in such a way that a mule can be harnessed to it for giving the driving power. The crushing is similar to grinding corn. After crushing to a certain fineness—no screens being used—the natives then wash the crushed ore on a small wooden apron or table, usually 5 feet long by 2 feet wide. About one hundred-weight of ore is washed daily when in full working order. No quicksilver or other chemicals are used to get a closer extraction—in fact, the use or knowledge of the latter is unknown here.

Prospecting will be comparatively easy in this gold field, as the outcrops in most cases can be traced to a considerable distance. So much indiscriminate digging has been done that in many places deep sinking will have to be resorted to.

The present condition of the mining industry outside the Great Wall offers unusual facilities for exploration and reduction. Progress in the past has been slow, with the result that the gold fields have achieved no prominence.

The earliest discoveries of alluvial were made in the drifts that fill up the valleys and cover the plains at the foot of the mountains, and a large proportion of gold is still derived from this source. In places the wash or gravel varies from 2 to 4 feet in thickness, the average contents yielding from 20 to 30 cents per cubic yard. Most of this alluvial has been worked for centuries, and it would not be profitable to work any old deposits, that have been already exploited by the natives, with foreign methods.

Considering the condition of the roads and rivers, transport in North Chili is exceedingly cheap. Native carts, capable of carrying over one ton, can be used at the rate of \$4 per diem. They travel on an average of 25 miles per day, and it is only in the rainy season that any delays occur. For river navigation flat-bottomed boats are readily secured, which carry over two tons and up to five tons, when the rivers are in flood. The cost per boat capable of carrying two tons is \$4 per diem. All machinery would have to be packed and boilers, etc., sent in parts. Boats going up stream make about 12 miles per day.

Chinese merchants who have obtained permits to open mines in North Chili, through the Governor General at Jehol, and who lack the necessary capital to develop same, usually let the mine or a part thereof out on tribute. The tributers have to pay all working expenses, and the gold yielded must be sold

at a fixed price to the concessionaires. The latter pay such a small price for the gold at Jehol and other places that the tributers sell only a small part of the yield to the owners and take the remainder to a market where they can obtain a higher price.

At Tientsin-Fu the Viceroy of Chili has his headquarters and governs the southern portion of Chili. Cheng-te-fu (Jehol) is the official residence of the Governor General, who governs the northern and eastern parts of Chili.

Coolie labor in North Chili is plentiful. The pay of an ordinary Chinese coolie varies from 20 to 30 cents a day and a miner or carpenter from 30 to 40 cents. No food or lodging is provided for any of the Oriental workmen. Under the supervision of foreign mechanical engineers, Chinese operate most of the hoisting and pumping engines in Chili, and no serious accidents have yet occurred. After overcoming the difficulties usually placed in the way of a foreigner introducing something new, the Chinese are as capable of receiving instruction as the European would be who had been brought up without any knowledge of our methods. A northern Chinaman is very conservative.

Coal is abundant in North Chili, but at present there are no markets excepting the towns and villages. Equipment and transport will exceed in cost the best coal to be obtained at the nearest port. However, this native coal will be very useful for the operation of gold mines. A small coal mine, sufficient for all purposes, can be opened and worked cheaply by native methods, and the cost landed at the mine over the most difficult routes should not be more than \$12 per ton.

The country outside the Great Wall is mountainous and barren, excepting the growth of a small scrub. It is, therefore, an easy matter for the prospector to locate the outcropping lodes and veins. When a concession is granted, and the company intend sinking shafts or building houses, etc., the land in question must first be bought, and, to save disputes, a price is fixed by the local authorities.

Water is abundant, and even in the depth of winter a supply can be had sufficient for all purposes.

Timber is scarce. The Wei-chang has a small belt, but in a few years this will be finished.

Mining costs in Chili may be roughly estimated thus: With a stoping width not less than 3 feet, and where there is not an excessive amount of dead work, the total cost of mining will be from \$3 to \$4 per ton. This will cover all ordinary costs, but will be exclusive of new crushing machinery, boilers, winding engines, etc.

## THE PROSPECTOR.

The rock specimens from Sanger, Cal., are: No. 1, a typical aplite (fine-grained micaless granite). It is an intrusive dike rock, sometimes is gold-bearing and often accompanies gold-bearing veins. No. 2 is apparently a true granite, that is, quartz, feldspar, orthoclase and biotite (black mica). No hornblende observed. If any ever existed in it, it has been removed by decomposition. No. 3 is a much-altered dike rock, probably syenite—too much decayed to make identification positive. It is not naturally a vein rock, but may accompany veins. No. 4 is a coarse quartz diorite in which are visible quartz, plagioclase (showing striation) and hornblende, the latter somewhat altered. No. 5 is a fine-grained greenstone, probably diorite.

The mineral specimens from Graniteville, Cal., are: No. 1, ankerite—an iron-bearing dolomite. It is decomposed, the iron carbonate having largely been altered to iron oxide. No. 2 is the same rock in fresher condition. It contains scales of green malachite—a chromium mica. There are a few grains of quartz present in both No. 1 and No. 2.

## Correction.

In the article entitled "Volumetric Standards for Technical Work," by W. J. Sharwood, which appeared in the issue of December 3d, in the tabulated scheme at the close of the article near the bottom of the table, "standard thiosulphate," etc., and "standard cyanide," etc., should have been grouped under "copper," while "standard ferrocyanide," etc., and "standard zinc sulphate" should have been grouped under "zinc," "standard ferrocyanide," etc., and "standard molybdate," etc., remain under the head of "lead," as they appear in the table.

A Boston dispatch says that two fifteen-year-old boys of that city have established a wireless telegraphic connection between their homes, half a mile apart. This recalls the fact that thirty days after the appearance of the first published accounts of Bell's invention of the telephone, two New York boys had built and were successfully operating an experimental telephone system of their own. These two boys have since achieved distinction in the electrical field, and have for many years been allied in business. They are Prof. Frank B. Crocker of Columbia University and Doctor Schuyler Skaats Wheeler.

\*Abstract Far Eastern Review. Manila, P. I.



### Private Rights in Forest Reserves.

The National Mining Congress at its session held at Portland, Or., August 22-25, adopted resolutions favoring "the conservative use of forest resources, and in particular the creation and management of forest reserves under practical, business-like rules and regulations." Early in August the National Live Stock Association, at its Denver meeting, was equally earnest for practical control and improvement of forest areas.

The permanent prosperity of nearly all the far Western States is threatened by the destruction of the forests on the watersheds of irrigation streams. Wasteful lumbering, excessive grazing and fires are unceasingly cutting down the efficiency of the forests as sources of water supply. Conditions are rapidly growing worse, and this is evidenced by the constant demands of citizens for the creation of new forest reserves. The great difficulty is to determine boundaries which will include only lands suitable for the purpose, and will avoid injury to local enter-

duct their several industries that the value of the forest in regulating stream flow will not be diminished. Indeed, under proper management it will actually be increased.

No authority exists for selling the timber standing on unreserved public lands. Its free use is being greatly abused, leads to numerous frauds, and has become an additional reason for reserve establishment for forest protection, as well as for the passage of a law permitting the sale of such timber. Lumbermen can buy this timber only by buying the land outright, and the law limits to 160 acres the size of the tract any one purchaser may secure. After the establishment of a reserve, however, the timber can be bought in large or small quantities. The cutting, removing and clearing must be done under contract with the Government, according to a definite plan, and with strict regard for the best welfare of the forest. Moreover the land, which remains in the Government's hands, is kept productive instead of going to waste after lumbering, as is too often the case when it falls to private ownership.

The vast public domain of the West has been given up to the stock business for pasturage in common.

Government to afford. Irrigation for the arid West cannot be successful unless the headwaters of all streams are kept under ample forest cover.

Reserves are for use, not for ornament. They are not private forest parks, but are open to all persons without distinction. Free transit across them is always allowed. Pleasure or health seekers and hunting parties are privileged to enter them at all times and enjoy their resources to the fullest legal extent. The most important injunction laid on them is that the greatest care must be taken to extinguish all camp fires, since fire is the worst scourge of the forest, and of all its enemies the most dreaded.

The temporary withdrawal of lands pending a careful inspection to determine their suitability for permanent reserves affects seriously no private right other than that of entry as a settler upon some claim. No entry can be made after such temporary withdrawal. If lands settled upon are finally included in the permanent boundaries, the rights of the owners are as has been set forth. If such lands are excluded from the boundaries, their status has not been affected, except as it is improved by being so near a forest that will now be protected and managed for



In the Redwood Forests of Humboldt County, Cal.—A Monster Tree.

prises. The interests of the settler, the cattle or sheep man, the miner, the lumberman, and the irrigator, often all dependent upon the same region, are always more or less conflicting. Seldom is a reserve created without opposition from one or more of these interests. Commonly the practice of the Government is to withdraw from settlement all the land involved until it can be carefully examined, after which the suitable portion is included in a permanent reserve, and that which proves to be open, agricultural, or largely under private ownership, is released.

A settler who has entered upon a claim which is later included in a forest reserve does not thereby lose it. He may return it to the Government and in lieu thereof select another equal portion of the public domain. Or, if he elects to remain on the claim, he is protected in all his rights of ownership, is allowed free ingress and egress over reserve lands, and is also permitted, without cost, to cut reserve wood for domestic and farm repair purposes. Residents in the neighborhood of reserves are granted a similar free use of wood.

Omitting actual settlers, four classes of citizens are directly and specially interested in reserves. Lumbermen, stock grazers and miners are concerned with the forest as a producer of timber and grass. Farmers have their direct interest in the highest water conserving power of the forests. It is not possible so to adjust the claims of these four classes as to provide for them all. Each of the first three can so use the forests as not to injure the rights of the others, and can at the same time so con-

The forests, forming a part of this domain, have been subject to this unrestricted pasturage. The result has been disastrous to the domain both open and forested, but the forests have suffered the most injury. Restricting forest grazing by means of reserve regulations and inspection will eliminate the danger from overgrazing, will ultimately greatly benefit the business, and will, most important of all, enable the forests to perform their highest function for all the people. A few grazers may have their rights slightly abridged or more closely regulated, but the business as a whole is conducted in a more orderly way.

Prospecting and mine development are not at all restricted by reserve establishment. Miners require in their work both timber and water. Their demand for timber is comparatively not great, and they cut it somewhat more carefully than lumbermen have done. Their interests do not suffer in the least by forest reserve establishment. On the contrary, in the long run they will be greatly benefited by the protection which assures their future timber supply.

The greatest industry affected by forest reserves is farming. In many parts of the West it depends absolutely on the water flow from the forest. If ill usage impairs its storage capacity, and the stream flow, in consequence, alternates between flood and drought, or is permanently lessened, all the dependent farm land suffers severely. Every farmer has the right to insist that his water supply be not decreased, and the industry as a whole, the foundation stone of our national prosperity, commands and will receive the highest protection it is possible for the

general welfare. The whole theory of reserve practice is, special injury or advantage to none, but the greatest good to the greatest number.

In this connection, the redwood forest in California is intensely interesting from several points of view: First, it is so intrinsically valuable as a source of lumber of unique quality and beauty; second, California has all there is of it in the world; third, the redwoods of the coast are a complementary species to that of the Sierra Nevada, famed as the "big trees"—and California has all there are of that species also. The accompanying engraving, kindly furnished by courtesy of the Times of Eureka, Humboldt county, shows that even if the big trees of the Sierra should sink their several thousand years of growth into the bowels of the mountains, California would still be well fixed for large trees in the coast regions. Redwood trees are found all along the coast from Humboldt to Santa Cruz county. Of this remarkable timber Humboldt originally had about 510,000 acres, or in round figures, 500,000 acres. From the date of settlement to the present time it is estimated that about 90,000 acres of redwood have been timbered off, leaving as a present holding 410,000 acres. This area would be somewhat reduced upon close estimation, as it embraces considerable quantities of spruce, fir, pine, hemlock and white cedar. The forest extends in an irregular belt 108 miles through the county from its southern to its northern limits, varying in width from 2 or 3 miles to 15 or 20 miles. The territory covered embraces level river bottoms, high table and rolling land, and steep



hills, generally covered with a dense tangle of undergrowth. The most competent timber experts reckon upon an average of 50,000 feet of merchantable lumber to the acre, besides which there must be taken into consideration the refuse—shingle bolts, railroad ties, fence posts, etc.—which yield nearly an equal value.

The bulk of sales of redwood lands two or three years ago was on a basis of from 30 to 50 cents a thousand for estimated standing timber. These figures have gradually been hardening, until at the present time no desirable holding of available timber can be had for less than 50 cents to \$1 a thousand for estimated standing timber. The choice holdings will command from \$1.50 to \$5 per thousand, and the upward tendency is very pronounced, with every indication of steady appreciation for several years, being stimulated by railroad projecting; that is to say, that hereafter deals will be made more closely, based on actual operating values. Where redwood stumpage is bought for operating purposes, it commands from \$1.50 to \$5 a thousand.

One remarkable feature of the redwood forests is its positive assurance and absolute immunity from destruction by fire. This immunity arises from two causes: The redwood is non-resinous, the trunks are covered with a soft, fibrous bark from 4 to 16 inches thick, according to age, and no forest fire seems able to affect a tree after it has attained 6 to 8 inches in diameter. And second, in the dense, tall, old redwoods the rays of the sun are so effectually excluded, so much moisture is retained in the soil and tangled undergrowth, and the trees gather so much moisture from the ocean fogs, which in turn they discharge in drippings to the ground beneath, that fires do not make much headway or produce much heat, as is the case in pine forests.

Nature has thus provided a positive assurance against loss by fire in such an investment. The writer of this once measured a fallen tree 14 feet in diameter. Over 100 feet from where its roots had been upturned was a redwood fully 10 feet in diameter, which had grown against the fallen log in such manner that it had partly grown over it. The standing tree could not have been less than 500 years old, and yet the fallen log had not been greatly injured by fire—it had many thousand feet of timber in it.

Such a thing as a destructive forest fire is unknown in redwood timber. In fact, it is impossible to burn a redwood forest. This is shown by the method of logging there, which arouses the greatest surprise among those accustomed to working in pine.

## The "White Precipitate" of the Precipitating Boxes.\*

Written by A. PRISTER.

A long series of analyses of this precipitate from the boxes of different mines will only settle definitely this most important question. The analyses brought forward by Whitby and G. W. Williams in support of their theory that the ferrocyanide and cyanide do not play the important part in the composition of "this white precipitate," as I suggested, are very interesting, but certainly cannot settle this question.

I will call the attention of the cyanider to this analysis of "a medium solution." The samples were taken at the "head" of the box (before the solution came in contact with the zinc) and at the "tail" of the box:

	Head.	Tail.
Oxygen.....	61	49 vol. %
Nitrogen.....	1.84	1.56 vol. %
Ferrocyanide of potassium.....	.147	.076 %
Sulphocyanide.....	.0232	.0247 %
Alkalinity.....	.3	.254 %
KCy.....	.110	.045 %

From these analyses it is evident that over 81% of the ferrocyanide present in the entering solution remained in the box. We know that the reducing process going on in the box is not destroying this ferrocyanide, but simply fixing it as "white precipitate" on the surface of the zinc shavings. This box was precipitating badly and, as was to be expected, the zinc was covered with white precipitate in the first compartments. From the analyses you will see also that the sulphocyanide passed through the boxes unaltered, a fact that can be easily explained if we remember the sulphocyanide of zinc is very soluble in weak cyanide solution.

You will note also the difference in per cent of KCy at the head and tail of the box. This fall of about 50% in free KCy from the head to the tail explains very well the precipitation of the ferrocyanide, as ferrocyanide of zinc in the box. Ferrocyanide of zinc requires a certain strength of free KCy to remain dissolved in the solution, and by lowering this percentage it must come down.

The fall in percentage in oxygen is explained by the joint action of the alkali and oxygen upon the zinc shavings and consequent formation of peroxide of hydrogen—in this case combined—with a subsequent re-solution of the gold precipitated on the shavings, and giving as a definite result bad precipitation.

The analyses indicate an increased alkalinity of 10% from head to tail, a fact contrary to the conditions required for an increased precipitation of zinc oxide, as the alkali is a solvent for it.

\*Jour. Chem. & Met. Soc. of S. A.

## A Modern Manufacturing Plant.

The recently completed plant of the Jeaneville Iron Works Co. at Hazleton, Pa., affords good example of a modern manufacturing plant, carefully engineered and arranged to obtain low shop cost and perfection in the product.

In 1852, James C. Haydon began the manufacture of mine pumps at Jeaneville, Pa. The business expanded as the merit of the pumps became known, and the plant was enlarged at intervals to accommodate the growing business. The result was a series of structures with numerous dark nooks and corners, a combination of buildings such as that in which old-established manufacturing establishments are conducted.

The management had long felt the need of new and larger quarters, but being engrossed in developing their pumps and establishing a demand for them, rebuilding was deferred. Two years ago, they finally determined to erect their new plant at Hazleton, Pa., which offered particular advantages for the

and, in the background, a side view of the casting-cleaning department, with the fire walls extending above the roof, forming a tower in which are located the water tanks and the heating apparatus.

The operation of the entire plant is primarily dependent upon the power equipment. The engineers chose as the motive power direct current electricity. With the exception of several pneumatic, ground operated traveling cranes in the casting-cleaning department, all the machinery in the shop is driven electrically.

A 300 H. P. turbine, connected to two 100 K. W. Crocker-Wheeler generators, furnishes power for the entire plant at present. Multiple voltage for securing the desired speed regulation throughout the shops is obtained by the introduction of a type D, Crocker-Wheeler balancer set, consisting of three units—40, 80 and 120 volts—each of these voltages being controlled by three field regulators. The compactness of the outfit and the small space required for the electrical power machinery is apparent from the illustration of the power house, Fig. 3. The adoption of a turbine without a condenser was governed by several important factors, not the least of



Fig. 1.—General View of the Jeaneville Plant.

manufacture of the mine pump to which the company still devotes their exclusive attention. Dodge & Day, the modernizing engineers of Philadelphia, were commissioned to engineer the equipment. Ballinger & Perrot, architects, co-operated in construction of the buildings. Within a year from the signing of contracts the new plant was in full operation.

As might be expected of an up-to-date plant, reinforced concrete was the principal material of construction. The new buildings, Fig. 1, present a pleasing appearance.

The raw material is received on a railroad siding,

which is the low cost of the steam generated, due to the fact that coal in this locality is obtained at about 90 cents per ton.

In the engine room there is also a 12x18x12x12 Ingersoll-Sargeant class H air compressor supplying air to the traveling cranes in the casting-cleaning department, jib cranes in the foundry, and the various pneumatic tools. Between the engine and the boiler rooms are located the artesian well pump, the boiler feed pump, the vacuum pump, the feed water heater and a 1000-gallon underwriter's fire pump, which receives its supply from a 200,000-gallon

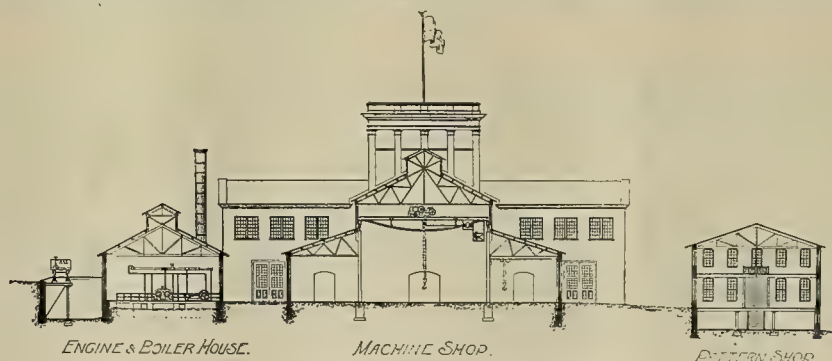


Fig. 2.—Cross-Section, Jeaneville Iron Works.

dumped into receiving bins and carried to the foundry over an industrial railway, then raised to the cupola platform by an electric elevator. The sequence of operations from that point to the loading of the finished product on cars which run directly into the machine shop is never interrupted.

The new plant consists of six buildings. The main building comprises the foundry, 107 feet by 192 feet, the casting-cleaning department, 41 feet by 160 feet, and the machine and erecting shop, 304 feet by 107 feet. In the latter are a room for small stores and a blacksmith shop. The other five buildings are the pattern shop, pattern storage house, offices, power house and stable.

Fig. 2 is a cross-section showing the machine shop, engine and boiler house, pattern shop, coal trestle,

reservoir.

The clinkers from the boilers are thrown on a grating over an elevator boot located in the boiler house and are broken to the proper size, dropped through the openings and into buckets of a steel-encased elevator, made by the Link Belt Engineering Co., whence they are carried to a cylindrical receiving bin of five tons capacity. They are dumped into trucks through a gate in the bottom of the bin and carted away.

Fig. 4 shows the interior of the foundry. On the left, immediately in the foreground, is a cylinder pit, 12 feet in diameter and 9 feet deep. The plunger pit, which forms a third of a circle (28 feet outside diameter and 20 feet inside, 4 feet wide and 6 feet deep), adjoins the cylinder pit. The weight pit is 13 feet 4



inches wide and 5 feet deep. These pits are served by individual jig cranes operated pneumatically. In the right hand bay are a cupola, four core ovens, the blower room, moulding department for small castings and sand bins and sifters.

The cupola is of twelve to fourteen tons melting capacity per hour. Another similar unit is now being installed. The charging platform is served by

At the north end of the shop is erecting space where, also, each pump is tested to far above its rated capacity before being shipped from the plant on the railroad cars, which come directly into this part of the shop.

Throughout the plant the same care has been given in the selection and installation of the minor apparatus as in the case of the largest machinery, and the entire plant may well be considered a fine example of what progressive policy, combined with intelligent shop engineering, can produce.

James C. Haydon still remains president of the company, Vernon H. Rood is vice-president and general manager, while R. O. Jones is chief engineer.

### Tin in Alaska.\*

Written for the MINING AND SCIENTIFIC PRESS by  
R. L. BEALS.

In Alaska, at the present time, considerable attention is being paid to the occurrence of tin. There are a large number of reported occurrences, but the majority of these are unauthenticated. In the Seward peninsula there are three known deposits, and enough has been done the past summer to warrant further development. The three occurrences referred to are near the western end of the peninsula, in that part called the York region by the United States Geological Survey, and are Cape Prince of Wales, Buck creek and Lost river.

grade level, they are of comparatively recent date, the valleys being of the characteristic V shape. The hills separating the various streams are oftentimes less than 300 feet high and the valleys are narrow—from 1000 to 3000 feet wide.

The country rock lying between the York mountains and Cape mountain is chiefly a dark slate, usually of fine texture. Jointage and cleavage have been so highly developed that the original bedding cannot be seen. The fragments frequently assume a nearly perfect rhombohedral form and have been called the rhombohedral slates, because of this. These slates are traversed by a number of greenstone and quartz-porphry dikes. The greenstone dikes, in most instances, have been altered to serpentine. The quartz-porphry dikes may be traced along the summit of Potato mountain and have been prospected in a desultory way for tin, but so far nothing satisfactory has been found. Westward of the slates is a limestone area. This limestone is rather impure, containing considerable silica. Intrusive in it is a boss of granite which makes up the promontory of Cape Prince of Wales.

Of the three districts, that of Buck Creek is the only one which has so far produced tin commercially. The creek is about 4 miles long, heading at the base of Potato mountain and flowing into Grouse creek. For the first 3 miles it receives numerous small tributaries, most of them called "pups," a term well describing their size. Cassiterite is found from the head to the mouth of the creek in quantity, and in the tributaries flowing to it from Potato mountain. The pay tin occurs in the creek bed and flood plain deposits, from the surface down. Cassiterite is also found on the hills at the head and flanks of the creek.

This tin shows no evidence of water action, having been freed from the rocks by weathering. Creeks flowing to the Arctic from the hills about Potato mountain also give prospects for cassiterite, as do the hills themselves.

As has been said, the ore found on the hills and in the upper stream valleys shows little trace of water action—that on the hills none; only in the larger creeks, near their mouths, is it noticeable, and here the fragments are subangular rather than rounded. Nuggets have been found enclosing quartz and slate. A number of specimens showing cassiterite containing slate were found. Though no ore has been found in place in this slate area, and that is chiefly due to the extremely weathered condition of the rocks, it seems most probable that the ore occurred as small veins or vugs scattered through the greater part of this slate area. As the creeks heading in Potato mountain and the hills trending westward from it contain tin, while those to the east fail to do so, it would seem that these hills mark the line of weakness along which mineralization took place.

On Buck creek this summer mining was carried on in two places and considerable tin recovered. The ground was handled with horses and scrapers. The sluice boxes were fitted with deep iron riffles which proved very successful. (See engravings front page.) In the previous work on the creek pole riffles were used; made of wood they wore out quickly and took up a large part of the room in the box.

The ore found on these creeks is of exceptional purity. Concentrates from the sluice boxes, after rewashing, ran 67% to 63% tin and the impurities present are not harmful, being iron and silica—the silica in such small quantities as to cause no trouble in smelting. Wulfenite and the metals usually associated with tin have not been observed so far.

In the Cape Prince of Wales district considerable float tin has been found on Cape mountain, especially on the southeast side near the contact of the granite and limestone. The specimens of float show large crystals of cassiterite in a granite matrix. A number of parties are prospecting the mountain by means of cuts and drifts to locate the source of the float. One party is using a gasoline motor to develop power to run two electric drills. The drifts are in the granite near its contact with the limestone. The works at the time of the writer's visit was in an elementary stage and no systematic sampling and assaying had been done. Some stringers of cassiterite have been found running east and west—at right angles to the cut. The tin so far found as float and



Fig. 3.—General View of Power House, Showing Turbine.



Fig. 4.—General View of Foundry.



Fig. 5.—General View of Casting Cleaning Department.



Fig. 6.—General View of Machine Shop.

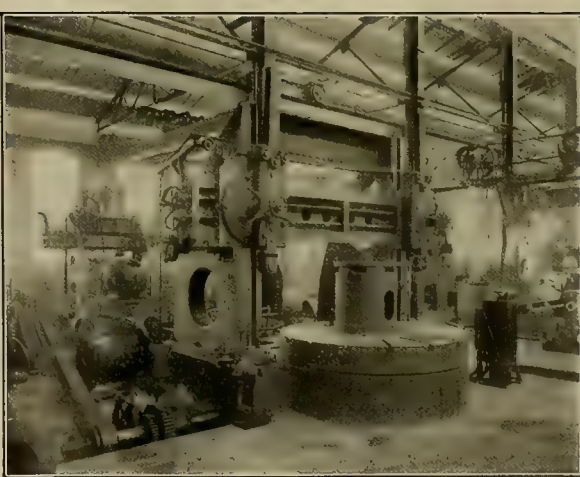


Fig. 7.—Boring Mill Equipped With Individual Motor Drive.

a two-ton electrically driven elevator, provided with automatic stops at the top and bottom of the lift. There are two worm ladles of 8000 and 10,000 pounds capacity, respectively, with numerous smaller ladles. Due provision has been made for rapid economic handling of materials and ladles throughout the foundry.

Fig. 4 shows the casting-cleaning department, which is served by two 10-ton floor-operated pneumatic traveling cranes running its full length.

Fig. 5 gives a good idea of the interior arrangement and layout of the machine shop, the absence of shafting, belts and other overhead obstructions being in marked contrast to the old-time shop. A generous area of glass in the windows and roof affords a uniform distribution of natural light. The floors are entirely unobstructed by anything that will interfere with the free use of the valuable floor space. A typical example of the method of driving the larger machine tools by an individual motor is the boring mill shown in Fig. 6.

In the reports of the United States Geological Survey on this region, not enough stress is laid on the extreme flatness of the country. The York plateau is low and the streams cutting it have very light grades, seldom over 1 foot in 100 feet and often much less. The York mountains, a chain of low, steep hills, rise abruptly at the south end of the plateau and are separated from each other by low divides. The streams heading in them are broad and shallow, have very little grade and at their heads in the foot of the mountains are practically dry. The streams heading in the hills about Potato mountain, at the other end of the plateau, have a slightly better grade, otherwise they have the same characteristics. Creeks leading from Potato mountain north to the Arctic ocean are mere gullies occupying gentle depressions in hills and carry little water; their beds in many cases are only a few feet wide. Notwithstanding the fact that most of the streams have reached

\*See illustrations on front page.



that from the drifts differs from the Buck-creek tin in being less pure—considerable wulfamite being found in many of the specimens. Work at this place is to be prosecuted during the winter and the hope is that by the opening of navigation in the spring a workable body of ore will have been found. The deposit is near the sea and during the open season is readily accessible.

### Cyanide Method of Assaying Low-Grade Copper Ores.\*

Written by J. W. Howson.

Copper occurs in the United States distributed over a large area and in many forms. Although there are but five or six important centers of production, the working of ores on a small scale is carried on in many separate localities. These ores as they are handled are almost uniformly of low grade. So, whether he be an assayer in a large smelter or mine, or a chemist handling the ores of one of the small producing regions, the analyst will find that he often has on hand a large number of samples running low in copper, say, 5% and under. Not only is the chemist expected to develop considerable speed at this work, but he is also expected to attain a high degree of accuracy, duplicates being required to practically equal each other. For these reasons the writer believes that any aids to the perfecting of the determination of copper will be welcomed.

The methods chiefly used for analysis of ores of this character are:

1. The cyanide method, using a large amount of the sample for analysis.
2. The colorimetric method.
3. The electrolytic method.

In the cyanide method the amount of the sample used—two to ten grams—varies with the richness of the ore. In accuracy it leaves little to be desired, but in ores with a large amount of gangue the time required for the complete precipitation of the copper on aluminum is often too long for rapid work. This is commonly due to the large amount of iron present, which has all been oxidized during the solution of the ore by nitric acid, and which must all be reduced by the aluminum before the precipitation of the copper can commence. To allow of the rapid reduction of iron, it is very necessary, therefore, that all nitric acid be completely expelled with an excess of sulphuric acid. When there is a large amount of gangue present, or much calcium salts, this can not be accomplished except by prolonged heating, which is accompanied by the danger of loss of solution by "spitting."

In the cyanide method as used by the author, except on ores running under 0.25%, one or two grams only of the ore are used. Instead of varying the amount of sample used, the bulk of the solution in the titration is varied according to the richness of the ore. In addition to eliminating the danger and annoyance of excessive gangue and iron, this method presents the additional advantage that the analyst does not need to know the approximate richness of the ore before proceeding with the analysis.

Taking one or two grams of the sample, the analysis is proceeded with in the usual way, treating the ore with nitric, hydrochloric and sulphuric acids, and evaporating the ore to copious fumes of sulphuric acid. Remove from the heat and allow to cool slightly and add cold water, which will on contact with the sulphuric acid cause sufficient heat and ebullition to dissolve the soluble salts. Filter, wash and precipitate the copper on aluminum foil until the iron is all reduced and the solution colorless and foaming. Continue the heating for fifteen to twenty minutes longer. This is important in order to throw down the last few hundredths of a milligram or so of copper, neglect of which will often cause an error of several hundredths of a percent.

Filter off the precipitated copper, wash it well from all aluminum and iron salts in solution, and dissolve it in 2½ cubic centimeters of concentrated C. P. nitric acid, quite accurately delivered from a burette. Send the solution diluted with a little water through the filter paper and wash the latter several times with a small amount of water. Boil off the nitrous fumes, cool, and add from a burette 5 cubic centimeters C. C. ammonia. The bulk of the solution will now be about 25 cubic centimeters. If it is not, dilute up to that amount. For ores under 1% proceed cautiously but steadily to add the cyanide solution from a burette until the blue color has entirely disappeared. If the amount of cyanide solution being consumed indicates that the ore is running over 1%, dilute the solution according to the following ratio:

- 30 c.c. of solution for a 2% ore.
- 40 c.c. of solution for a 3% ore.
- 50 c.c. of solution for a 4% ore.
- 60 c.c. of solution for a 5% ore.
- 75 c.c. of solution for a 6% ore.
- 100 c.c. of solution for a 7% ore.

With practice this becomes a quick and easy operation, the analyst telling at a glance the proper degree of dilution. It must be borne in mind that to secure good results strict attention should be paid to the complete expulsion of the nitric acid used to get the ore in solution, to the complete precipitation of the copper on aluminum foil, and the addition of the

proper amounts of nitric acid and ammonia preparatory to the titration. Otherwise there may be a considerable discrepancy in results. This method has been tested hundreds of times with duplicates seldom differing more than one-tenth of 1% on the higher grades mentioned. The results also agree with the work of other chemists, and with each other as shown by the following table:

Sample No.	Modified Cyanide Method.	Cyanide Method Using 5-10 Gms.	Colorimetric Method.	Electrolytic.
A	2.73% 2.74%	.....	.....	2.70
B	0.45% 0.53%	.....	0.35	.....
C	1.68% 1.65%	.....	1.62	.....
D	0.67% 0.65%	0.66 0.65	.....	.....
E	0.99% 0.97%	0.98 0.97	.....	.....
F	3.57% .....	3.53 3.52	.....	.....

In working with a large number of samples, results by this method can be obtained at an average speed of from twelve to fifteen minutes per analysis.

For ores running under 0.25% take from 5 to 10 grams of the sample and proceed as above, paying special attention to the expulsion of the nitric acid with sulphuric acid and to the complete precipitation of the copper. Duplicates should agree within 0.01%. Following this method through on two low-grade samples, there were obtained the following results:

Sample G	Using 10 grams of ore, gave 0.142%.
	Using 5 grams of ore, gave 0.143%.
Sample H	Using 10 grams of ore, gave 0.168%.
	Using 5 grams of ore, gave 0.151%.

In standardizing any amount of copper may be used provided that the solution is made up to the proper volume of titration. In general it is found best to standardize with 0.20 gram of copper.

### Silver in Sandstone, Shale and Coal at Silver Reef, Utah.

TO THE EDITOR:—The foundation to this article was given the writer by J. Barbee, superintendent of the Barbee & Walker mine from 1876 to 1882.

This discovery of silver in calcareous sandstone at Silver Reef was made by W. Barbee, and is, I believe, the first of record of such occurrence. Its occurrence here was in the form of native silver and silver chloride. As explained to the writer, it would seem to have been in an anticlinal fold, with the apex cut away by erosion. The sandstone had been capped by an eruptive, most of which had been removed by erosion, leaving only small amounts in isolated patches.

The white sandstone stratum, about 70 feet thick, called the Tecumsee reef, was the one worked, the ore occurring in this in shoots, with a trend to the northwest and strike of reef almost east and west.

The thickness of the ore bodies sometimes reached 30 feet and the cropping of our shoot was about 900 feet long. After following this back 1000 feet they were but 12 feet from the surface. Beyond this the dip became about 35° from the horizontal. Sometimes in the ore would be found petrified trees. The heart of all these trees was rich in horn silver, in some instances almost solid and 2.5 inches in diameter. The small seams were also rich in silver.

Vertical faulting had occurred. In one instance

the down throw was about 125 feet. In all cases a streak of red clay showed the direction of throw, so that it was an easy matter to pick up the shoot. The values were deposited before the faulting took place.

In some places were boulders of red clay, called by the miners "red soap," 6 to 8 feet in diameter and carrying silver values of four to five ounces per ton. In the center of the boulder would be found a mass of several hundred pounds called "green soap," carrying values as high as 500 ounces silver per ton. No gold values at all appeared, though sometimes 5% copper would be present.

In one instance the trunk of a tree was found changed to coal. Three thousand pounds of this coal were shipped to Salt Lake and netted \$1100 silver at \$1.09 per ounce. Small seams of coal occurred at times about 1 inch thick, 2 feet long and several inches wide, always rich in silver. This coal was of a good blacksmith grade. The coal was not milled on account of the oil it contained, causing the loss of too much silver by flouring and sickening the mercury. No fossils were ever found in this reef so far as reported to the writer.

Some wood haulers had made a road across this reef between two large rocks. At this point had always been a mud hole of a black sticky substance. One day W. Barbee noticed it, took a sample and had it assayed, then shipped ten tons by wagon 24 miles to Salt Lake. This ten tons netted him \$7800 in silver.

The cropping of this reef made a fine building stone. Barbee built a house of it and later the house was torn down and milled, returning 32 ounces silver per ton.

Method of treatment was by crusher and stamps, followed by pan amalgamation, which gave a saving of 95%.

Seven hundred and fifty stamps dropping 100 times per minute gave an average of eight tons per stamp through a 30-mesh screen. This high stamp duty was caused by the cementing material being calcite, while the quartz grains were about 30-mesh in size.

About one and one-half pound of salt and one pound of copper sulphate was added to each ton of ore treated. The amount of mercury was governed by the assay value of the ore. The loss of quicksilver was about one pound per ton of ore treated.

This reef crops for about 30 miles, but in so far as the writer is aware, payable ore has been found only in the vicinity of Silver Reef.

At this point there is a record production of \$12,000,000, but of late years very little has been done.

Values in coal are reported from the Cambria coal field of Wyoming of from 1 to 2 pennyweight in gold, supposed to be in the iron pyrite. Also from South Africa in small seams of coal in the quartzite, quite rich in gold in places. Also in a vein of coal 2½ feet thick in Colorado in the Sangre de Cristo mountains, said to carry 10% copper with some gold—in this last instance the writer will "have to be shown." This may not be impossible, but seems highly improbable, for such a large amount of high-grade copper to exist in coal at the location claimed. There is no doubt but a great deal of coal has been burned that has had good metallic values, but to undertake to make it of value commercially would more than likely result in failure.

W. E. THORNE.  
Denver, Colo., Nov. 27.

### Electrical Machinery Wanted.

<p>MINES</p> <p>CHANCELLOR AND INDIANA GROUPS</p> <p>31 CLAIMS 620 ACRES</p>	<p>INCORPORATED UNDER THE LAWS OF WASHINGTON</p> <p><b>Chancellor Gold Mining Co.</b></p> <p>CHICAGO OFFICE Suite 943 Monadnock Bldg.</p> <p>TELEPHONE HARRISON 732</p> <p>Mines at SLATE CREEK, WHATCOM CO., WASH.</p>	<p>WILLIS E. CRANE President</p> <p>C. H. BALLARD, M.E. 1st Vice President</p> <p>DR. E. P. RICE 2nd Vice President</p> <p>O. B. BROWN, Sec'y and Treasurer</p> <p>JAMES CADY Manager</p>
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Chicago, Ill., Dec. 5, 1904.

Mining and Scientific Press,  
San Francisco, Calif.

Gentlemen:—

Can you give us the names and addresses of any one on the Pacific Coast who manufactures electrical machinery? By this we mean a plant for generating two to five hundred horse power, and convey same ten to twelve miles. We want to do business with a company that can furnish everything complete for a plant of this kind, and if there are any on the coast, will appreciate the matter very much if you will put us in touch with them.

Very truly yours,

CHANCELLOR GOLD MINING CO.

O. B. Brown, Sec. and Treas.



Cyanide Practice at the Maitland Properties, South Dakota.\*

Written by JOHN GROSS.

INTRODUCTORY.—The group of claims, comprising over 1100 acres, located at Maitland (formerly known as Garden City), in the Ida Gray mining district, Lawrence county, South Dakota, are now being developed and operated by Alexander Maitland, the owner.

Prior to the acquisition of this property two years ago (in 1902) by Mr. Maitland but little work had been done in this district, and little was known of the extent of the ore deposits. Recent development, however, has opened up some very promising ore.

The ores so far encountered are the so-called "siliceous ores," occurring in the flat formation which lies immediately above the Cambrian quartzite, which dips at this locality about 12° N. E. Both oxidized and blue ores are found, and the latter have proven particularly refractory to treat. No prospecting in the underlying slates of the Archean has so far been

the sands, and to treat the slimes by agitation and decantation.

Table I, containing the variations of analyses of these ores, gives a fair idea of their general character:

TABLE I.—ANALYSES OF MAITLAND ORES.

Oxidized Ore From General Mill Samples.	Blue Ores.	High-Grade Ores, Both Oxidized and Blue, Mainly the Latter.	
	Per Cent.	Per Cent.	Per Cent.
SiO <sub>2</sub> .....	70.00 to 80.00	65.00 to 80.00	70.00 to 80.00
Fe .....	10.00 to 12.00	7.00 to 15.00	8.00 to 15.00
S .....	0.50 to 2.00	5.00 to 12.00	2.00 to 12.00
As .....	none to 0.30	0.50 to 2.00	trace to 0.30
Sb .....	trace	trace	trace
Te .....	trace	trace	trace
Cu .....	trace to 0.02	trace to 0.02	trace to 0.02
Zn .....	none	none	trace
Mn .....	trace to 1.00	trace to 0.50	trace to 1.00
Al <sub>2</sub> O <sub>3</sub> .....	2.00 to 5.00	2.00 to 6.00	1.00 to 2.00
CaO .....	2.00 to 4.00	1.50 to 3.00	0.50 to 1.00
MgO .....	0.40 to 2.00	trace to 0.50	trace to 0.50
Ounces per Ton	Ounces per Ton	Ounces per Ton	Ounces per Ton.
Au .....	0.30 to 0.60	0.50 to 0.90	1.00 to 3.00
Ag .....	0.50 to 2.00	0.50 to 6.00	0.50 to 2.00

The ore, trammed from the shaft, 330 feet east of

able temperature, and during the coldest weather of last winter, with an outside temperature of 0° F., the temperature of the interior of the mill was from 54° to 62° F.

The water for the mill and boilers is obtained entirely from the mine workings, and is stored in a 50,000-gallon tank on the hill back of the mill.

MILL PRACTICE.—A ground plan of the mill building is shown in Fig. 2 and a cross-section through the center of the mill in Fig. 1. A legend of the metallurgical treatment at the mill is given in Fig. 3, which shows the passage of ore and solutions throughout the entire treatment.

The statistical data given in this paper are based on a daily tonnage of from 110 to 120 tons, which is the rate of treatment now maintained.

CRUSHING THE ORE.—The ore as it comes from the mine, carrying an average of 8% moisture, is delivered to the crusher bin of 150 tons capacity. The crusher bin has a flat bottom, and is 22 feet long, 10 feet wide and 12.5 feet deep; the inside is lined with double planking, and is protected at the points most exposed to wear by 0.25-inch steel plates. Upon the assumption that the ore will form its own slope, the idea of using a rectangularly shaped bin, in place of one having a bottom sloping to the discharge, seems, at first glance, to be economical, but this form is not as practicable as the 45° sloping bin, which practically discharges the ore cleanly. It is true that wet ore forms its own slope, but this slope is so steep that the working capacity of the bin is reduced to a very low point of efficiency. The ore for the breaker is passed directly from the bin to the breaker, no grizzly being intermediate; it is contemplated, how-

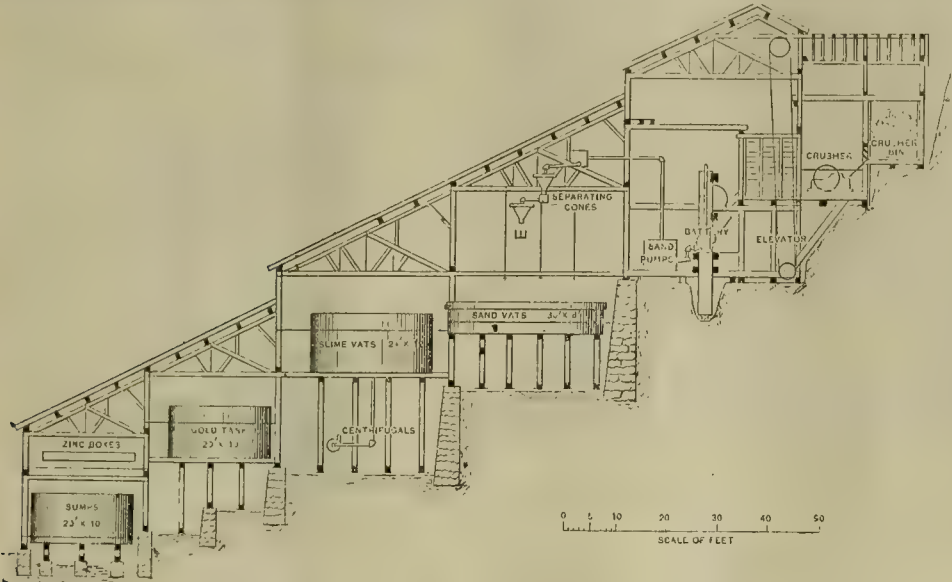


Fig. 1. Sectional View Maitland Mill, South Dakota.

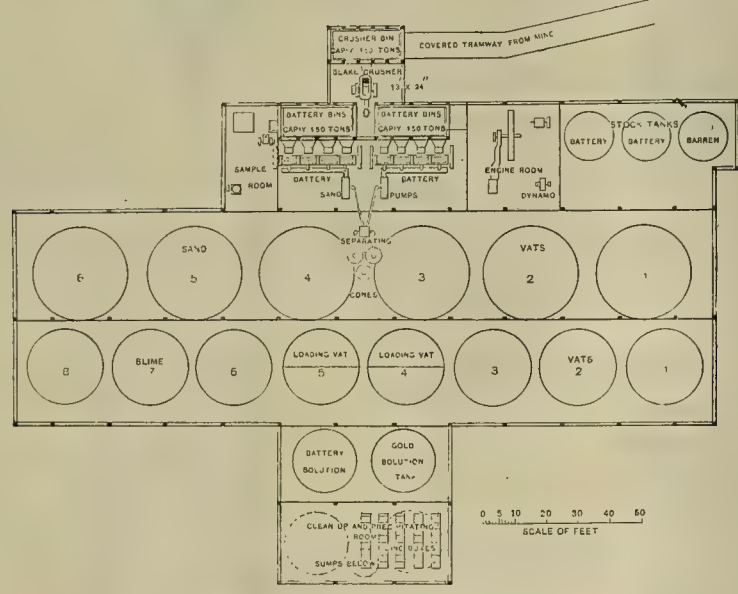


Fig. 2. Ground Plan Maitland Mill, South Dakota.

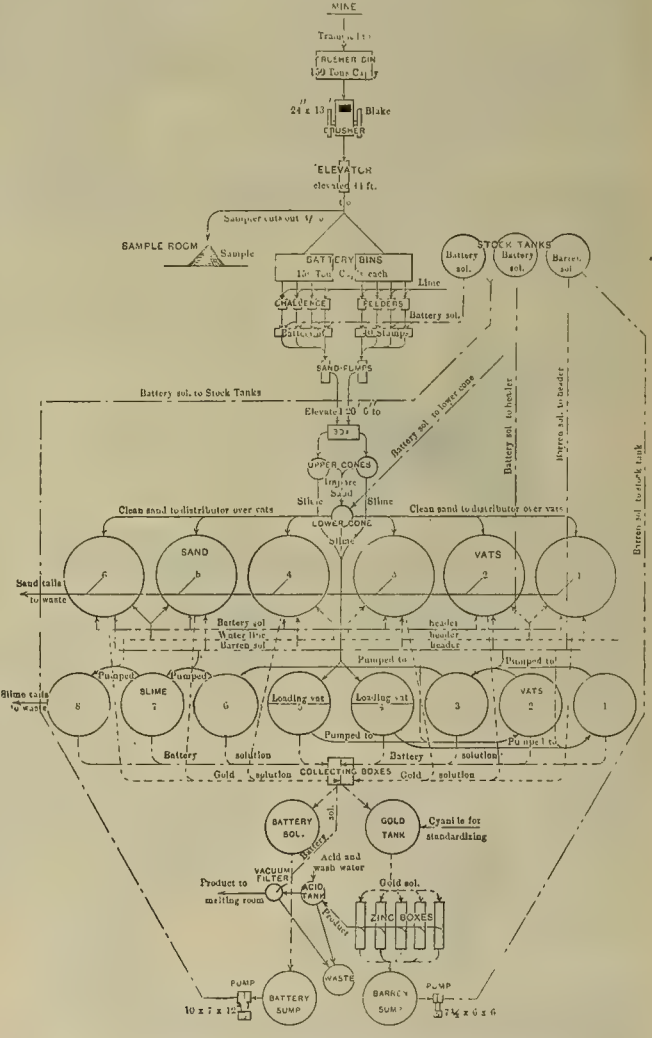


Fig. 3. Scheme of Treatment Maitland Mill, South Dakota.

attempted; but this work is one of the future considerations in the development of the property.

Small quantities of blue ores are unavoidably sent to the mill, but special care is taken to send only the oxidized ores for cyanide treatment. The ores, being close-grained and hard, have given considerable trouble in their treatment. Pyrrhotite and iron pyrite exist in about equal proportions; arsenic, copper, and traces of antimony and tellurium are found, and considerable quantities of bismuth have been found in the zinc-box precipitates. The silver in the low-grade ores is slightly greater than the gold, while in the high-grade ores the reverse is generally true.

Early in 1902, the building of a 40-stamp wet-crushing cyanide mill was begun, and it was finally placed in commission by January 1, 1903. The treatment, briefly, was to crush the ores in a cyanide solution, to separate the sands and slimes, to leach

the mill, through a covered tramway, is delivered to the crusher bin: hoisting being done only during the day shift, six days a week, which gives sufficient supply of ore to keep the mill running steadily.

The boilers are near the hoist, and the steam is carried to the mill through a 6-inch covered pipe passing through the tramway.

Convenient to, and connected with, the mine and the mill, by tram track, are a blacksmith shop and machine shop, the former containing two forges and trip hammer, and the latter a 20-foot lathe, a 31-inch drill press, a planer and a pipe-cutting machine.

The melting room is apart from the mill, and is situated near the office, thereby obviating the necessity of having any fires in the mill. The heating in the winter is done by a series of 8-inch galvanized iron pipes, in all about 1500 feet long, which take the exhaust steam from the mill engine, and causes practically no back pressure on the engine. Sufficient heat is obtained to keep the building at a comfort-

ever, to install a grizzly, not only to shorten the actual running time of the breaker, but as a beneficial aid in breaking very wet ores.

The breaker is a 24x13-inch Blake, running at 260 revolutions per minute, and set to break to a size that will pass through a 1.5-inch to 2-inch ring. The average time of running is seven hours per day, which gives a capacity of from sixteen to seventeen tons per hour. A set of jaw plates in the breaker lasted fifteen months, during which time 41,000 tons of ore were broken.

The crushed ore is passed through iron-lined chutes, inclined 45°, to the elevator boot, and is elevated 44 feet for delivery to the battery bins. In the original mill a bucket elevator of the continuous type, traveling 100 feet per minute, was provided; but was soon discarded after handling 9300 tons of ore, for the reason that the links wore out and caused it to fall into the pit on several occasions. A 14-inch, 8-ply rubber belt is now used, traveling 350

\*Abstract Trans. A. I. M. E.



feet per minute; and, in order to lengthen its life, it is reinforced between the buckets with old pieces of belt which take the roughest wear. One belt has so far been worn out after having handled 16,965 tons of ore at a cost of 0.91 cent per ton. The first rubber belt elevator received extremely hard usage during the first few months of its service; the second one, now in place, has handled a larger tonnage and is still in good condition.

The 12-inch buckets are spaced 18 inches apart on the belt. No. 10 sheet-steel buckets were first used and handled 16,965 tons of ore at a cost of 0.45 cent per ton. Malleable iron buckets proved too light for the work and handled 8080 tons of ore at a cost of 0.76 cent per ton. No. 6 sheet-steel buckets are now used, and the tendency is to use still heavier ones.

The stream of ore, in falling from the elevator head to the battery bins, is cut by an automatic sampler, consisting of two light endless-link belts carrying several buckets suspended between them; the chains, which travel at the rate of 100 feet per minute, cause one of the buckets to pass through the falling stream of ore every thirty seconds, cutting the full width of the stream and taking 2% of the ore as the sample and delivering it to the sample room, where it is cut down and quartered in the usual manner. The sample buckets are 5 inches wide, 14 inches across and 6 inches deep, and are ample for a capacity of twenty-five tons per hour. This sampling arrangement has proven satisfactory and reliable.

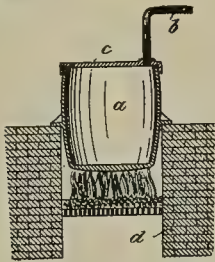
(TO BE CONTINUED.)

## Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 29, 1904.

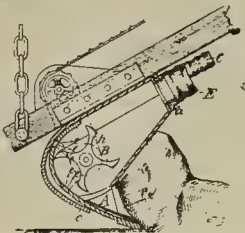
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

PROCESS OF MAKING METALLIC CYANIDES.—No. 775,953; M. Voigt, Charlottenburg, and A. R. Frank, Berlin, Germany.



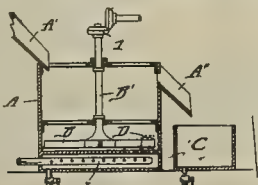
Process for obtaining metallic cyanides which consists in dissolving cyanamide from metallic cyanamides, separating solution from sediment, formed in dissolution of cyanamide, separating cyanamide from solution and heating separated cyanamide up to melting point in presence of inorganic substances containing base whose cyanide it is desired to produce.

DREDGING APPARATUS.—No. 776,049; O. Fruhling, Brunswick, Germany.



In dredging apparatus, combination of hollow head or drag provided with cutting or digging means and inlet or mouth through which material to be dredged enters head, walls of head forming exterior pocket in which material is initially received, shape of such pocket causing material therein to close mouth of drag and prevent passage of water therethrough as drag is drawn forward, means for disintegrating material forced into interior of drag from pocket, through mouth, as drag is moved forward, and means for removing such material from drag.

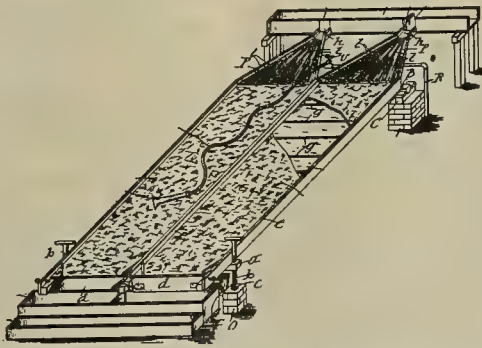
PROCESS OF SEPARATING METALS FROM SULPHIDE ORES.—No. 776,145; C. V. Potter, Balaclava, Victoria, Australia.



Herein described process of separating metals

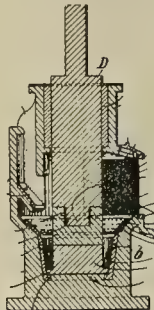
from pulverized sulphide ores which consists in adding to same acid solution which is non-solvent of precious metals, then applying heat to same, and removing sulphides from surface of solution.

CONCENTRATOR.—No. 776,189; F. T. Le Strange, Syracuse, N. Y.



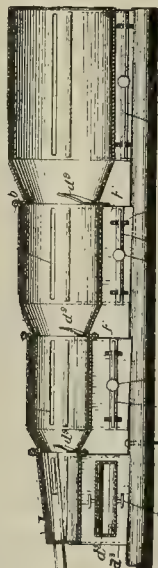
Concentrator comprising front and rear foundations, plates mounted on rear foundation, inclined concentrating table provided under its elevated end with transverse bolster having convex bottom seated in correspondingly shaped recesses in plates, metallic sockets mounted on front foundation, crossbar secured to under side of lower end of table and provided with screw threaded vertical holes, screws passing through holes and stepped in sockets and operative for adjusting table to different degrees of inclination, top of table provided with vents of escape of water, cloth cover spread over top, supply sluice extending along upper end of table, conductor leading from sluice to upper end of table and of gradually increasing width and entirely open across its wider end, main slime distributors and auxiliary slime distributors fastened to conductor, means controlling discharge from supply sluice to conductor, universally movable flushing device, concentrate box and waste sluice under lower end of table, and gate connected adjustably to end of table to communicate with either box or latter sluice.

ORE STAMP MILL.—No. 776,414; P. N. Nissen, Prescott, Ariz.



In ore stamp mill, combination of mortar, provided with anvil projecting upwardly from bottom thereof, removable interior lining therein having horizontal upwardly projecting flange surrounding anvil, and removable die within mortar resting upon anvil and overlapping horizontal flange of lining whereby lining is held in position.

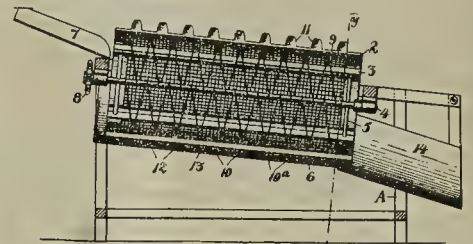
ORE CONCENTRATOR.—No. 775,944; A. H. Stebbins, Little Rock, Ark.



In ore concentrator, combination of series of cylindrical chambers varying in size from end to end of series and each having at one end reduced connecting portion joined to larger end of next preceding chamber, means for introducing spiral or gyratory air currents into first of series of chambers,

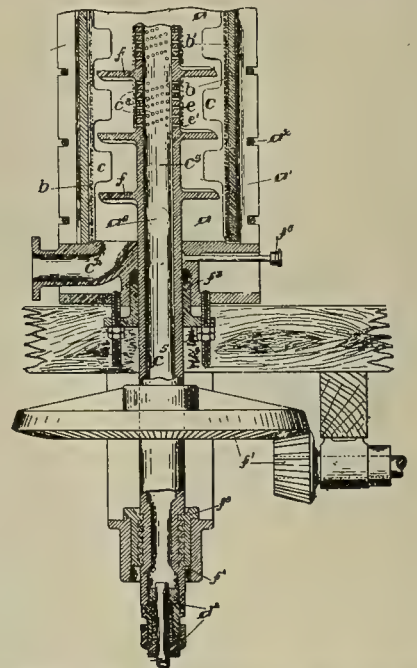
discharge opening in wall of each of chambers and separate tangential inlet for each of cylindrical chambers.

GOLD SAVING APPARATUS.—No. 776,113; H. O. Clark, San Francisco, Cal.



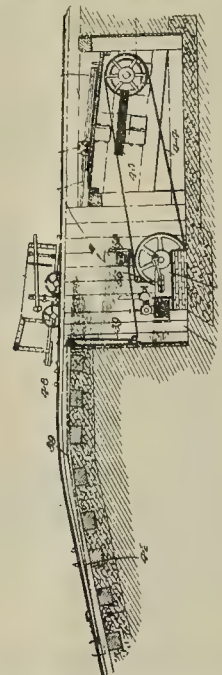
In gold washer, combination of revoluble, foraminous cylinder; trough below cylinder and provided with parallel riffles arranged concentric with cylinder, and scrapers on cylinder each operating in one of spaces between adjacent mercury containing riffles and adapted to remove material from space for advancement to succeeding mercury containing riffle.

PRESSURE FILTER FOR SLIMES.—No. 776,084; W. A. Pritchard, Kalgoorlie, Western Australia, Australia.



In pressure filter, combination with receiving chamber having inlet for slimes in bottom, exits for filtrate solutions, outlet for undissolved residue, and filtering medium interposed between slime inlet and exits, of baffle blades longitudinally disposed in cylinder, and plurality of propeller blades acting in conjunction with baffle blades, for purpose specified.

SAFETY DEVICE FOR CABLE MINE HAULS.—No. 776,083; A. Palmros, Fairmont, W. Va.



In cable mine haul, combination with cable-driving mechanism having clutch, of buffer removably positioned in path of car and means connecting buffer and clutch operative only by impact upon buffer.



# Mining Summary.

SPECIALY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

The Oceanic M. Co. at Sumdum, W. Gans manager, has closed for the winter. They worked fourteen men throughout the summer, keeping the 5-stamp mill at work.

F. Cook & Co. have been developing the Devil Club lode at Echo Harbor.

T. Smith and others have completed the assessment work on the Rex group in Yankee basin. A 15-foot tunnel was run on the Rex ledge, showing a 4-foot vein of ore.

Work has begun at the Treadwell mines to connect all of the underground workings from the Ready Bullion to the old Treadwell.

A 10-stamp mill has been delivered at Eagle river for the Eagle River M. Co. by the Risdon Iron Works, San Francisco, Cal.

The following list of mining incorporations and agents in Alaska has been compiled by the Record Miner of Juneau: Alaska-Juneau G. M. Co.—Mines in Silver Bow basin; J. MacDonald, Treadwell. Alaska Development Co. (oil).—Mines at Kayak; W. R. Johnson, Chilkat Point. Alaska United G. M. Co.—Mines on Douglas Island; J. MacDonald, Treadwell. Alaska-Mexican G. M. Co.—Mines on Douglas Island; J. MacDonald, Treadwell. Alaska-Treadwell G. M. Co.—Mines on Douglas Island; J. MacDonald, Treadwell. Alaska G. M. Co.—Mines on Berners bay; B. M. Behrends, Juneau. Alaska-Snettisham G. M. Co.—Mines at Snettisham; J. N. Tisdale, Snettisham. Alaska Copper Co.—Mines at Copper river; S. Birch, Valdez. Alaska-Empire M. Co.—Mines on Unga island; F. R. Brown, Unga. Alaska-Atlin M. Co.—Mines in Atlin district; A. S. Lovett, Juneau. Alaska-Perseverance M. Co.—Mines at Silver Bow basin; C. H. Pierce, Juneau. Alaska Gold Mines Corporation.—Mines at Windham bay; Z. P. Burnhart, Sumdum. Alaska Gold Miners' Development & Guarantee Co.—W. W. Boughton, Skagway. Alaska-Washington G. M. Co. of Juneau.—Property at Yankee cove; H. R. Shepard, Juneau. Alaska Con. G. M. Co.—Controlling Douglas island properties; T. S. Nowell, Juneau. American G. M. Co.—Controlling Sheep creek and Silver Bow basin properties; T. S. Nowell, Juneau. Apollo Con. M. Co.—Mines on Unga island; F. R. Brown, Unga. A. B. W. M. Co.—Mines on Prince of Wales island; R. Allison, Ketchikan. Alma Con. M. & Dev. Co.—Mines at Dolomi; C. E. Buttrick, Dolomi. Auk M. Co.—Mines on Douglas island; C. E. Summers, Juneau. Boston Group M. Co.—Property near Juneau; A. S. Lovett, Juneau. Bessie G. M. Co.—Mines at Yankee cove; P. S. Early, Douglas. Brown-Alaska Co.—Property at Prince of Wales island; S. I. Silverman, Hollis. Berners Bay M. & M. Co.—Controlling the Kensington, Seward and Ophir group of mines at Berners bay; T. S. Nowell. Chittyna Exploration Co.—Property on Kuskalino river and Lorin; J. J. Rogers, Skagway. Chisna M. & Imp. Co.—Property at Chisna river; J. G. Heid, Juneau. Choumagin M. Co.—Property on Unga island; F. R. Brown, Unga. Cook Inlet Coal Fields Co.—Property at Cook inlet; A. Ray, Homer. Coronation M. Co.—Property at Coronation island; T. Donohue, Valdez. California-Alaska G. M. Co.—Property at Windham bay; J. F. Stewart, Windham Bay. Delaroff M. Co.—Property at Unga island; F. R. Brown, Unga. Detroit-Alaska G. M. Co.—Property at Windfall; J. A. Mays, Juneau. Eagle River M. Co.—Property at Eagle river; C. D. Mallory, Juneau. Elephant's Nose M. Co.—Property near Wrangell; G. Clark, Wrangell. Ebner G. M. Co.—Property in Silver Bow basin; W. M. Bibner, Juneau. Funtar Bay M. Co.—Property at Funtar bay; J. H. Fox, Juneau. Golden Fleece M. Co.—Property on Prince of Wales island; F. N. Chapman, Dolomi. Golden Coin M. Co.—Property near Ketchikan; J. W. Darling, Ketchikan. Greek Boys M. Co.—Property at Berners bay; C. H. Pierce, Juneau. Grindall M. & S. Co.—Property on Prince of Wales island; A. M. Butterfield, Sitka. Golden River M. Co.—Property at Windham bay; J. R. Winn, Juneau. Hilda M. Co.—Property near Ketchikan; C. H. Galbreath, Ketchikan. Helvetia G. M. & M. Co.—Property at Windham bay; J. R. Winn, Juneau. Jualin M. Co.—Property at Berners bay; B. M. Behrends, Juneau. International Con. M. & Brokerage Co.—Property on Prince of Wales island; C. E. Ingersoll, Ketchikan. Jualpa Co.—Property at Silver Bow basin; J. R. Winn, Juneau. Ketchikan Copper M. Co.—Property at Prince of Wales island;

J. R. Heckman, Ketchikan. Kasaan Bay M. Co.—Property at Kasaan bay; L. A. Babcock, Kasaan. Ketchikan G. M. Co.—Property near Ketchikan; J. H. Gilmore, Ketchikan. Khayyam Copper Co.—Property, Scowl Arm, Prince of Wales island; J. R. Heckman, Ketchikan. Lemon Creek Co.—Property on Lemon creek, near Juneau; J. R. Winn, Juneau. Laskawonda G. & C. Co.—Property at Ketchikan; C. E. Ingersoll, Ketchikan. Meilen M. & M. Co.—Prince of Wales island; G. Skeavington, Juneau. Monte Cristo G. M. Co.—Property on Baranof island; N. K. Foster, Sitka. Mongollon Exploration Co.—At Nome and Port Clarence; J. W. Griffin and S. B. Howard, Nome. Minnesota M. Co.—Property near Ketchikan; J. S. Bagg, Ketchikan. Mansfield G. M. Co.—Property on McGinnis creek, near Juneau; W. Jarrett, Juneau. Norton Sound Placer M. Co.—Property near Nome; R. F. Lewis, Juneau. Nugget Bar M. Co.—Property on Porcupine; C. G. Lewis, Haines. New York-Alaska Dev. Co.—Property near Hollis; S. I. Silverman, Ketchikan. Nowell M. & M. Co.—Controlling the Johnson mines at Berners bay; T. S. Nowell, Juneau. Northern Homestake M. Co.—Nevada creek, Douglas island; A. S. Lovett, Juneau. Olympic M. Co.—Property at Woodsy; J. R. Winn, Juneau. Pacific Lithograph Marble & M. Co.—Property, Mendenhall, Glacier Creek basin; J. B. Preiss, Juneau. Providence & Sitka M. Co.—Property near Sitka; C. O. Smith, Sitka. Pioneer Coal & M. Co. of Alaska.—Property at Coal Harbor, Unga island; H. S. Tibby, Coal Harbor. Roseland & Deer Park M. Co.—Property on Gravina island; I. I. Frohmann, Wrangell. Resurrection Creek-Alaska M. Co.—Property on Resurrection creek; G. W. Paswater, Hope. Russian-American M. & Exp. Co.—Property at Golovin and Omilak; H. W. Mellen, Juneau. Sitka Con. M. Co.—Property on Unga island; F. R. Brown, Unga. Sea Level M. & M. Co.—Property at Thorn Arm, near Ketchikan; E. C. Morse, Sea Level. The Setuok Co.—Property on Ankow river, near Yakutat; L. H. Jewell, Yakutat. Silverman Alaska Co.—Property on Prince of Wales island; S. I. Silverman, Hollis. Seandia M. Syndicate.—Property on Bourbon creek; A. J. Spute, Nome. South-eastern Alaska M. Co.—Property on Prince of Wales island; J. McFarland, Ketchikan. Sumdum M. Co.—Property at Sumdum; H. T. Tripp, Sumdum. Tyee Con. M. Co.—Property on Douglas island; C. M. Summers, Juneau. Turnagain Arm G. M. Co.—Property at Cooks inlet; L. R. Bellman, Sunrise. U. S. B. C. Corporation.—Property near Valdez; W. E. Crews, Juneau. Unik River M., S. & T. Co.—Property on Stikine river; J. W. Daily, Ketchikan. Victory C. M. Co.—Property near Ketchikan; B. Stevens, Ketchikan. Windham Chief G. M. Co.—Property at Windham bay; W. W. Lawson, Windham. Wales C. M. Co.—Property on Prince of Wales island; C. E. Ingersoll, Ketchikan. Windham Chief Con. M. Co.—Property at Windham bay; D. W. Yates, Windham. Yellow Jacket M. Co.—Property at Windham bay; J. F. Malony, Juneau.

## ARIZONA.

### Gila County.

The former production cost of copper of 12 cents per pound at the Old Dominion at Globe has been greatly reduced by the introduction of new machinery. It is the expectation of the present management to produce copper cheaper than any other Arizona company.

The Inspiration M. Co., 8 miles west of Globe, contemplate the erection of reduction works on the property and are negotiating for a new smelting plant.

General Manager J. D. Coplen of the Inspiration Co. will this season do considerable development work on the company's sixteen claims, 8 miles west of Globe. The plans embrace the erection of reduction works.

The McCallen-Schilling-Bates copper properties at Ray are reported taken by the Big Land M. Co. of Philadelphia, Pa., for development under a working bond. W. B. Twitchell is superintendent.

### Maricopa County.

(Special Correspondence).—A Texas company is working the Fleming group of claims in the Cave Creek district.

E. T. Stewart of Arlington visited his property in the White Tank mountains this week. He states that he is about to make a sale of his gold claims.

The Mormon Girl mill is in successful operation, under charge of Davies Bros. J. U. Creath is working his gold property, 7 miles south of Phoenix. He will arrastra the ore which he is taking out.

The Bowyer mill in Cave Creek district is running on ore supplied by C. E. Philes. Mr. Philes has recently discovered some tungsten, and he intends to do some work on the claim at an early date.

Work will be resumed at the White

Cloud mine, near Morrilstown, at an early date.

### Phoenix, Dec. 4.

L. L. White, of the White G. M. Co., Wickenburg, is awaiting the arrival of the machinery for the company's 20-stamp mill. Grading for the plant is now in progress, about twenty-three men being employed.

### Mohave County.

L. D. Godshall contemplates building a smelter at Kingman. He is now at the Twins mine, Cerbat.

C. G. Andrews of Los Angeles, Cal., states that the Gold Hill Reduction Co. will erect a 500-ton plant at Kingman, Arizona, to treat the zinciferous sulphide ores of the region.

### Final County.

(Special Correspondence).—The Silver Bell mine, 22 miles northeast of Florence, is again a producer. A considerable quantity of silver-lead ore has been shipped recently from Cochrane station on the Phoenix & Eastern. A wagon road was recently built from the mine to the station.

### Kelvin, Dec. 5.

(Special Correspondence).—The Mammoth mine at Schultz has recently been examined by an expert and it is stated that a sale of this former gold producer is pending.

Another large body of silver-lead ore has recently been struck at La Fortuna mine, north of the famous Silver King mine.

The Superior Co. is constructing an office building of adobe at Florence, near the Phoenix & Eastern Railroad.

### Mammoth, Dec. 5.

At Dudleyville the Saddle Mountain M. Co.'s smelter at the San Carlos group approaches completion.

### Yavapai County.

H. P. Anawalt of the S. F., P. & P. R. R. says that the railroad is now receiving and delivering freight for the Walker district, on upper Lynx creek, through the Poland tunnel, recently completed between Poland and Walker. The tunnel between the two towns is nearly 2 miles long and is slightly up grade from the Poland end. The cars are drawn through to Walker by mule power and returned by gravity. Plans for the installation of an electric line are being made.

T. F. Cole, J. Hoatson and D. E. Woodridge of Prescott, said to be acting for the Calumet & Hecla interests in Michigan, have purchased the Copper Chief group of claims, near Jerome, for \$3,000,000.

### Yuma County.

The Amalgamated G. M. Co. at Cholla, near Quartzsite, has completed grading for a 120-stamp mill and work will soon begin on the building. Plans for the mill have been drawn, but have not yet been approved. Sixty stamps only will be used at first, and the other sixty will be added later. Forty of the stamps are now on the ground. It is expected to have the mill in operation early next year. The company will use cement mortar blocks in the mill.

## CALIFORNIA.

The number of flasks of quicksilver of seventy-six and one-half pounds net produced in California by counties in 1903 were: Colusa, 510 at \$21,708; Lake, 2130 at \$85,520; Napa, 7859 at \$359,006; San Benito, 8150 at \$370,000; San Luis Obispo, 4592 at \$185,430; Santa Clara, 4658 at \$200,330; Sonoma, 2361 at \$97,766; Trinity, 266 at \$11,156. Total, 30,526 at \$1,330,916. This is an increase of 108,418 flasks and \$1652 over the total of 1902.

### Amador County.

At the Climax mine, 2 miles from Pine Grove, the 2-stamp mill is going, the monthly output proving so satisfactory that arrangements are being made to operate on a more extensive scale. A hoist of the Balliol mine has been erected on this mine and is now in running order. They have started sinking below the tunnel level and intend to go 150 feet. The management is now considering the erection of a 10-stamp mill.

At the Copper Hill mine on the Cosumnes river, owned by W. F. Detert, V. S. Garbarini is putting up hoisting works. Sinking is to begin when this is completed. The forty additional stamps at the Kennedy mill, making 100 in all, have been started and extra ore bins filled. New machines have been placed underground and it is supposed that the force of men will soon be increased.

### Butte County.

The Butte & Yuba Placer & Dredge M. Co. has bought land on the South Honcut. W. F. Gates is president, R. M. Green vice-president, Harry Tuggles manager. Preparations are being made for work.

J. E. Doolittle of San Francisco and Eastern capitalists have purchased 1600 acres from J. O'Brien, the P. George es-

tate, A. Eymard estate, H. D. Mitchell and D. Shay, lying along the north side of the Yuba river, 10 miles east of Marysville. The purchase price was more than \$350 an acre, or nearly \$600,000. Several large dredgers will be placed on the property as soon as possible and will be in operation within a year.

### Calaveras County.

Valley Springs report that a 100-stamp mill is to be put up at the California M. Co.'s property, 1½ mile from the town. Fifty men are at work sinking a shaft 500 feet deep. Five or six carloads of machinery have been received and thirty-six more will arrive soon.

The suit of the Lightner M. Co. against the Utica M. Co. and the Hobart and Hayward estates for \$120,000 damages has been decided in favor of the plaintiff, awarding \$54,000 damages. The plaintiff brought suit eight years ago, alleging that the Utica Co. had trespassed upon the Lightner property. The trespass was never denied and the suit was merely to determine the amount of damages. The mines adjoin each other at Angels Camp.

### El Dorado County.

At the Darling mine, Bear creek, near Georgetown, a dam has been put in preparatory to installing an electric plant on the property in the spring.

J. C. Newton of South Pasadena, Cal., is president of the Red Raven G. M. Co., which proposes to erect a 20-stamp mill at the Uncle Sam group.

### Nevada County.

The Empire mine will install another sand plant, working it in conjunction with the one now in use.

### Placer County.

A 5-stamp mill has been put up at the Bouk mine, near Auburn, on the Black Oak mine at Weimar, and there are fifteen men at work. A contract has been let to R. A. Davis and others to sink another 100 feet.

A full force of men are working at the Southern Cross mine, near Towle, and Superintendent W. R. Trimble has put in a compressor.

At the Golden West gravel mine, Canada Hill district, above the Hidden Treasure, Superintendent F. F. Armstrong says the gravel channel has been reached and pay dirt struck.

### San Diego County.

(Special Correspondence).—A 10-stamp mill is being installed at the High Peak mine at Julian. The Owens is being unwatered preparatory to sinking 100 feet further.

### Cuyamaca, Dec. 6.

### Shasta County.

The wagon road from Kennett to the smelter site and mine of the Mammoth C. M. Co. has been completed, and the company can now transport machinery and building material. G. Anderson is in charge of operations during the absence of Frederick Lyon, the chief engineer. The first machinery to be set up will be an air compressor plant, the mine terminal of the aerial tramway, and then the smelter terminal of the same line.

F. P. Primm of Redding has located on Oregon gulch, 3 miles south of Redding, two claims under the names Oregon Gulch kaolin mine and Oregon Gulch mining claim. He says the purpose of the locations is to secure the deposits of kaolin known to exist on the land. He wishes to organize a company to put up a pottery plant.

G. H. Bell has returned to Stella from San Francisco.

F. N. Cushman and H. P. Palmer contemplate the erection of a quartz mill at Horton's gulch, Dog Creek mining district, near Redding.

### Sierra County.

E. Westall of Sierra City has purchased the Northern Bell mine, bonded the Marguerite mine and will work them together and crush the rock in the Marguerite mill. He purchased from the Rosenfeld Co. the air compressor formerly used in their Gold Bluff mine at Downieville and will install it at the Marguerite mine.

### Siskiyou County.

A. Ball, superintendent of the Zedellia G. M. Co., on the East Fork of Methodist creek, near Etna, reports that in the spring the company intend putting in a stamp mill, cyanide plant and a sawmill and equipping the mines with good tracks and steel cars.

### Trinity County.

The Gold Hill group, 10 miles east of Trinity Center, has suspended operations owing to the approach of winter. Work will be resumed in the spring.

### Yuba County.

J. Martin and E. de Saba have secured 1200 acres of dredger land on the Yuba river, north of Marysville, from R. D. Cranston, and propose beginning work as soon as the necessary dredgers can be put in operation. Two dredging machines have been ordered and seven more are to be contracted for.



## COLORADO.

## Boulder County.

F. G. Shaffer of Denver has purchased the Cuba, or Good Morning group in Wall Street from Mrs. K. Hall for \$12,000.

## Chaffee County.

The Clinton group, in Taylor park, 20 miles west of Buena Vista, has been sold to J. Harrison of St. Louis, Mo., for \$50,000, of which \$5000 was paid down and the balance to be paid in quarterly payments. The new company will commence work immediately. The claims are adjoined by the Woods G. M. & M. Co. property. A large cyanide mill is being erected in the park by the Woods people.

Manager Fankhauser says that new machinery is being placed in the Pat Murphy property, near St. Elmo. A 6000-foot tram system has been installed to handle the ore from the mine.

At the Mary Murphy mine at Romley, R. G. Hinkson is manager and J. Taylor superintendent.

## Clear Creek County.

C. W. Miller and A. C. Rosser of Osage City, Kansas, and T. S. Hunsicker of Washington, D. C., intend to install machinery at the Little Jack vein of the St. Paul Co. property, near Georgetown, early in the coming year. The company will hold a meeting in Georgetown this month, when plans for future work will be laid out.

The Dives-Pelican Co., near Georgetown, has received a compound Corliss compressor with a capacity of 1700 cubic feet per minute, to be placed at the mouth of the Burleigh tunnel. The foundation is about completed for the company's mill and the construction of the building will commence soon.

## Custer County.

Lothrop of Chicago & Fueller of Denver have bought the Silver Bar mine for \$75,000. Under the terms of the deal, it becomes necessary for the new owners to construct a 200-ton daily capacity mill.

G. M. Laird is operating the Mackay-Burroughs mine on Quartz hill under a lease.

## Dolores County.

Operations on the Ophir-Consolidated properties, near Ophir Loop, have temporarily suspended. The thirty stamps of the 50-stamp mill which have been dropping steadily for months past have been hung up and the plant is idle.

The Durango Leasing Co. will overhauled the Enterprise mill, near Rico. Hydraulic sizers and slime tables are to be added.

## Gleichen County.

The Maine-Hamlet mine at Central City has started up. This property has been closed for the past eight months. It is the intention of the company operating the mine to do much development work. S. W. Brereton is superintendent.

The plant of the Western Reduction Co. on North Clear creek, west of the Forks of Creek, has been destroyed by fire. It was erected eight months ago to handle the slimes from North Clear creek. The loss is estimated at \$30,000, which is partly covered by insurance. F. A. Thompson of Forks of Creek is manager of the plant, and at this time it is not known whether the plant will be rebuilt or not.

## Gunnison County.

The Akron Co., at White Pine, whose buildings were destroyed by fire, will wait until spring before erecting new ones, when a modern concentrating plant is to be built.

## Lake County.

At the Manhattan M. & P. Co., O. P. De Ford of Twin Lakes manager, the new tunnel has been driven in 195 feet, and a new boiler, engine and air compressor have been installed.

## La Plata County.

In the La Plata district the May Day Co. is putting in a Crane washing machine to facilitate ore sorting and to save the finer values. Preparations are being made to build a tramway from the mouth of the tunnel to the county road to obviate the necessity of packing the ore down the trail on burros. Operations on the Bonnie Girl mine have been suspended, pending the arrival of the machinery plant.

## San Juan County.

At Galena mountain, R. W. Davis reports that the tram towers have all been framed and are being placed in line. The tram will be completed and in running order by the first of the year. This tramway is to supply ore to the new mill yet to be built.

When the road for the Green Mountain M. & M. Co., in Cunningham gulch, is completed, grading for the mill will be begun.

At Animas Forks, near Silverton, Chas. Dale has completed a contract for 2000 feet of flume for the Gold Prince M. Co. The flume is in two branches—one 16x16 inches and the other 24x24 inches. The flumes are to furnish power for the new

Gold Prince mill, which is to be built next spring at Animas Forks.

The Frank Wetzel del Mino group on Cement creek, near the foot of Dry gulch, was sold to Messrs. Ross, owners of the Galtie Boy.

## San Miguel County.

The following is the scale of wages which will be paid in the mills and mines of Telluride district after December 1:

## MINES—UNDERGROUND.

Miners.....	\$3.00	for eight hours
Machine men.....	4.00	" "
Trammers and shovellers.....	3.00	" "
Drivers, caring for horses.....	3.25	" "
Drivers, not caring for horses.....	3.00	" "
Timbermen.....	3.50	" "
Timbermen helpers and laborers.....	3.00	" "
Nappers.....	3.00	" "
Hoisters (engineers).....	4.00	" "
Station tenders.....	3.00	" "
Cage tenders.....	3.50	" "

## MINES—OUTSIDE.

Engineers.....	\$3.50	for eight hours
Engineers (if hoisting men).....	4.00	" "
Firemen.....	3.00	" "
Blacksmiths.....	3.75	" "
Blacksmiths' helpers.....	3.00	" "
Tool sharpeners.....	3.25	" "
Laborers.....	3.00	" "

## TRAMWAY.

Gr. men and loaders.....	\$3.00	for eight hours
Brakemen.....	3.75	" "
Linemen.....	4.00	" "

## MILLS, CYANIDE WORKS, ETC.

Crushermen.....	\$3.00	for eight hours
Batterymen.....	3.50	" "
Batterymen helpers.....	3.00	" "
Huntington and Chili mill men.....	3.00	" "
Concentratormen.....	3.50	" "
Concentratormen helpers.....	3.00	" "
Engineers.....	3.50	" "
Firemen.....	3.00	" "
Blacksmiths.....	3.75	" "
Carpenters.....	3.75	" "
Laborers and shovellers.....	3.00	" "
Cyanide plant employes.....	3.00	" "
Solution men.....	3.50	" "

## BOARDING HOUSE.

Head cook (if over 100 men), \$100 per month and board.

Night cook and baker (if over 100 men), \$90 per month and board.

If over 175 men, the head cook will be furnished with a meat cutter at \$80 per month and board. Second cook, \$65 per month and board. Waiters and dishwashers, \$60 per month and board.

This scale is the minimum, some, especially among the miners and machine men, getting more, many good miners getting \$4 and \$4.50 per day and machine men \$5 and \$6.

## Summit County.

At Kokomo the Willey mill is being enlarged and stamps, concentrating tables and slimes put in place. E. E. Byron is in charge of this and of men at the Wilfley mine, on Elk mountain.

At Breckenridge G. C. Smith and A. E. Keables of the Old Union M. & M. Co. are operating through two shafts 260 and 200 feet deep, with connecting levels and a crosscut tunnel from the level of the upper floor of the company's new mill progressing satisfactorily. A prospecting crosscut tunnel is being driven 200 feet east of the No. 2 shaft to disclose the size and course of the veins in the group ahead of the present workings. A 125 H. P. engine and two 80 H. P. boilers, with crusher, roller, screens and jigs, have been purchased and will be placed in the mill building. Concentrating tables will also be added to the plant, which is designed to handle from 50 to 100 tons of crude ore per day.

At the Morning Star on Mount Baldy, Conlon & Zerbe have opened up a pay-streak of lead-silver-gold ore in the tunnel 175 feet from its mouth. A coal boring machine, with a special bit, is used in driving the tunnel through the frozen ground.

The Washington-Joliet M. & M. Co. has started up its 20-stamp and concentrating mill. The track from the tunnel to the mill has been covered.

## Teller County.

C. B. Burch of Pony Gulch, southwest of Cripple Creek, has purchased cyanide machinery for the erection of a 50-ton mill, so constructed as to permit enlargement to 150 tons per day with little expense.

The El Paso Con. M. Co. at Cripple Creek will construct five additional ore bins, making fifteen bins in all.

## IDAHO.

## Idaho County.

A. Prader of the Union group, between Seigle creek and Red river, near Elk City, has sunk 85 feet on the vein, drifted and crosscut 350 feet, constructed a 3½-mile wagon road, built a shaft house, installed a hoist, a sawmill, and built a residence, and intends to sink to the 200-foot level and install a mill.

J. C. Garvin of Spokane, Wash., has an option on the French group, in Station district, south of Newsome, on the Clearwater, 15 miles west of Elk City.

G. V. Herrington of the Crooked River M. & M. Co. says a 300-ton cyanide plant is to be built on the property at Oro Grande. The vat building will be 100x100 feet. Four leaching vats, each 44 feet in diameter, two gold storage tanks, one sump tank, two solution tanks and two pumps will be required. The present

crushing capacity of twenty stamps will be reinforced by a 12-ton rock crusher.

## Shoshone County.

The official statement of the Federal M. & S. Co., in the Cœur d'Alenes, covering the year ended August 31, 1904, shows that the ore shipped was valued at \$4,908,926, and yielded a gross profit of \$1,690,524. Deducting from this sum \$219,625 for general and administrative expenses, and adding \$18,374 interest, and \$2810 from rents and dividends, makes the net income \$1,492,083. This amount has been still further reduced by the allotment of \$67,709 to the reserve for legal contingencies, and \$38,649 for incorporation costs, explorations, examinations, etc., which left \$1,385,725. From this there has been paid in dividends \$629,309, leaving a surplus for the year before charging depreciation of \$756,416. Mine labor cost \$1,056,207; mine supplies, \$379,379; mill labor, \$103,399; mill supplies, \$76,201; in all, \$1,615,186. This company controls the Wardner (formerly belonging to the Empire State - Idaho Co.), the Mace (formerly owned in part by the Standard Co. and in part constituting the Mammoth group), and the Burke (formerly the Tiger-Poorman group).

Near Wallace, the 16 to 1 mine is running its compressor by electric power from Spokane, Wash. About 50 H. P. is received. A raise is being made from the 400-foot to the 200-foot level, and when finished it is expected that the mill will be started.

The manager of the Monarch, near Murray, expects to have the 75-ton concentrator in operation by the first of the year. The frame work is completed and the machinery is now being installed. The company has a large amount of ore awaiting the completion of the concentrator. The Bear Top purchased the concentrating plant formerly used to treat the second-class ores from the Black Bear mine at Gem. The machinery has been moved to Murray and is being placed in position. The concentrates from both properties will be hauled to the railroad at Wallace and then shipped to the smelters.

## Washington County.

It is reported that the Werdenhoff M. Co., F. W. Hunt manager, will erect a reduction plant at Weiser.

## MONTANA.

## Deer Lodge County.

The Montana Zinc Co. has demonstrated the success of experimental tests of the zinciferous ores of the Alice mines at Walkerville and has leased the Alice 60-stamp mill for five years and arranged for a daily ore supply of 250 tons for that time. The mill is now being overhauled and will be ready by the last of December. Forty of the sixty stamps have been removed and two Blake rock breakers, three sets of Colorado Iron Works rolls, 16x36 inches, and one set of 27x14 Humphrey rolls have taken their place. The treatment will be by dry concentration, and the separation of the minerals in the zinciferous rock will be electrical. The plant will contain seven sets of separators and twenty sets of sizing machines or screens, also cyanide tanks for treating the siliceous residue containing gold and silver.

## Flathead County.

The Spokane Placer M. Co. has been organized at Spokane, Wash.; capital stock, \$1,000,000; F. W. Schwellenbach, president and general manager; R. H. Hoag, secretary. The company owns 1280 acres of placer ground on Standard creek in the West Fisher gold belt. The prospectus says this ground has been tested over an area of 1000 acres and that it will vary from 1 to 75 feet of pay dirt, and will yield 25 cents to the yard, and can be mined on an extensive scale. The company owns its own water right. The water will have a fall of 500 feet on the company's ground.

## Lewis and Clarke County.

The New Park mines in the Elkhorn mountains, 30 miles east of Helena, have been bonded by W. G. Paine for \$50,000 to a syndicate headed by A. C. Mason of Tacoma. The syndicate has a bond on the surrounding claims and is driving a 1400-foot adit tunnel through the rock to connect with all the ledges. The tunnel is in 440 feet, and about forty men are working on it, driving 10 feet a day. They will put a 100-ton concentrator on the claims.

## Madison County.

A 10-stamp mill is being erected at the Black Hawk M. Co.'s property near Norris. The mill will be ready for operation in February.

## Park County.

At Cooke, the Eagle M. & M. Co. has been organized to develop claims in the New World mining district. A. Gassert is superintendent and secretary at Cooke.

## Powell County.

The new concentrator at Emery, work-

ing over the tailings dump of the Emery mine, is a success. Some improvements are to be added as soon as possible and grading has been begun for the installment of another Huntington mill in the spring. C. N. Loring is in charge of the concentrator. The company are figuring on adding a cyanide plant to work the tailings from their concentrator.

## Silver Bow County.

The Eva May mine in Cataract district is to be again operated. It is owned by the Montana Mineral Land Dev. Co., of which Thos. C. Kelly is president. J. Hume of Butte, a mining man of ability, is now the manager of the property. Thirty-two men are employed.

## NEVADA.

## Esmeralda County.

The shaft on the Tonopah-Wilmington at Gold mountain is down 100 feet and crosscutting will be commenced in both directions. The new shaft is following the hanging wall. A 15 H. P. gasoline hoist will be put in.

The Florida mine was recently bonded for \$75,000. The company is now building a stamp mill and putting in concentrators. The Wisconsin mine has been sold to Tacoma men for \$20,000.

## Lincoln County.

The Siegel Con. M. Co. is shipping to the Salt Lake, Utah, smelters ore running 45% manganese, 150 ounces silver and \$2 gold per ton from Siegel.

## Nye County.

T. Fleming is manager at the Florence Extension, near Liberty.

Manager C. F. Maunders of the Utica mine at Liberty will increase his force and push development work.

J. W. Riggle has bonded the Grasshopper group of five claims, southeast of the Jumbo, to H. Dibley of San Francisco for a year for \$35,000. A force of men will be put on to develop the property.

The shaft on the Portland mine is down 120 feet and will be sunk 200 feet before crosscutting. The 34 H. P. engine and hoist from the Montana-Tonopah will be erected on the Portland mine.

Operation on the Golden Gate group, 1½ mile west of Tonopah, will be resumed. H. T. Bragdon, A. C. Eisen and H. H. Clark propose to equip it with a steam hoisting plant to sink from the 160 to the 500-foot level.

J. P. Brissell of Jefferson canyon reports that there is ample wood and water in the district and every probability that a mill will be erected on his properties there soon.

The N. Y. M. Co. have bought the steam hoist and building from the Stranger mine at Austin, and are moving it to their property.

## Storey County.

At the C. & C. a building, 60x22 feet, will house the largest air compressor on the Pacific coast—a 200 H. P. Ingersoll-Sargeant, 28½x16½x24, set on a concrete foundation 7 feet in depth and 18x12 feet in width. This will supply the air needed in the underground workings, and the lowest levels will be made cool and comfortable for the men to work in. It is to be driven by an electric motor.

At the Alta mine good progress has been made in repairing the shaft, and Superintendent Sharon is now inaugurating active work.

## NEW MEXICO.

## Grant County.

The reduction plant of the Comanche M. & S. Co., at Silver City, is nearing completion. Work is being pushed on the blast furnace building and when finished the capacity will be 300 tons daily. In addition to the working of the Burro Mountain properties, the company has purchased the Hearst mines at Pinos Altos, which have been developed extensively. In order to handle the output of this property, the company is going to build a narrow gauge road from Silver City to Pinos Altos, a distance of 9 miles. The company headquarters are at Milwaukee, Wis. S. S. Curry, Ironwood, Mich., is president and treasurer; T. G. Atkinson will go to Grant county and assume personal management of the Hearst properties, making his residence at Pinos Altos.

## OREGON.

## Baker County.

The Chicken Creek placer mines, known as the Weatherby mines, together with the water rights, were sold for \$22,000 cash, according to a deed filed for record. The deed is from J. N. Malsberger, who purchased the property a year ago from the Weatherby estate, to G. F. Frey, representing a syndicate of Eastern capitalists. The new owners will purchase other property adjoining and make arrangements to work the mines on a more extensive scale than ever.

The new roadway from California mountain into Big Limber and Bull Creek



sections has been completed. A short extension will bring it close to the Golden Rule, Storm King and La Bellevue mines and make Sumpter the supply point.

L. V. Swiggett, of the Constellation group in Big Lumber district, intends to install a hoisting plant and sink a double-compartment shaft and to open the Lucky Kid shoot and install a concentrating plant large enough to treat ores from the surrounding properties.

The Imperial mine at Cableville has been bought by the Imperial G. M. Co., Ltd., and extensive development will be at once started. A. L. McEwen will be manager, K. O. McEwen metallurgist and J. Arthur will continue as superintendent of mill operations. The new company will install a hoist to prosecute deep sinking on the Imperial vein, put a force developing the Eagle ore bodies and increase the milling capacity.

#### Douglas County.

The Osgood placers on Illinois river, near Glendale, will be worked this winter with three giants, which are now being placed in condition. F. H. Osgood of Seattle is owner.

At the Hall mine, 10 miles from Myrtle creek, owned by James and John Hall and J. Rice, the ore is being hoisted 75 feet to the surface by a whim, but the increasing output will necessitate the erection of heavier machinery to handle it.

#### Josephine County.

At the Millionaire mine, Gold Hill district, machinery will be placed to facilitate development and, if the ore body warrants, a stamp mill will be placed next spring. M. Ward of Portland is manager.

J. F. Reddy and P. Clark of Spokane propose the installation of a 40-stamp mill before long at the Opp mine, near Jacksonville. Ten stamps are now dropping.

The Rogue River Courier gives the following list of producing quartz mines in southern Oregon: Greenback mine, Grave Creek district—Two mills, one of ten, one of thirty stamps; 100-ton cyanide plant, output \$40,000 monthly; C. W. Thompson, superintendent, Greenback. Gold Bug mine, Mt. Reuben district—Five-stamp mill, 30-ton cyanide; supposed production, \$5000 monthly; R. Jones, superintendent, Glendale. Ajax mine, Mt. Reuben—Three-stamp mill; superintendent's address, Glendale. Kremer & Palmer mine, Mt. Reuben—Ten-stamp Parker mill; W. Kremer, superintendent, Myrtle Creek. Granite Hill mine, Louse Creek district—Ten-stamp mill; ten more will be added by July; L. Y. Wickersham, superintendent, Grants Pass. Gopher mine, Jump Off Joe district—Five-stamp mill and equipment; superintendent, Dean, Grants Pass. Baby mine, Jump Off Joe district—Undergoing development; 2-stamp mill operated; C. C. Higgins, superintendent, Grants Pass. Vulcan mine, Grave Creek district—Five-stamp mill and concentrators; superintendent's address, Placer. Yellow Horn mine, Grave Creek—Uses Vulcan's mill; superintendent's address, Placer. Eureka mine, Soldier Creek district—Ten-stamp mill and splendid equipment of boilers, engines, hoists and compressor; H. C. Nelson, superintendent, Grants Pass. Rising Star mine, Williams district—Five-stamp mill and plant; superintendent's address, Williams. Boie of Contention mine, Williams district—Eight-stamp mill; manager, F. J. Catherine, Grants Pass. Mountain Lion mine, Williams district—Five-stamp mill; C. E. Harmon, Grants Pass. Braden mine, Gold Hill district—Ten-stamp mill and plant; more stamps to be added soon; R. C. Ray, Tolo. Bill Nye mine, Gold Hill district—Five-stamp mill and plant; Bill Nye M. Co., Gold Hill. Golden Wedge mine, Galice district—Three-stamp mill; cyanide plant and other equipment to be added; Thien Bros., Golden Wedge, Galice. Harth & Ryan mine, Wards Creek district—superintendent, H. Harth, Grants Pass. Golden Standard mine, Gold Hill district—Five-stamp mill; Kubli Bros., Jacksonville. Hammersley mine, Jump Off Joe district—Five-stamp mill, concentrator; F. H. Osgood, Grants Pass. Ida mine, Louse Creek district—Two-stamp mill; L. Y. Wickersham, Grants Pass. Comstock mines, Baldy district—J. M. Layman, Grants Pass. Mule mine, Rogue River district—Five-stamp mill; superintendent's address, Gold Beach. Oregon Belle mine, Forest Creek district—Four-stamp mill; Foster & Gunnell, New York & Western M. Co., Grants Pass. Oro Fino, Jump Off Joe district—Forty-ton cyanide, with Sturtevant rolls, ore crushers; manager, S. Chase, Grants Pass. Opp mine, Jacksonville district—Ten-stamp mill, concentrators; manager, J. F. Reddy, Medford. Takilma Smelter, Waldo district—One hundred-ton copper smelting plant, Takilma Smelting Co., Colorado Springs, Colo.; manager, C. Tutt.

A rich strike has been made at the old Free and Easy mine, on the Illinois river, near Kerby. The property was recently purchased by the Siskiyou Sunset M. &

Dev. Co. of Grants Pass, who are planning to install a cyanide plant.

The center of interest in platinum mining in the United States has shifted from Shasta and Trinity counties, Cal., to southern Oregon, where, in the neighborhood of Grants Pass and Kerby, considerable platinum and iridium are found in the placer gold. In collecting this material another heavy mineral has proved commercially profitable—that is, the natural alloy of iron and nickel called josephinite, which is found associated with the platinum and gold. The quantity of pure platinum contained in the platinum sand, obtained in 1903, amounted to 110 ounces of refined metal, worth \$2080.

### SOUTH DAKOTA.

#### Lawrence County.

The Clover Leaf M. Co. at Deadwood is attempting to remedy the wet condition of the mine due to seepage from Elk creek. An addition to the mill is being considered and also an additional forty stamps. O. B. Amsden is superintendent. Stockholders in the Columbus Con. Co. at Deadwood understand that the present need is money in order that a large amalgamation and cyanide mill can be erected. J. H. Mayham is president, M. Thompson general manager.

### UTAH.

#### Carbon County.

It has been determined by Manager Williams and Superintendent Smith of the Utah Fuel Co. that the new coal camp up Willow creek, northeast of Castle Gate, is to be opened up, being run by power from the electric plant at the Castle Gate workings.

The creation of the new camp means the building of 100 coke ovens at Castle Gate and 2 miles of railroad to reach the new mine by the Rio Grande Western Railway.

#### Salt Lake County.

The Ohio Copper Co. has purchased the Winnemuck group of mines at Bingham for \$50,000. The property is equipped with a mill which the purchasing company has been operating under lease. This will be enlarged so as to provide for the handling of an increased tonnage.

#### Summit County.

Classifying tanks will probably be put in the mill of the California mine, near Park City, as considerable values are carried off in the waste.

#### Utah County.

J. H. Wootton, manager of the Utah Co. Light & Power Co., says that an auxiliary power plant is to be put up 1½ mile above the present plant and will probably furnish power to the Utah C. Co.'s mill at Bingham. The construction of the plant will cost about \$150,000.

Articles of incorporation of the Knight-Roberts M. Co. have been filed at Provo by N. and J. J. Knight, B. M. Roberts, H. G. Blumenthal and A. Nelson, with B. M. Roberts secretary and treasurer. The company owns the Roberts mine in Rock canyon. A tunnel 1500 feet long to tap the vein 1700 feet below the surface will be driven.

Manager G. H. Dern of the Con. Mercur reports that the December ore output is approximately 20,000 tons. The mill at Manning has been operating since September 26th. The new sampling mill is almost completed.

### WASHINGTON.

#### Ferry County.

Five men, under Superintendent Case, at the California mine are unwatering the mine and repairing the shaft. The shaft has been cleaned and retimbered as far down as the water in it would permit. The removal of the dirt and old timbers which caved from the roof has revealed less damage from the caving than was expected.

R. L. Boyle, president of the Keller & Indiana Con. S. Co., has purchased a 150-ton smelter, sampling plant, turbine water wheel and an electric plant for the new works at Keller.

The Washington S. & R. Co. has organized to erect a smelting plant for the ores of the Belcher M. Co., the Midnight and the Jupiter-Ammon. The plant will be erected near West Fork, about 15 miles south of Republic, on the San Poil river.

#### Stevens County.

The Five Mile concentrator, 5 miles above Trout Lake City, on the south fork of Lardeau creek, is working double shift and handling the ores from the Nettie L. and Silver Cup, with which it is connected by aerial trams. This plant is preparing to increase its capacity to handle custom ores. The additional stamps will probably be installed this winter.

The Frisco-Standard M. Co., 8 miles east of Boundary, has completed a wagon road from the mine to the county road, along Fish creek, and is shipping ore to the railroad at Boundary. Superintendent

J. Keogh is considering the installation of a jig, having demonstrated the value of concentration.

### WYOMING.

#### Laramie County.

The Globe M. & M. Co., owning the Hecla mines at Silver Crown and the stamp mill at Hecla, proposes to erect a \$100,000 smelter at Hecla to treat the ores of the Silver Crown district and the mines in northern Laramie, Converse, Natrona and other counties. T. E. Swartz of Denver is mentioned in prominent connection therewith.

### FOREIGN.

#### AFRICA.

##### Transvaal.

The Transvaal Chamber of Mines at Johannesburg reports the gold output for October, 1904, of the Witwatersrand mines at 313,928 fine ounces. The return for the outside districts is 11,697 ounces. The following table gives the output in fine ounces for 1904 to November, compared with 1903:

Month.	Rand.	Outside.	Total.
January.....	278,867	9,957	288,824
February.....	282,436	7,066	289,502
March.....	299,625	8,017	308,242
April.....	297,470	8,475	305,945
May.....	306,586	7,894	314,480
June.....	299,913	8,306	308,219
July.....	298,825	8,015	307,840
August.....	301,113	11,164	312,277
September.....	301,131	11,155	312,286
October.....	313,928	11,697	325,625
November.....			
December.....			
Totals.....	2,979,894	93,347	3,073,241
		1903.	

Month.	Rand.	Outside.	Total.
January.....	192,935	6,345	199,280
February.....	187,977	5,536	193,513
March.....	208,456	9,009	217,465
April.....	218,900	8,971	227,871
May.....	224,409	9,716	234,125
June.....	228,167	10,153	238,320
July.....	242,070	9,573	251,643
August.....	262,569	9,249	271,818
September.....	267,513	8,864	276,377
October.....	275,064	8,580	283,644
November.....	272,107	7,706	279,813
December.....	278,510	7,351	285,861
Totals.....	2,859,477	104,273	2,963,750

#### BRAZIL.

Diamonds are mined to a limited extent near Franca, Sao Paulo; Tibagy, Parana; Bagagem, Agua-Suja, and various points in southwestern Minas Geraes and Goyaz. Hyaline quartz (Brazilian pebbles) and citrine quartz (false topaz) are mined at the Serra dos Cristoes, in Goyaz.

### BRITISH COLUMBIA.

#### Boundary District.

The output of the important mines of this district can be judged from the weekly shipments: Granby mines to Granby smelter, 11,370 tons; Mother Lode to Greenwood smelter, 3808 tons; Brooklyn-Stemwinder to Boundary Falls and Trail smelters, 2170 tons; Sunset to Boundary Falls smelter, 360 tons; Emma to Greenwood and Nelson smelters, 891 tons; Senator to Granby smelter, 165 tons; Mountain Rose to Greenwood smelter, 66 tons; Athelstan - Jackpot to Boundary Falls smelter, 90 tons; Skylark to Granby smelter, 20 tons; total, 18,940 tons; total for year to date, 744,631 tons. Granby smelter treated 11,650 tons this week, or 533,381 tons for the year to date. Boundary Falls smelter treated 2120 tons, or 20,260 tons since starting operations.

The first electric locomotive to be used in any copper mine in British Columbia is to be put in at the Granby mines. A Baldwin-Westinghouse direct-current locomotive, driven by two 35 H. P. motors, will be operated at the No. 3 tunnel level in the mine and out to the new ore crusher and ore bins. The crusher will be operated by two 75 H. P. electric motors, and the two 3-ton ore skips, running in balance, will be driven by a 35 H. P. motor.

J. P. Graves, manager of the Granby mines and of the smelter at Grand Forks, announces that the company will increase the daily smelting capacity 700 tons and will put in the necessary blowers for handling the ore, motors for driving them and engines and cars for moving the slag. Blowing engines will also be added to the smelter to increase the converting capacity. We have six furnaces and two more will be put in this year. The ten shells in the converters will be increased to fourteen when all the improvements are in. At the mines new bins, crushers and motors will be put in to take the ore from No. 3 tunnel. Electric haulage engines will be used to land the ore at the railroad.

#### East Kootenay District.

It is reported that the Eva G. M., Ltd., will shortly install a compressor to facilitate work on the Eva. John Knox, Jr., is local manager and superintendent at Camborne.

#### Nelson District.

For October the Ymir mine at Ymir re-

ports that twenty stamps ran twenty-nine days and crushed 1700 tons of ore, producing 412 ounces of bullion; estimated realizable value of the product, \$4925; ninety tons of concentrates shipped, of a gross estimated value of \$2250; cyanide plant treated 1150 tons of tailings, producing bullion of an estimated gross value of \$550; 38 tons of crude ore shipped, \$1950; sundry revenue, \$220; total revenue, \$9875; working expenses, \$9780; profit, \$115. There has been expended during the month on development \$403.

#### Yale District.

Manager M. K. Rodgers of the Daly Red. Co., Hedley City, has taken a working bond of \$160,000 on the Maggie group in Aspen Grove, Nicola Valley mining division, and will equip the mine with machinery.

### CANADA.

#### Yukon Territory.

The Dominion Government has established a temporary office for recording claims on Buntz creek. The discoveries in the Tanana country have decreased the population of Dawson 2404.

The postoffice department have made arrangements with the northwest mounted police by which the latter will carry mail this winter to outlying points; for this service policemen will receive additional remuneration.

### MADAGASCAR.

Mining districts are being opened up in Madagascar and the local Government is doing what it can to favor the movement, says La Quinzaine Coloniale. The director of the mining service reminds prospectors that in applications for a license, after staking claims, the registration of the application at the chief town of the circumscription gives a priority of claim. M. de Floris has been working alluvial deposits. In a single claim which he started to work last year, he has already obtained 250 kilogrammes (4 hundred-weights 103.2 pounds) of gold, and the yield increases every month. At present it is 35 kilogrammes per month. He employs 2000 to 2500 miners. The richness of the placer led him to examine the higher districts of the locality, and he found a gold-bearing quartz outcrop. M. Colson of La Reunion is also interested in companies being organized to develop these fields.

### MEXICO.

D., M. and S. Guggenheim, of the Guggenheim Exp. Co. and the American S. & R. Co., have been in Mexico making a tour of the mines and operations of those two concerns. S. W. Eccles of the company says of the new Velardena smelter that the capacity of the plant and its exact location will not be settled until they return to New York. The old one is worn out. They have abandoned the Descubridora copper mines in Durango. At San Gil, 30 miles east of Aguascalientes, they have been opening up the Santa Francisca mines, and have built a railroad 12 miles long to them from San Gil station, on the Mexican Central. These mines will be producing by May 1.

#### Chihuahua.

The Evanston M. Co. is shipping ore to the Torreón smelter from the Purisima mine, in the San Juan del Rio district. The company is erecting a hypsulphite lixiviation plant to handle its low-grade ore and to be in operation Dec. 1.

Manager Coleman, of Lluvia de Oro mines of western Chihuahua, plans the erection of ten more stamps in the mill, making twenty in all.

A. V. Garcia and R. Emerson have purchased from Dale Bros. and F. McDonald the Inglaterra mine of thirty-five pertenencias in the Santa Eulalia camp.

P. H. McDermott of Los Angeles, Cal., and H. N. Cannon of San Diego, Cal., have commenced work on the Americano at Terrazas camp. The present pumps have a capacity of 1350 gallons per minute, but if heavier ones are necessary they will be put in.

J. C. Brooks has resigned as superintendent of the Granadina M. Co., Santa Barbara. Mr. Brooks says that a 75-ton concentrating plant is to be built 1600 yards from the mine. An air compressor for four drills has been installed and an 85-foot galloways frame has been put up. J. W. Pender is general manager.

It is reported that the Torreón Smelter is to put up a 75-ton concentrating plant on the San Diego mine at Santa Barbara. J. W. Pender is manager.

#### Durango.

H. W. Higley of the Santo Nino mine at Tepehuanes, will put in a 25-ton cyanide plant.

Superintendent H. W. Higley, of the Santo Nino mines at Tepehuanes, has ordered a 25-ton cyanide plant for that property.

The Monterey News reports that C. C. Codman of Monterey has a concession for



customs smelting plant to be erected in Durango. A. B. Callender of Monterey has been gathering data for such a plant.

#### Sonora.

(Special Correspondence).—The success of the gold dredger in central California directs attention to similar possibilities elsewhere, and in this vicinity W. C. Greene is spending some of his copper profits to develop hydraulic gold mining here on a large scale. He has chosen the Santo Domingo river bed, which here passes through a canyon, the walls of which rise in places 2000 feet. Preliminary prospecting shows that there is about 30 feet top gravel and clay which pans about 30 cents gold per cubic yard. Below is the ancient river bed, indurated cement, much like that found below the lava in Placer county, Cal., drift mines; this latter yields an average of \$3 per cubic yard. It is Mr. Greene's intention to use steam shovels and sluices for the loose top gravel, the lower and harder to be dug out and carried by aerial tramway. A dredger is now being put in at La Busca canyon.

Magdalena, Nov. 20.

President W. C. Greene of the Cananea Con. Co., at Cananea, says they are producing 3000 tons of copper, 40,000 ounces of silver and 2000 ounces of gold per month. The gross valuation of this output is \$900,000 gold, monthly. There is one ore body 600 feet wide. The Greene placers at La Bresca, in Magdalena district, are in operation, and by January 1 they expect to be producing \$350,000 gold per month, says Greene. The method of handling the dirt is by overhead cables. These cables handle skips into which steam shovels dump the placer dirt and the skips dump it into the sluices. The pumps handle 6000 gallons of water per minute, handling all the water in the box canyon, leaving it dry to work.

### Books Received.

The Department of the Interior has issued a series of statistical bulletins extracted from David T. Day's report on "Mineral Resources of the United States." "Production of Quicksilver in 1903," "Production of Precious Stones in 1903," "Production of Platinum in 1903" and the "Production of Tin in 1903" have been received.

Catalogues of the periodical publications in the library of the American Institute of Mining Engineers and of the American Institute of Electrical Engineers may be had by applying to the secretaries thereof. They give a complete list of technical journals and reports now in the library and enumerate the missing numbers required to make complete sets, inviting members to remedy this want. Members living at a distance may write to the librarian of the Institute asking for information, extracts or abstracts of literature upon subjects in which they are interested.

Architects will welcome "Locks and Builders' Hardware," by H. R. Towne, as a valuable aid in designing and estimating building construction. The author is president of the Yale & Towne Mfg. Co. and the past president of the American Society of Mechanical Engineers. The volume includes a historical review of its subject, technical descriptions of the leading facts of locks and their component parts, a detailed enumeration of the articles included under the term "builders' hardware" and a discussion of the subject of architects' specifications relating to the selection and furnishing of builders' hardware. W. W. Kent writes on the "Schools of Ornament," describing the origin and characteristics of the recognized schools into which architectural design and ornament have been classified. It is published by John Wiley & Sons, New York City, at \$3.

### Trade Treatises.

The important question of magnetic treatment of iron-zinc lead ore is the subject of a special treatise issued by the United Iron Works of Springfield, Mo., describing and illustrating in detail the Cleveland-Knowles electro-magnetic separator.

#### Dividends.

The Bunker Hill & Sullivan M. & C. Co., Idaho, dividend No. 86 of \$7500, payable Dec. 5th; total paid since Jan. 1st, 1904, \$738,000; total to date, \$2,271,000.

### Personal.

THE address of Henry G. Catlin is wanted.

T. BRADFORD has left Cripple Creek for Montana City, Nev.

C. M. CLARK of Phoenix, Ariz., is in charge of the Union mine.

JAS. CHYNOWETH is now superintendent of the Miskwabik M. Co., Keweenaw, Mich.

C. C. LEAVITT, superintendent of the Monumental mine, Waldo, Or., has resigned.

W. F. FREMERSDORF is now mining engineer at the Stonewall mine, Cuyamaca, Cal.

A. W. HARE of San Francisco, Cal., is at the Crown Deep mine, Johannesburg, S. A.

HENRY DAHL is superintendent of the Ophir mine on Raven hill, near Cripple Creek, Colo.

C. H. SHERMAN of San Francisco, Cal., is operating in the Magdalena district, Sonora, Mex.

JAMES WILSON is superintendent of the Alps mine on Quartz hill, near Central City, Colo.

B. M. ARMITAGE is manager of the Yellow Jewel mine at Myrtle creek, Douglas county, Or.

SUPERINTENDENT HENRY KALER of the Grey Eagle mine at Maybert is in San Francisco, Cal.

THOS. YERKES has returned from Philadelphia, Pa., to his mines at Santa Ana, Sonora, Mex.

G. C. SMITH is superintendent of the Old Union mine, on Mineral hill, near Breckenridge, Colo.

A. C. JESKEY is superintendent of the Golden Star mine, below Nelson Point, Plumas county, Cal.

R. A. THOMAS is superintendent of the Esperance drift mine, near French Corral, Nevada county, Cal.

R. M. EDWARDS succeeds J. D. Hosking as superintendent of the Franklin mine, Calumet, Mich.

J. E. SPURR is at Goldfield, Nev., conducting investigations to supplement his report on that region.

GEORGE MORRISON is superintendent of the Golden Wave mine, 3 miles south-east of Congress, Ariz.

MARK R. LAMB of the Cal. H. E. & S. Co. has returned to San Francisco from Minas Prietas, Mexico.

A. F. KROHN is assistant superintendent of the Greene Con. Co. at La Brisca, Sonora, Mexico.

O. H. FAIRCHILD, who has been examining the Atlas mine at Ouray, Colo., has returned to De Kalb, Ill.

R. A. KILPATRICK, formerly shift boss on the Portland mine at Cripple Creek, is in Goldfield from Alaska.

F. KEFFER is manager of the Mother Lode mine, near Greenwood, Boundary district, British Columbia.

C. P. HALTER is superintendent of the Las Vegas copper mine, near Coyame, in eastern Chihuahua, Mexico.

SENATOR W. C. RALSTON will succeed D. B. Hinkley as president of the Fulton Iron Works of San Francisco, Cal.

S. A. R. SKETCHLY is managing the development of the oil fields of the Mexican Oil Corp. at Tuxpan, Vera Cruz, Mexico.

C. J. JOHNSON has returned to Spokane, Wash., from examining the Scandia tunnel and the Climax group in eastern Oregon.

W. D. CLAIR is superintendent at the mines of the Sylvania Co., in the Palmetto range, 40 miles southwest of Goldfield, Nev.

PAUL COULDREY, who has been superintending operations on the Le Roi No. 2 of Rossland, B. C., has left for Sydney, Australia.

A. E. CURRY, of the X-Ray M. Co., is investigating the company's properties at Cottonwood lake, near Buena Vista, Chaffee county, Colo.

S. H. LUCAS has resigned as superintendent of the Cuyamaca M. Co., Cuyamaca, San Diego county, Cal., and is located at San Diego.

E. GEE, formerly manager of the Pride of the West M. Co., Washington Camp, Santa Cruz county, Ariz., is now at Via Guaymas, Lower California.

JAMES EARLS has resigned as superintendent of the Bullion-Beck mine, and has gone to Salt Lake City, Utah. Foreman Anderson succeeds him.

JOS. RANDEL, underground manager at the Nanaimo collieries, British Columbia, has been succeeded by Thos. Mills, the present assistant manager.

W. B. SALE, president of the St. Louis White Lead Co. of St. Louis, has been in Prescott, Arizona, negotiating for the lead output of Yavapai county.

E. J. STOCKFELDT, formerly chief electrician for the Sheep Creek mines, Alaska, is installing an electric plant at the Eagle River mines at Eagle, Alaska.

WM. HANAN of the Bradley Eng. Co. of Spokane, Wash., is at Republic, taking an inventory of the machinery of the Republic Power & Cy. Co.'s mill.

J. M. BELL, an instructor in mining at Harvard University, has been appointed official geologist of the government of New Zealand, to succeed James Hector.

W. THOMPSON has left the Velvet-Portland mine at Rossland, B. C., to act as general manager of the mines of the Waterson Gold, Ltd., at Ocampo, Chihuahua, Mexico.

A. N. GOULD, civil engineer, is superintending the work of surveying and leveling for a large mining ditch being constructed for the Commander mine at Eckley, Curry county, Or.

J. T. GRIBBLE of Grass Valley, formerly superintendent of the Reward mine, has left San Francisco for the Island of Luzon, in the Philippines, where he will assume charge of a mine.

THOMAS RUSSELL who was foreman at the Moody mine, Groveland, Tuolumne county, Cal., will take charge of property belonging to W. A. Nevills, in Amador county. He is succeeded by R. Barrett.

RALPH FINDLAY, formerly superintendent of the Portland mine, has been made general manager of the Elkon properties at Cripple Creek, Colo., succeeding E. M. De La Vergne, the newly elected Senator.

J. C. BROOKS, Chihuahua, Mexico, has resigned as superintendent of the Grenada mine at Santa Barbara to take a similar position at Avino, Durango, with the English company of that camp, which is managed by W. B. Jeffery.

### Commercial Paragraphs.

THE Westinghouse Electric & Manufacturing Co., through their agents G. & O. Braniff & Co. of Mexico, has been awarded the contract for all the electrical apparatus to be installed at the El Oro Mining & Railway Co., El Oro, Mexico. This contract amounts to nearly \$100,000.

THE general offices of the Stromberg-Carlson Telephone Co., which were formerly at Chicago, have been moved to Rochester, N. Y., where the main factory is located. A Western salesroom and stock will be maintained at Chicago as heretofore. The factory at Rochester is a modern one in every way and admirably adapted to the careful work necessary for the construction of telephones. The buildings are of one story and with skylights covering the entire area. They are situated alongside the New York Central Railway tracks, which gives facilities for loading direct into cars. The mine telephones made by the Stromberg-Carlson Telephone Co. are coming into general use, as they have demonstrated that a great saving of time and labor is possible where they are installed.

#### Some November Mine Dividends.

Silver King, Utah, Nov. 10, \$100,000.  
Natividad M. Co., Mexico, Nov. 10, \$12,000.  
Dos Estrellas, Mexico, Nov. 15, \$13,800.  
Daly-West, Utah, Nov. 15, \$72,000.  
Central Eureka, California, Nov. 11, \$19,921.  
Annie Laurie, Utah, Nov. 12, \$12,500.  
United Copper Co., Montana, usual dividend on preferred stock of \$150,000.  
Gold King M. Co., Colorado, Nov. 15, \$9369.  
Montana Ore Purchasing Co., Montana, Nov. 14, \$2 a share, \$162,000.  
Amalgamated Copper Co., Montana, Nov. 28, 50 cents a share, \$769,420.  
Bunker Hill & Sullivan M. Co., Idaho, Nov. 4, 25 cents a share, \$75,000.  
Great Central M. Co., Utah, Nov. 20, 5 cents per share, \$12,000.  
Mammoth M. Co., Tintic, Utah, Nov. 15, \$20,000.  
Anaconda M. Co., Montana, Nov. 18, 50 cents a share, \$600,000.  
St. Eugene Con. M. Co., at Moyie, B. C., declared a dividend of 2 cents a share.

### Latest Market Reports.

SAN FRANCISCO, December 9, 1904.

#### METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59½c, refined (1000 fine); San Francisco, 59½c; Mexican dollars, 47½c San Francisco, 48c New York.

COPPER.—New York: Standard, \$14.87½; Lake, 1 to 3 casks, \$14.67½@15.25; Electrolytic, 1 to 3 casks, \$15.00; Casting, 1 to 3 casks, \$14.75; San Francisco: \$16.00. Mill copper plates, \$17.00; bars, 18@24c. London: £66 spot per ton.

LEAD.—New York, \$4.75; Salt Lake City, \$3.50; St. Louis, \$4.12½. San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £12 17s 6d long ton.

SPELTZ.—New York, \$5.87½; St. Louis, \$5.00; London, £25 ½ ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$29.12½@29.50; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 3½c; bar tin, \$ ½, 32½@35c. London, £133 spot.

PLATINUM.—San Francisco, crude, \$13.50 ½ oz.; New York, ingot, \$19.00 ½ Troy oz. Platinum ware, 75 @ 82c ½ gram.

QUICKSILVER.—New York, \$42.00@44.00, large lots; London, £7 15s San Francisco, local, \$41.50@42.50 ½ flask of 75 lbs.; Denver, \$45.00. Export, \$41.50@42.50.

BABBITT METAL.—San Francisco, No. 1, 100; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100 lb. lots, 16.75c.

ZINC.—Metallic, chemically pure, \$ ½, 50c; dust, \$ ½, 10c; sulphate, \$ ½, .04c.

NICKEL.—New York, 40@47c ½ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

#### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$15.85 @16.10; gray forge, \$16.60; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$21.00; open hearth billets, \$21.00; San Francisco, bar, 7c to 12c ½ lb.

#### CHICAGO CURRENT QUOTATIONS.

Bessemer	.....	\$16 00@16 50
Charcoal	.....	16 00@17 00
Foundry Northern 1	.....	16 50@17 00
Northern 2	.....	16 00@16 50
Northern 3	.....	15 50@16 00
Southern 1	.....	17 40@17 65
Southern 2	.....	16 90@17 15
Southern 3	.....	16 40@16 65
Forge	.....	15 90@16 15
Billets, Bessemer	.....	24 50@26 00
Bars, iron	.....	1 50@1 55
Bars, steel	.....	@ 1 47
Rails, standard	.....	28 00@28 00
Rails, light	.....	22 00@23 00
Plates, boiler	.....	1 72@—
Tank	.....	1 57@—
Sheets, 27 store	.....	2 27@ 2 32
Angles	.....	1 57@—
Beams	.....	1 57@—
Tees	.....	1 57@—
Zees	.....	1 57@—
Channels	.....	1 57@—
No. 1 railroad wrought	.....	17 50@18 50
No. 1 cast, net ton	.....	13 50@14 50
Iron rails	.....	22 00@23 00
Car wheels	.....	16 00@17 00
Cast borings	.....	8 00@ 8 50
Turnings	.....	10 00@11 00

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c ½ lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city ½ bbl.

CEMENT.—Imported, \$2.15@2.65 ½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 ½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

COAL.—San Francisco, coast, yard



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## Undeveloped Resources.

Every mining State and region of the West has undeveloped mineral resources, no matter what their previous history may have been. The gold and silver mines are always first to be developed it would seem. This is due largely, if not wholly, to the fact that gold and silver are in demand; there is no competition in their production; the product is readily disposed of and at the highest price to those eager to buy. Moreover gold and silver, generally speaking, are more easily obtained than most other metals and minerals, and their treatment more simple than most other ores, and there is an immediate and constant demand for them. For these reasons gold and silver mines are the first to be developed in the mining regions of the West, but their development and operation at once creates new needs, and many of these must be supplied by the mines of other metals and minerals. Cities spring up as a direct result of the operation of the gold and silver mines. Buildings require stone, lime, bricks and terra cotta in their construction, and these are taken from the neighboring hills where they can be found. Quarries are opened, lime kilns are built and operated, brick yards

none of which are at present in operation, but the day is not far distant when this great basal industry

material advantage of the West.

In addition to these undeveloped resources there are still in the forest-clad mountains of Oregon, Washington, Montana and Idaho; in the Sierras of California; in the rugged desert hills and valleys of Nevada, Utah and Arizona, and in the heart of the Rocky mountains in Colorado, many undeveloped and even undiscovered deposits of gold, silver, copper, lead and zinc which in future years will be the basis of a great industry. There still remain deposits of borax, soda, gypsum and marble, and many other minerals as yet untouched.

The reason for this is largely due to lack of transportation—a factor in the mining industry of paramount importance, and particularly as related to base metal mining and the production and marketing of the earthy minerals and structural materials, but time will change this and means of transportation will be provided which will make all that are now known available, and will aid in the discovery and development of those the existence of which is, as yet, unsuspected.

THE State of Illinois has a law which has been sustained by the appellate court of that State making it a misdemeanor to employ boys under the age of 16 years at any hazardous occupation, including mines. There are said to be over 2500 boys under the age of 16 years who have found employment in the coal mines of that State. There are 973 coal mines in that State.

and potteries spring into existence. Soon sulphide ores are developed in the gold mines and the chlorination process is often turned to. This demands manganese oxide from the mines and salt from the marshes. Sulphuric acid may be made as a by-product of the roasting of the rebellious pyrite. Fuel must be had to furnish heat and steam for power. Coal mines and oil wells supply this need better than any other fuel, and often less expensively.

In time copper mines are also developed, though in some instances these are the first to attract attention, because the product is available and the metallurgy of these ores is more simple. Every Western State has large deposits of iron ore, and although this—the iron industry—is the foundation upon which all industrial life is built, yet, strange to say, it is usually the last to receive attention. This is, of course, owing to economic causes. In the United States the mines of the Lake Superior region, Pennsylvania, Alabama and Missouri supply iron and steel cheaper than they can be made, apparently, west of the Rocky mountains. But this is gradually changing, for to-day large iron mines are being developed and operated in Colorado, Wyoming and Arizona, and even in Mexico great iron and steel plants are projected to replace the smaller affairs already in existence. Utah, Montana, Nevada, California, Oregon and Washington all have great iron deposits,

of our national prosperity must be equipped and operated in the West at a profit, and to the greater



Black Oak Hoist, Soulsbyville, Cal. (See Page 410.)



Black Oak Mill, Soulsbyville, Cal. (See Page 410.)



Providence Mine, Tuolumne County, Cal. (See Page 410.)



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## Production of Gold and Silver in 1903.

An advance sheet of the statistics of annual production of gold and silver in the United States in 1903 has been received from the United States Geological Survey, which contains the surprising statement that in that year Nevada's output of the precious metals, due chiefly to the shipment of rich ore from Tonopah, "made Nevada the leading State in the Union in the production of gold and silver in 1903." According to the "Mineral Resources of the United States" for 1902, issued by the United States Geological Survey, the production of gold in Nevada in 1902 was \$2,895,300, and \$1,985,486 (commercial value) silver—a total of \$4,880,786. As the advance sheet states that the increase in production of gold and silver in Nevada during 1903 was \$492,700, the total output for 1903 for that State should have been about \$5,373,000. As there are several States which in 1902 are known to have produced considerably in excess of this amount, and in which the falling off, if any, in mineral production has been comparatively slight, it is clearly evident that Nevada, although increasing production rapidly, is still far from leading in the output of precious metals. In 1902 Alaska produced over \$8,000,000, which was increased in 1903; California produced over \$17,000,000 in 1902 and nearly the same in 1903; Colorado over \$36,000,000 in 1902 and about \$30,000,000 in 1903; Montana produced over \$11,000,000 in 1902 and nearly as much in 1903; South Dakota in 1902 produced over \$7,000,000 and nearly the same in 1903; Utah's production in 1902 was over \$9,000,000 and exceeded this in 1903, and Arizona produced \$5,725,143 in 1902 and showed an increase over this in 1903.

These figures merely indicate that, although Nevada is rapidly increasing her output of precious metals, and that while the statistics for 1904 will probably show a still further increase over 1903, that State is not in the lead as stated by the bulletin of the United States Survey, but really is number seven in the list.

Naturally the United States Geological Survey is looked to as a source of reliable information, but such

statements as these, bearing the names of the director of the Survey and of the director of the Mint, are not only misleading, being absolutely incorrect, but tend to throw a shadow of doubt over all of the official figures of the Survey. These bulletins are prepared in Washington and sent throughout the world for the purpose of giving advance information. Doubtless the official report will, when issued, be found correct, but there seems no good excuse for the advance sheets containing so flagrant an error as that above referred to.

## An Interesting Report.

The annual report of Stratton's Independence mine at Cripple Creek, Colo., recently issued from the London office, for the year ending June 30, 1904, shows that during the year 43,758 tons of ore were shipped to mills and smelters at a cost of \$24.29 per ton, the gross value of the ore being but \$21.695 per ton, resulting in a loss to stockholders of \$2.595 per ton. The cost of mining per ton seems high—\$5.182—but this is due to the fact that the values occur in a zone of reticulated rich seams, and a large amount of ground must usually be broken to secure a ton of payable ore. The cost of blocking out ore is stated to have been \$4.131, and this, with other expenses of practical operation, is considered as not extraordinary in a mine of the character of the Independence.

There are, however, expenses which seem unusually heavy and which represent the difference between success and failure, if they could be eliminated. The item of foremen, for instance, is \$0.265 per ton, or over \$11,500 per year for underground superintendence; that of watchman on the surface is about half as much—nearly \$6000. The cost of hoisting, tramming, sorting and loading ore is over \$2 per ton; but this again is due to the character of the mine and of the ore. The combined salaries of manager and consulting engineer were nearly \$40,000 for the year and the expenses of the London office exceeded \$17,000, in addition to which over \$5000 was expended on a special expert examination of the property. Over \$10,000 was spent in settlement of claims on account of the accident at the mine, when a number of men lost their lives as a result of overwinding.

As the total loss on the year's operations is stated by the report to be only about \$11,000, a casual study of the report indicates that there are several items of extraneous expense which, if omitted, would change the balance from the loss to the profit side of the account.

The mine report furnishes a fair illustration of the topheavy organizations occasionally formed abroad (and sometimes at home), for the management of mining properties. Mines, greater in extent and of greater intrinsic worth, are successfully operated in the United States without expensive and unnecessary attachment of such costly management, and where watchmen do not cost so much, nor the head office expenses absorb so large a portion of the gross output of the mine. It is such flotations that often do harm to the advancement of legitimate mining, for those who would ordinarily become investors look with suspicion upon any mine promotion, after having been a stockholder in a concern run on apparently extravagant management.

That the mine in question had the elements of success within it during the fiscal year covered by the report is self-evident, but the result of even such magnificent management must prove unpalatable to stockholders, for they cannot help making a comparison between the result and the eminently satisfactory outcome of working numerous mines in Cripple Creek district under other systems clearly applicable to this mine.

SOME of the niceties of discrimination in the classes of work and pay made by trade unions cannot fail to have a reactionary and disastrous effect upon themselves. As an instance, a man who is listed as a particular kind of an artisan is allowed to work a stated number of hours daily at his trade receiving a stipulated daily wage. He cannot work as a helper at this trade, for a less rate of wages, even though he be otherwise unable to obtain employment. Each man is placed in his particular class and there he must remain, no matter what the result to himself and others associated with him.

## Water Rights.

A subject of great moment to miners of the Western States is that of water rights, and yet this is a subject upon which there has been comparatively little legislation. Contests over the appropriation and use of water have been numerous enough, it is true, and as an outcome of these many causes we have a large number of court decisions which take the place of laws enacted by legislative bodies. This judicial legislation covers many phases of the appropriation and use of water in the Western States. In the early mining days in the West a new code of rules and regulations was evolved, differing materially from the common law covering water in the East and in England. In those days mining was the most important industry, overshadowing every other, but with the development of the country other industries came into existence, and the miners' law of water appropriation and use began to receive criticism and, finally, opposition. As previously stated, many suits at law resulted, and it is largely these decisions which constitute the law of the West in all matters appertaining to water. Elsewhere herein is the first of a series of papers on "Water Rights in California," considered from a legal standpoint, and is the first extensive treatment which this important matter has received outside of the pages of law books. For reference these papers will become valuable to all those interested in the law of appropriation and use of water in California, and also to some extent, in other Western States outside of Nevada, where mining is still the paramount industry, and where all judicial decisions in water cases favor the miner.

## A Boston Enterprise.

Many and devious are the ways of wary men who work the unwary with meretricious mining schemes, though seldom is much notice given herein, as our readers are of the intelligent class who need no exposure of dubious measures. But a case just to hand deserves brief notice, as illustrating the brazen nature of such creatures. In Challis, Idaho, is published a creditable local paper, the Messenger, which tries to have a good word for legitimate mining development and has justly earned a good reputation for accuracy. A Boston concern, trading in the truthfulness of the Idaho paper, has issued a facsimile of the Challis Messenger, reading matter, advertisements and all, calling it the Messenger and purporting to be published at Challis, Idaho, but with "booming" notices of sundry mine prospects of alleged value, that would not find place in the paper that is thus so flagrantly counterfeited. The Challis paper proposes to prosecute the enterprising Boston gentlemen. Probably that is what they want; anything for notoriety. It certainly is natural for a reputable paper to seek some vindication in such case, but its proprietor cannot get any substantial judgment for the manifest injury done him, and suit would only give them further advertising. The United States postal authorities could probably be of most assistance in such a case.

THE progress and improvement of the past ten or fifteen years in mining methods is due, not to the effort of any particular mine manager, or set of managers, but comes from every corner of the world. The mining practice of the Comstock Lode during its best days was taken to every corner of the world where these methods could be applied, and they have been improved upon ever since, until today the mine methods of Australia are as well known in the United States as those of the United States are known elsewhere. The best of the various methods are applied in each case and the result is improvement. At first large stopes were timbered by the square set method; as a matter of necessity the filling method was adopted. Now, where permissible, the square set method has been modified in such a manner that a large portion of the system can be dispensed with, filling alone taking its place, and in some instances large stopes are extracted and filled without any timber being employed at all. This latter method is applicable to many mines, but the cost of labor is likely to prohibit its use in any county except where unskilled labor is extremely cheap, which is not likely soon to be the case in the United States.



## CONCENTRATES.

THE oil process saves the finest slimes in tailings from Wilfley or other concentrating tables. For close work it is necessary that sulphides have a fresh surface; oxides cannot be treated.

\*\*\*\*

It is not an uncommon thing for structural materials in gold-mining camps to carry appreciable amounts of gold. The mortar and bricks often are made from gold-bearing clay and tailings.

\*\*\*\*

WHERE crude oil is used for fuel under boilers, the oil may be kept fluid by carrying the exhaust steam from the engines in a pipe placed in contact with the oil pipe line leading from the oil tank to the burners.

\*\*\*\*

THE possibilities in an idle mine, presumed to be worked out, cannot be estimated by comparison with what it has already produced. It must be developed and new ore bodies sought in unexplored ground.

\*\*\*\*

CRUDE PETROLEUM is successfully used in reverberatory furnaces in the reduction of ores at various places. A furnace of this type built for wood can be easily fitted with oil burners. It is usually found necessary or desirable to heat the oil for the best results.

\*\*\*\*

It would be difficult to determine the probable cost of driving a tunnel without knowing something of the character of the ground other than the statement that it is soft. Soft ground, if wet, often gives more trouble than that which is hard and requires no timbering.

\*\*\*\*

TIMBER can best be lowered into a vertical shaft beneath a skip, cage or bucket suspended by means of a rope and large clevis and bolt. In the bottom of the timber a dog, with rope attached, should be driven to facilitate landing when the timber has reached the station where it is to be taken off.

\*\*\*\*

MANY of the largest mines of the Cripple Creek, Colo., district have veins or zones of rock through which the values are irregularly scattered in bunches and small bands or veinlets, and all such ore must be washed and sorted before shipping to the smelters or mills for treatment, making the mining cost unusually high per ton.

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SEVERAL mining States have laws making it unlawful and a misdemeanor to use a metal bar of any description for tamping a blast. It is believed that metal is so rigid as to communicate too great a shock to nitro powder, rendering its use dangerous. Where black powder is used there is danger of a spark prematurely discharging the blast.

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PRODUCER GAS is an inflammable gas made in a closed chamber called a "producer." It is accomplished by passing a mixture of steam and air through a bed of incandescent fuel (coal, charcoal, etc.). The fuel is converted into fixed combustible gases, only the ash remaining. Producer gas is used in gas engines and for heating, also in some metallurgical operations.

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VEINS have been known which had two outcrops or apices, as a result of a fold. Where separate owners have located on each apex, the vein in event of contest goes to the older locator. Such occurrences are rare. There were several such instances in Leadville, Colo., in the early history of that district; but, as the law of extralateral right never obtained there, there was never any controversy over this structural peculiarity.

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WHEN a tailings pile has not been tested by the cyanide process it is decidedly an unknown quantity. It may have the appearance of sands which will be easily leachable and yet there may be present sufficient slimes to render percolation slow if not impracticable. Some tailings consist of sands and slimes which together are an unleachable material, but which when properly sized results in two products, easily leachable sands, and readily leachable slimes. This demonstrates that the cyanide process in its application is always a matter for experiment, and a determination of the adaptability of the process is often a matter of difficulty.

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WHERE the physical conditions will admit, it is an advisable practice to break ore in stopes faster than it is drawn away into cars at the chutes, the men engaged in stoping standing on the broken ore, only sufficient being drawn away to make working room—usually about one-third of the amount broken. In this way a large tonnage of ore becomes available which may be drawn upon in the event of any unforeseen circumstance which may necessitate the stoppage of stoping operations. The ore is stored in the stopes in the same manner as in bins on the surface and only needs trammers to draw it off to send it to the surface.

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SOME States have laws which impose a penalty for keeping nitro powder and caps together. The powder is rarely known to explode without the aid of caps, although a heavy concussion is usually sufficient to explode the powder alone. Shooting into nitro powder with a pistol or rifle will almost invariably result in an explo-

sion. Powder should always be handled with care, and new cases opened with caution. A few months ago a miner attempted to open a box of powder with a pick in much the same manner as wooden barrels of lime and cement are opened. He was killed by the explosion which resulted.

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WHEN charging a hole with nitro powder the powder cartridge should be slit with a knife on 3 or 4 sides so that it may yield readily to the pressure of the tamping stick. The tamping should be firmly but carefully rammed, avoiding excess of shock, particularly when introduced to the hole. The detonators should be at least XXXX, and XXXXX and XXXXXX are better. The more complete the detonation and blow of the primer the more complete is the explosion of the powder, and consequently the more effective is the blast. The placing of a blast requires as much good judgment for the best effects as the placing of the hole.

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WHERE an incline shaft is small and it is desired to run a skip of largest possible capacity, the skip may be built deeper than those usually constructed. Capacity may also be gained by placing the skip wheels on lugs solidly bolted to the sides of the skip, which permits the body of the skip to sink between the wheels to the level of the rails or below them. It is unwise to place air, ventilating and other pipes in a shaft compartment which is also used for hoisting, as they take up much room that could be used to greater advantage otherwise. Bell wires should be placed within easy reach of men riding on skip or cage in each compartment of the shaft used for hoisting.

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WHERE a mine is developed but has no plant for the treatment of the ore, the cost of such plant is charged against the ore, and if the amount of ore in sight be comparatively small, the charge per ton for such installations must be correspondingly high. Those intending to place their property on the market for sale will do well to bear this fact in mind, as in some instances all that the miner has figured as profit may be charged to equipment by a prospective purchaser. A mine with \$200,000 worth of net ore in sight—ore which should pay this amount in profit over reduction costs, may require the expenditure of this sum or more in plant, which leaves only the possibilities of the future as an asset to the mine.

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AN innovation was made some time since at the Ferreira mill at Johannesburg, S. A., when the use of concentrators was discontinued. The belts were taken from the machines, the end travel thrown out of gear, and copper plates placed on each machine frame, to which the vibratory motion of the machine was imparted, and over these the pulp from the batteries was run. On these shaking copper-amalgamated tables, between Nov. 1, 1903, and Aug. 31, 1904, was secured 4342 ounces of amalgam, which retorted 1302 ounces fine gold, and this after the pulp had passed over the silvered-copper amalgamation apron plates in front of the battery. It is claimed the most of this gold was obtained from the so-called black sands, which, in the cyanide treatment, yielded only 45% of their value.

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THE life of a hoisting rope depends largely upon its usage. If it be kept well lubricated, and no acid waters attack it, and if it be not wound over sheaves and drums of too small a diameter it should outlast one where these precautions are not taken. A rope which is run at slow speed will undoubtedly last longer than if it were run at a high rate of speed under otherwise the same conditions. The number of trips a rope makes is an important factor also. It would seem that this is the real test of the durability of a hoisting rope, rather than the number of months or years the rope will last. A rope will deteriorate even if it is not used at all, for rust is almost certain to attack the interior stands, weakening the rope and in time destroying its capacity for usefulness.

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It is stated by authority that the expense of transporting and putting up an aluminum line for electrical purposes is less, the durability greater and the cost of maintenance below that of a copper line of equal current carrying capacity. The advantages are in a measure offset by the greater difficulty in making joints and to the great sag in long reaches, due to the large coefficient of expansion of aluminum and lack of strength of aluminum wires of the size ordinarily employed for electrical purposes. The specific gravity of aluminum is 2.68, that of copper 8.93; conductivity of aluminum 62, copper 97; tensile strength of aluminum 28,000 pounds per square inch, of copper 45,000; cross section for equal resistance—aluminum 1.56, copper 1; diameter of equal resistance—al. 12.5, cu. 1; weight for equal resistance—al. 0.47, cu. 1; tensile strength for equal resistance—al. 0.96, cu. 1. The best joint for aluminum wires smaller than No. 0000 (B. & S. gauge) is made by inserting the two ends into a piece of flattened tube and the tube given 2½ twists by means of two pairs of wire connectors. Larger wires can be joined by the usual dovetail splice by means of terminals compressed on the ends at the factory, or by placing the ends into a cast sleeve and compressing them in a portable press.

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PURE GRAPHITE is pure carbon, but most natural graphite is contaminated by the presence of various

earthy impurities. When considering the possible value of a deposit containing graphite there must be noted whether it is crystalline or amorphous (without crystalline form); the percentage of graphite in the ore; the character of the impurities present—as quartz, mica, clay, iron oxide, etc.; whether or not these impurities can be successfully and cheaply eliminated; for what purpose the cleaned graphite can be employed; and it must be determined before any plant is built whether or not the graphite can be cleaned so as to make a merchantable product. Graphite is produced artificially by heating to a very high temperature amorphous carbon in the electric furnace; by dissolving an excess of carbon in molten metal, when, on allowing the metal to cool, the carbon separates out as graphite. Another method, the one employed at Niagara Falls, N. Y., is to heat in the electric furnace carbon in association with one or more oxides (iron) to a temperature so high as to cause a chemical reaction between the constituents, and then continuing the heating until the combined carbon separates in a free state.

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THE tin mines on the Rancho San Jacinto, about 7 miles south of the town of Corona, are opened on veins in granite. The tin occurs as oxide (cassiterite) in quartz associated with a large amount of black tourmaline, which occurs as a mass of fine black short needle-like crystals. Some of the ore is rich in tin, being nearly pure tin oxide, but ordinarily it is disseminated in grains and small veinlets through the gangue. The mines were opened nearly fifty years ago, but after a brief career were abandoned and remained idle until about 1890-91, when an English company reopened the works, sunk new shafts, and spent a large amount of money in surface equipment. Some tin was produced, but the expenses were so heavy that no profit resulted from the operation, and the mines were not sufficiently developed to maintain production. The plant was closed down in 1891 and remained idle until recently when work was recommenced by leasers, who it is reported have undertaken the development of the several tin bearing veins. One of the outcrops on the property is about 25 feet wide, but as the showing of tin at the surface is very low only superficial development has been done at that point. The greatest amount of development work is on a small vein carrying the rich ore.

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ANNUAL assessment work may be done on one claim to hold a group of claims, but it must be clearly shown that the work so done at one point is for the benefit of all the claims of the group. It is not sufficient that the claims are contiguous, though this latter condition is a pre-requisite. The Idaho court has recently decided a case where a portion of a group of claims was relocated for failure to perform the assessment work as required by law. The claims were placers, were contiguous, and sufficient work was done on one of the claims to hold all, but the owners could not show that the work so performed was of actual benefit to the remainder of the claims of the group, while the other side to the controversy had no difficulty in showing that the work done, although exceeding \$5000 in amount during one year, was of benefit only to the claim where the work was done, and of no advantage whatever to the remainder of the claims of the group. It is unlikely that any court would find against a locator owning several adjoining claims on one stream, who did all of his assessment work on the lowest claim on the stream, as that is the natural way to work placer ground—the lowest ground first—as this is essential to the proper drainage of the claims higher up on the stream. The same applies to quartz locations. If it can be shown that the work done on a single claim is an advantage to the adjoining claims that is all that is necessary if the amount of work is sufficient to represent \$100 worth for each claim.

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FIVE or more persons may form a corporation to carry on mining business in the State of California, and a majority of the incorporators must be residents of the State. Articles of incorporation must be drawn which shall contain the name of the corporation, the purpose for which it is formed, the place where its principal business is to be transacted, the term for which it is to exist, not exceeding fifty years; the number of its directors or trustees, which shall not be less than five, and the names and residences of those who are appointed for the first year; the amount of its capital stock and the number of shares into which it has been divided; if there is a capital stock, the amount actually subscribed and by whom. The articles of incorporation must be signed by five or more persons, a majority of whom must be residents of the State and acknowledged by each before some officer authorized to take and certify acknowledgements of real property. As a prerequisite to filing the articles of incorporation there must be paid in for the benefit of the corporation, to a treasurer elected by the subscribers, 10% of the amount subscribed. Upon the filing of the articles of incorporation in the office of the county clerk of the county in which is situated the principal place of business, and a copy thereof certified by the county clerk filed with the secretary of State, the secretary of State must issue to the corporation, over the great seal of the State, a certificate that a copy of the articles containing the required statement of facts has been filed in his office, and thereupon the persons signing the articles, and their associates and successors, shall be a body politic and corporate by the name stated in the certificate and for the term mentioned in the articles of incorporation.



## Water Rights in California.

Written for the MINING AND SCIENTIFIC PRESS by  
SAMUEL C. WIEL.

**HISTORICAL.**—The law of water in California is built in two parts. One part came with the general body of the law from the older States, and to them from England—the common law of riparian rights. The other part had its birth in California and was developed on the western slope alone—the law of appropriation. At the outset the latter took a strong hold, and was intended to replace the other system completely. That was because the law of appropriation grew out of the customs and necessities of mining, and mining in those days in California surpassed everything else in importance. To-day it is somewhat different, because California is now a great commercial and agricultural as well as a mining State. The law of appropriation is still applied, but, in fact, to a less extent than the law of riparian rights.

The law of appropriation arose in the early days when the pioneers were, perhaps, aided in drifting into it by the Mexican law which they found there. The Mexican law regarded the use of water as a common right, to be taken advantage of by any inhabitant of neighboring pueblos. The pioneers had to have water to work their mines, and this common right must have encouraged them to take the water wherever they could find it. Certainly that is what they did. Later comers, among themselves, grew to regard that as proper. The principle of "first come first served" became a firmly established custom in the use of waters. It served its purpose well—in fact, in Nevada, where mining remains of predominating importance, it is still the only rule. The miners in California pressed this custom upon the courts very early. Lawyers in mining regions depend more on their own reasoning and originality than on precedent. It was forced upon them partly by the rough and ready spirit of mining camps and partly by the lack of books and of facilities for reference. As early as the third volume of California Reports the matter was before the Supreme Court of California, but the court was not ready to declare this custom lawful. In the year 1855, however, the universal acceptance of it was so clear that the Supreme Court declared it the law of the State. (Irwin vs. Phillips, 5 Cal., 140.) It was not done by statutory legislation, but by a decision of the Supreme Court, entirely hostile to what was and still is known as the common law rule, which the Supreme Court was supposed to declare. True, the courts said they were in true harmony with the common law, because of the deeper seated rule that established customs will always be taken into consideration by the judges, but it has since been acknowledged that the decision was actually hostile to the common law—a proper decision, however, because the old law was not suited to existing conditions, and only such law is brought with settlers into new communities as are suited to their conditions. The principle of appropriation was affirmed by the Supreme Court of the United States (Atchinson vs. Peterson, 87 U. S., 507, and later cases).

Thereafter California grew into a settled agricultural and commercial community, resembling more and more the older States and needing more and more the older law that had been replaced. Riparian rights were mentioned occasionally in the cases, but the understanding had become general that riparian rights were entirely out of favor in California. The early legislation was strongly in that direction. An Act authorized a miner to enter upon agriculturist's land and, if he paid for it, actually take the water, ditches, etc., for his own use, though he was not the first comer at all. It was enough if he was the first miner. But this was held unconstitutional (16 Cal., 154; 23 Cal., 452). The law of riparian rights was, however, firmly established again in 1886 by a decision of the Supreme Court mainly independent of legislation. A case arose out of the use of the Kern river for irrigation, the case of Lux vs. Haggin, 69 Cal., 255. The defendant, J. B. Haggin, having organized an irrigation company, claimed the right to divert the waters of the Kern river by an appropriation to that effect, denying that any rights which under the rule of riparian rights would have prevented this could be recognized in California. It is probably the most extended opinion in California reports. The previous cases had almost all arisen out of mining, but here was one in the San Joaquin valley, and it showed how the law must consider water rights of immense value, though where mining was in no way concerned. Among other things the Supreme Court said: "The doctrine of appropriation, so called, is not the doctrine of the common law," and, deciding against Haggin, held that the doctrine of appropriation and the old rule of riparian rights existed in California together, in a way that, as will appear hereafter, makes the latter really overshadow the former. At the time of this decision C. C. 1410 read, "The right to the use of running water flowing in a river or stream or down a canyon or ravine may be acquired by appropriation," and C. C. 1422 read, "The rights of riparian proprietors are not affected by the provisions of this title." But the decision was reached on common law principles, of which the latter section was said to be merely declaratory, so

that the result would have been the same had C. C. 1422 never been enacted. This had been forecasted in "Pomeroy on Riparian Rights" before Lux vs. Haggin arose. In other States this restoration has been urged also. But in Nevada, for example, they refused to have anything to do with riparian rights and would not follow Lux vs. Haggin, though that case was commented upon. (20 Nev., 269.) In "Farnham on Waters" the Nevada court is sharply criticised for this action.

The law of appropriation is still of first importance to the miner, however. Its practical interest to the readers of the MINING AND SCIENTIFIC PRESS is relied on to justify this attempt to collect and state the rules which California decisions leave us to-day. In some respects there have been important modifications from the early law.

**WHERE AN APPROPRIATION CAN BE MADE.**—1. An appropriation can be made only on unoccupied public lands of the United States, or of the State. As to public lands: Of federal lands the National Government is the owner, and has full power to dispose of them as it sees fit. Congress has made the rule of appropriation apply to them, first, by tacit acquiescence in early customs of miners (whose operations were, of course, almost entirely upon public lands), now by express provisions in Sections 2339, 2340, Revised Statutes.

"The principle of prior appropriation of water on the public lands in California, where its artificial use for agricultural, mining and other like purposes is absolutely essential, which has all along been recognized and sanctioned by the local customs, laws and decisions, was thus expressly recognized and sanctioned by the Supreme Court of the United States,

sions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the right of way for the construction of ditches and canals for the purpose herein specified is acknowledged and confirmed; but whenever any person, in the construction of any ditch or canal, injures or damages the possession of any settler on the public domain, the party committing such injury or damage shall be liable to the party injured for such injury or damage.

Revised Statutes, Section 2340—All patents granted, or pre-emption or homesteads allowed, shall be subject to any vested and accrued water rights, or rights to ditches and reservoirs used in connection with such water rights, as may have been acquired under or recognized by the preceding section.

Of State lands likewise the State is the owner and the State has likewise made the law of appropriation apply to them, by Sections 1410-1422, Civil Code. (Lux vs. Haggin, 69 Cal. 255.)

(TO BE CONTINUED.)

## Derrick for Handling Placer Boulders.

Written by DENNIS H. STOVALL.

The derrick is becoming a fixed feature in the equipment of many southern Oregon and northern California placer mines, at least, in those diggings where huge boulders are encountered. The most disagreeable, annoying and expensive part of placer mining, in some channels, is "bucking" boulders. They are too large to be juggled by the giant, and even though moved in this way will later cause trouble by choking the sluice. The old way was to turn



A Placer Mine Derrick in Oregon.

and also by the act of Congress of 1866. And in keeping with this policy, Congress further provided, in Section 17 of the amendatory act, approved July 9, 1870, (Copp's Mining Decisions, 1873-74, p. 296), "that all patents granted or pre-emptions of homesteads allowed, shall be subject to any vested and accrued water right or rights to ditches and reservoirs used in connection with such water rights as may have been acquired under or recognized by the ninth section of the act of which this is amendatory, to wit, the act of July 26, 1866." The above words were used in Osgood vs. Water Co., 56 Cal. 571.

The provisions of the Statutes of 1866 and 1870 there referred to are those now incorporated in Sections 2339 and 2340, Revised Statutes, and are as follows:

Revised Statute, Section 2339—Whenever, by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes, have vested and accrued, and the same are recognized by the local customs, laws and the deci-

aside the giant, drill a hole in the big stone, put in a stick of dynamite, and the explosion did the rest. But this was an expensive method.

A derrick, similar in construction to those used in stone quarries, is found to solve the problem completely. The main mast, which is made of tough, yellow fir, is from 35 to 50 feet high and is fitted by a revolving pin to a steel plate at the base. It is guyed by cables which are easily adjusted, and the whole affair can be quickly moved to accommodate the placer operations. The jib, or boom, is fitted with a joint at the foot of the mast, with block and pulley at the end, and the whole can be lifted and swung around when the load is raised. Loads of four or five tons are easily handled by the crane platform of this derrick.

Donkey engines are used in some diggings to supply power, but the most economical method is to use a water motor when the supply and pressure are adequate enough to permit. The motor is sometimes attached by a fire hose to the main pipe line.



## Cyanide Practice at the Maitland Properties, South Dakota.\*

NUMBER 11.

Written by JOHN GROSS.\*

**STAMPS.**—The two battery bins, each of 150 tons capacity, are situated one behind each set of twenty stamps. The ore falls through chutes to suspended Challenge feeders, one for each battery of five stamps. The mortar is narrow, of single-discharge type, 12 inches wide at discharge, and a 6-inch discharge is maintained, crushing the ore to 26 mesh. The screens used are 26x13-mesh, No. 26 wire; this screen having a longer opening does not clog so readily. The screens used are also rolled, which helps to keep the holes open. The life of the screens now installed is about fifty days. Two sizes of screen frames are used, the larger size taking a 12-inch clear height of screen, and, after it has become worn at the top and bottom, it is removed, cut down and placed on the smaller frame, taking an 8-inch clear height of screen. This arrangement increases the life of the screen almost one-half.

The weights of the various parts of a new stamp are: Shoe, 150; boss-head, 250; stem, 375; tappet, 135; total, 910 pounds.

Ten cams are on one shaft; the cam shafts revolve in babbitted boxes without caps, which simplifies the re-babbitting and lubrication. The stamps drop ninety-seven times per minute, from 7 to 8 inches, the order of drop being 1, 3, 5, 2, 4.

At present chrome steel shoes and dies are mainly used, but other materials also have been used, both in practice and for experiment.

Comparative results of work of the shoes and dies are being obtained.

The battery solution is kept at a strength of from 1.2 to 1.3 pound of KCN and a protective alkalinity corresponding to from 0.8 to 1 pound of NaOH per ton of solution. Two solutions only are used in the mill—the battery solution, as noted above, assaying about 50 cents in gold per ton, and the barren solution with a strength of from 1.5 to 1.6 pound KCN and a protective equivalent of from 1.0 to 1.2 pound of NaOH per ton of solution.

The lime, which is fed with the ore in the battery, has an average composition of: CaO, 92.5; MgO, 0.5;  $Al_2O_3 + Fe_2O_3$ , 2.0; insoluble, 1.5; and  $H_2O + CO_2$ , 2.5%.

The stamp duty per day was not high, averaging 2.66 tons during the latter six months of 1903 and 2.80 tons for the first five months of 1904. During May, 1904, the stamp duty was increased to 2.96 tons per day. The quantity of solution going to the battery was between four and five tons to one ton of ore, which, in connection with the hardness and compactness of the ore, accounts largely for the small stamp duty.

The stamps deliver a product carrying about 60% of sands and 40% of slimes, the latter being that portion of the ore the addition of which to water will render it muddy; sands, no matter how fine, leave the water clear; and, because of this sharp line of distinction, the separation of these two products in the laboratory can easily be made in a gold pan.

The losses of time in running the battery during the past ten months, working with a full shift, were: Extraneous causes 4.20%, general mill repairs 0.41%, engine shutdowns 0.07%, sand pumps 0.16%, cone system 0.06%, general battery repairs 0.35%, short of iron 0.30%, renewing iron 0.18%, total 5.73%. Of this total loss it is seen that but 0.83% of the full running time was due to the stamps proper, which is equivalent to about six hours' shutdown per month.

**SEPARATION.**—The separation of the slimes from the sands is one of the most, if not the most, vital factors in the wet crushing process. Several systems were formerly tried, but they proved to be inadequate. This present method of separation differs from the classification made in concentration in that only a single separation of sands and slimes is made. The system used and elaborated by C. W. Merrill at the Homestake mill, of using successive cones for throwing off the slimes, and finally using an upward stream for producing a clean sand, seems to be simple and efficient, and is now in use, in a more or less modified form, in all of the wet crushing mills in the Black Hills.

We have found it to be advisable in the separation to make a clean sand rather than a clean slime, a charge of sand with 5% or more of slimes giving us a low leaching rate. Therefore, we are making this clean sand at the expense of throwing some sands into the slimes. These sands are, however, very fine and cause no trouble in the slime department and assay after treatment the same as the slimes proper.

The pulp that the battery delivers flows to two sand pumps, 54 inches by 10 inches, making nineteen revolutions per minute, and is raised 20.5 feet to a regulating box, 3 feet by 6 feet by 3 feet deep, for delivery to two upper cones, and is intended primarily to take care of the intermittent discharge of the sand pumps, and is provided with a screen to catch any foreign substance, thus avoiding the choking of the cones.

These two upper cones are simple in construction,

being 42 inches diameter at the top and having vertical sides for 12 inches down, at which point the cone starts at a 60° slope, ending in a 6-inch diameter sorting column with a 2 inch discharge at the bottom provided with a cock.

The partially cleaned sands, containing from 25% to 30% of slimes, discharge at the bottom of the two upper cones, then combine and flow to one lower cone, of the same size and pattern as the upper ones, but provided with an upward current of solution. This upward current is taken, after partial settling, from the battery solution stock tank under a variable head of from 5 to 20 feet. While an absolute head is preferable, the fact remains that the head is kept fairly constant at about 15 feet above the overflow at the cone and gives practically no trouble. At rare intervals only does this head vary more than 1 foot either way.

The sands, discharging at the bottom, contain from 1% to 2% of slimes and pass direct to sands vats.

The slimes overflow from the three cones contains from 15% to 25% of sands, of which only a small portion will stay on a 150-mesh screen.

The products going to sands and slimes vats from the cones amount each to approximately 50% of the original ore. The average since the cone system was installed eleven months ago has been 49.03% to the sands and 50.97% to the slimes vats.

**TREATMENT OF THE SANDS.**—The clean sands from the lower cone, issuing with from 2.5 to 3 parts of solution to 1 part of sands, flow through a launder, having a grade of 7 in 100, to the distributor over the sands vats. The quantity of solution with the sands coming from the cone is not sufficient to carry them through the launder and keep the distributor open and running, and in order to overcome this hindrance enough solution is added in the launder to bring it up to at least 5 parts of solution to 1 of sands. The distributor is of the Butters type, having six arms, ball and roller bearing.

The sands vats, of which there are six, are 30 feet in diameter by 6 feet deep, having a lattice filter frame. Eight-ounce duck cloths are used on top of cocoa matting. The eight-ounce duck has a life of from eight to ten months and has been found to be more satisfactory and economical than the heavier grades. The sands vats hold 140 tons and are filled in about sixty hours.

The method of filling the sand vats through a vat full of solution has been discarded in favor of "dry filling"—that is, the vat contains no solution when starting to load, and all solution coming in with the sands is allowed to drain off as rapidly as it enters, thus keeping practically a dry surface on top of the sands. This method of filling gives a better leaching product, since the slimes with the sands are evenly distributed through the charge, an effect which does not occur in filling through a vat full of solution. It also gives a more porous charge, the average weight of 1 cubic foot of sands, as filled into the vats, being 93 pounds (calculated from eleven months' run). The specific gravity of the original ore averaged 2.7.

As soon as the vat is filled it is leveled with a stream of solution from a hose under a low head, and battery solution is run on for a period of ten days on the average. The small amount of slimes in the battery solution forms a thin coating on top of the charge and requires an occasional light raking in order to maintain a satisfactory rate of leaching. The battery solution is followed by barren solution for about six days more. The vat is then allowed to drain and 15 tons of wash water are passed through. The sands, now ready for sluicing, require from 100 to 150 tons of water for this purpose. The sand launder has a minimum grade of 8 in 100, which is necessary in order to keep it open.

An average of a large number of sand vats gives 900 tons of battery solution and 450 tons of barren solution for one sands vat treatment, exclusive of the solution filtering through the charge during the filling, which amounts to approximately 700 tons. This large quantity of solution, being nearly 10 tons to 1 of sand, together with a total treatment time of about sixteen days, is by no means excessive, for the reason that experiments show as large a volume as possible of weak solution should be kept constantly leaching through the charge.

**TREATMENT OF THE SLIMES.**—The overflow from the cones passes to two loading vats, which are filled alternately. There are eight slimes vats—including the two for loading—24 feet in diameter and 12 feet deep, all connected to two No. 4 centrifugal pumps, provided with hard iron linings, which can deliver to any one of the slimes vats. The centrifugal pumps have a 4-inch suction and a 4-inch discharge, running at 550 revolutions per minute, and handle 50 tons of wet pulp per hour. The stuffing box of the centrifugal pumps is supplied with solution or water under pressure to avoid undue wearing of the shaft and the cutting out of the packing.

The loading vats are provided with a partition through the center of the vat, extending to within 30 inches of the bottom, thus allowing the slimes to settle sufficiently so that the clear solution may be decanted from one side of the partition while the vat is being filled on the other side. The time of filling one of the vats is twelve hours, the stream being then turned into the other loading vat.

The slimes passing into the loading vat have 12

tons of solution to each ton of dry slimes, and during a loading of twelve hours about 150 tons (or one-half) of the incoming solution are decanted sufficiently clear to render objects visible through a distance of 2 or 3 feet. The loading vat, just filled, is decanted as closely as possible and transferred by the centrifugal pump to vat No. 1, forming one-half of a charge, barren solution being added at the same time. The material in the second loading vat, after decantation, is transferred to vat No. 2 as one-half of the charge with barren solution, and upon the decantation of these two vats the contents are combined, now constituting the full charge, are pumped to a third vat. Two more transfers and dilutions are then given with barren solution, and, finally, one with water. After each transfer and dilution several hours of agitation are given by pumping out from the bottom and discharging into the top of the same vat. For the past eleven months the average time of agitation for each charge was thirteen and eighty-seven one-hundredth hours during solution dilution and one and ninety-seven one-hundredth hours during wash water treatment.

It will be noted that the two largest dilutions are obtained on the half charges when the contained solutions are the richest. A charge of 60 tons of dry slimes from a twenty-four-hour run gets practically the following dilutions with barren solution:

First half charge .....	30 tons, 1 dilution of 100 tons
Second half charge .....	30 tons, 1 dilution of 100 tons
Full charge .....	60 tons, 3 dilutions of 65 tons

This treatment makes a total dilution of 395 tons, or a little more than 6.5 tons of barren solution to 1 ton of dry slimes, the actual figures for the past eleven months being 6.57 tons of barren solution and 0.93 ton of water per ton of dry slimes. Theoretical calculations on this amount of dilution, on the assumption that the total extraction has taken place before the first decantation, and taking the value of the barren solution at 10 cents per ton, the dissolved gold passing out with the slimes-tails should assay from 12 cents to 20 cents per ton solution, starting with a head solution of a value of from \$1 to \$2. However, the extraction has not all taken place, but continues slowly throughout the entire treatment, and for a period of six months the solutions finally going out with the slimes-tails showed an average value of 46.1 cents per ton, with an average value of \$1.80 for the head solution, and a value of 10.6 cents for the barren solution. During a period when precipitation was giving us trouble, the value of barren solution averaging 26.7 cents, the value of the head solution averaged \$1.48, and that of the solutions passing out with the slimes averaged 49.8 cents per ton.

The decantations are brought down to a pulp containing from 55% to 60% of moisture, 50% moisture being equivalent to equal weights of dry pulp and solution. After the decantation of the wash water the top layer of the thinner slimes is drawn off and thrown back to the charge next following. In this way we obtain dryer slimes going to waste, averaging for the past ten months 47% of moisture.

While the decantation process is far from ideal, it is the simplest one at present at our command. The results we have obtained from it have proven more satisfactory than experimental tests by other systems, yet it has openings for improvements, and we are now contemplating several changes by which we hope to decant to a drier pulp, by giving more agitation, which will not only bring the final loss of soluble gold to a lower point but will simplify the system as well.

**BATTERY SOLUTION.**—This solution, of which 1100 tons per day are used, is pumped by a 10x7x12-inch duplex pump to two stock tanks, 16 feet in diameter and 16 feet deep, at top of mill, and is distributed approximately as follows: Battery, 500 tons; sand vats, 350; cones, 150; launder, 100.

**PRECIPITATION.**—Only the richer solutions from the sand vats pass to the gold tank for precipitation, the balance of the sand vat solutions and all the decantations from the slimes passing to the battery solution sump.

All standardizations of solutions are made in the gold tank, thereby obtaining the benefit of the higher strength solution for precipitation—an arrangement which accounts for the higher strength of the barren solution above noted.

Four 8-compartment iron zinc boxes, of a total capacity of 224 cubic feet, and one 8-compartment iron box, of a capacity of 76 cubic feet, are used; hand cut zinc is used for the reason that it offers a better precipitating medium than machine cut zinc. It is, however, true that the consumption of zinc is heavier with machine cut than with hand cut zinc. This statement is based upon the actual results of working the two kinds of zinc side by side under precisely the same conditions—and we attribute this result to the hand cut zinc offering an easier escape for the hydrogen (thus avoiding polarization) than does the machine cut zinc, because the latter has a smoother surface.

(TO BE CONTINUED.)

A TAILINGS FLUME in the Black Hills of South Dakota, where the temperature goes very low in winter, has been given a grade of 8 in 100 which was found satisfactory.

\*Abstract Trans. A. I. M. E.



## Britannia Mines, Howe Sound, B. C.

Written for the MINING AND SCIENTIFIC PRESS BY  
WM. M. BREWER.

Situated about 30 miles from Vancouver by water, on the east shore of Howe sound, is the site on which are being built the concentrating plant and other buildings for the treatment and shipment of ores and concentrates produced at the Britannia mines, situated about 3½ miles in a southeasterly direction from the shore.

The development of these mines is the most important piece of work being carried on to-day in western British Columbia. The management of the work is under the direct personal supervision of G. H. Robinson of Utah, and the capital being invested is practically all being drawn from the United States.

These properties have a history, the parallel of which has not been often met with in many of the older mining camps. Although so comparatively close to the city of Vancouver, it was not until the autumn of 1899 that the occurrence of the ore bodies was generally known, but some years previous pieces of "peacock" copper ore had been picked up by men engaged in trapping in the neighborhood, which, however, excited but little interest, except in the minds of a few prospectors.

During 1898, when the first serious interest was being shown in lode mining on the coast of British Columbia, some trappers staked the Jane and Fairview mineral claims, which to-day are included in the group of claims which comprise the Britannia property.

The locators showed some of the samples they took from the outcrop to Mr. Turner, a fur buyer of Victoria, when they were selling him their season's catch. This gentleman in turn interested L. Boscowitz to such an extent that a visit was paid to the prospects and an option obtained. Later men were put to work to cut a trail and do some preliminary work. An open cut was made on the mountain side on the Jane claim, which exposed a body of bornite, carrying high values in copper. As a result of this work several mining men visited the locations, but it was not until the late autumn of 1899 that a deal could be made to sell the property. At that time, though, H. C. Walters, who had previously carried through the sale of the Snowshoe mine near Libby, Mont., had his attention called to the prospects on Howe sound, and succeeded in securing a bond from Mr. Boscowitz for seven-tenths of the property.

Mr. Walters interested several Montana mining men, who, together with two or three British Columbians, organized a syndicate to take over the property and carry on the prospecting work which had previously been commenced.

Each one of the original members of this syndicate subscribed for shares at the rate of \$125 per share, each member originally subscribing for ten of these shares. A little later more money was required, when each member doubled his subscription, which brought the actual paid-up capital of the syndicate up to \$35,000. As work progressed, and the possibilities of the property were realized, it became apparent that instead of its being a proposition of ordinary extent, carrying high or medium grade ore, it was a proposition of extraordinary extent, but carrying low-grade ore. The working capital necessary to equip and thoroughly open up a proposition of such extent was estimated at about \$500,000, and as the carrying on of the prospecting work alone, together with paying Mr. Boscowitz for the property, was costing a considerable amount, it was decided by the members of the syndicate to organize a company, capitalized at \$250,000, divided into 400 shares, each having a par value of \$625, and to open up the mine sufficiently to negotiate a sale to some company possessed of ample capital to properly equip and develop it. The stock of this company was issued to the original members of the syndicate on a basis of one share of new stock for one share of old stock, which required 200 shares. Of the remainder of the stock of the new company, twenty to thirty shares were sold at par, and the remainder retained in the treasury for future use.

So successful had been the management that there was a strong demand for Britannia stock, and within a short time after the new company was organized the shares could be readily sold for from \$500 to \$1000 each.

During 1900 representatives of nearly all the leading copper companies in England and the United States visited the group of claims and attempted to secure bonds on them. The purchase price named by the directors was \$1,250,000. Although several times it appeared that negotiations would be concluded, and the property sold, such did not occur until the winter of 1901-02, when G. H. Robinson, the present manager of the company, carried through a deal for the property by securing a majority of the issued stock, for which he paid at the rate of \$1500 per share. Later he purchased the three-tenths interest which Mr. Boscowitz had retained, and the entire property came under the control of one company. In order to purchase the three-tenths interest and carry on the work as it has been done since Mr. Robinson and his friends secured control,

the remainder of the treasury stock had to be sold and the capital increased to \$650,000.

The necessary action to accomplish this was taken a few days ago at an extraordinary general meeting of the shareholders, at which it was stated that Henry Stearn of New York had agreed to underwrite the entire increased capital at par, besides subscribing to a large block of the stock himself.

It is not often—in fact, is very rare—in the history of mining to find a property that has been handled so successfully and profitably that the original shareholders have been enabled to realize twelve times the amount of their investment before a ton of ore has ever been shipped, and that within two years from the time the investment was first made.

**GEOLOGY.**—Owing to the dense forest, the quantity of fallen timber and the abundant growth of sallow and other brush and ferns, it is very difficult to make a thorough geological survey of any of the country adjacent to the coast line.

Howe sound is one of those deep, fjord-like indentations or bays which are so common along the mainland coast of British Columbia. Glaciation, as well as eruptive action, are responsible for the formation of these sheets of inland water, and Howe sound is no exception to the rule—in fact, it presents all of the characteristics possessed by other bays and inlets along the coast. The mountain ranges reach high altitudes within a comparatively short distance from the shore lines. As an illustration, the work being carried on to-day at the Britannia mine is at an altitude of about 4000 feet, while the distance in a straight line from the shore is less than 3 miles.

The summits of the mountains in the near vicinity reach an altitude of about 2000 feet higher than that at which the mine workings are situated, while within 30 or 40 miles can be seen enormous glaciers which reach still higher altitudes.

The rock formations in the vicinity of the Britannia mine are apparently all of igneous origin, although the ore bodies occur in a schistose country rock, which at first sight might be taken for a metamorphosed sedimentary rock; but it is more probable, in the writer's opinion, that it is of igneous origin, and that the schistosity has been produced by shearing movements. As no attempt has ever been made to classify this rock by an expert petrologist, and it is evidently very much altered, it has always been known locally as the "Britannia" schists.

In width the extent of this belt of schists in several places must be fully 1 mile. While its length has never been explored to any great distance beyond the Britannia mines, towards the southeast, yet in the opposite direction the same character of schist has been found across Howe sound, but to what distance it extends is not known at present.

The line of strike of this belt of schist is north 70° west, magnetic. The dip is nearly vertical, the incline being towards the southwest.

On both the northwesterly and southwesterly sides the schist is bounded by granite. This rock apparently occurs as intrusive masses of very considerable extent.

The writer has examined the belt of schists nearly the entire distance from the beach to the Britannia property, and for a considerable distance on that property. It is noticeable that a very large proportion of the schist carries mineral, chiefly iron pyrites, and that there occur at irregular intervals very extensive lenses of highly siliceous ore, carrying copper and low gold values, as well as smaller bodies of higher-grade ore, a considerable proportion of which is bornite. The most extensive of these ore bodies, so far as development has determined to the present time, occurs on the Britannia property, but between its northwestern boundary and the beach there are several occurrences of ore bodies of considerable promise, but up to this time none of these have been developed to any extent beyond the regular assessment work.

From a casual examination it would appear as though the shearing movements which had produced the schistosity had been accompanied by a great, deep-seated lateral pressure, that had caused the formation of enormous fissures of lenticular form, and that these had subsequently been filled with siliceous material, and that probably the mineralization took place contemporaneously with the filling of the fissures. The mineralization of the schist itself can be readily accounted for as being accomplished through the agencies of mineral charged solutions, which percolated through the interstices of the schist. The most pronounced mineralization of the schist itself is always found to occur in the vicinity of the siliceous ore bodies, where it often reaches to a width of nearly or quite 100 feet beyond the confines of the ore body itself.

As this material will pay to concentrate and as the mineralization gradually grades off into barren schist, it is very difficult to say anything about either foot or hanging walls, especially as the ore bodies all lie en echelon to each other.

**CHARACTERISTICS OF ORE BODIES.**—One of the most noticeable characteristics possessed by the ore bodies proper throughout the zone of schist is that several of the most extensive occur as enormous bluffs in the mountain range itself. The largest of these, so far as is known at present, is that designated as the Mammoth Bluff, on the Britannia property. The ap-

proximate dimensions are about 600 feet long and from 200 to 250 feet high above the flat on which the mine buildings have been erected. The northerly side of this bluff is very precipitous and, this face being free from timber, at the first glance shows its character, which is that of a wall of slightly decomposed and very much altered quartz. In order to test the material, shots were put in every 20 feet in a diagonal line along the face of the bluff, starting at zero for elevation, and carried to the top where the elevation is 250 feet. As each one of these shots broke back to ore it was considered advisable by the management to drive a crosscut tunnel into the bluff and ascertain the character of the material of which it is composed. This tunnel has been driven about 200 feet, the entire distance being through a highly siliceous ore, which carries low gold, silver and copper values, but as the gangue is almost pure silica and the values held in iron and chalcopyrite, the material is all susceptible to concentration by water without excessive loss.

When the dimensions of this bluff are taken into consideration, together with the fact that this 200-foot tunnel, which is almost a crosscut, has been driven through ore the entire distance and that its face is still in ore, it must be presumed that this bluff alone will produce an enormous tonnage of ore. While, of course, no actual measurement of "ore in sight" is warranted with only two sides exposed, yet it would seem safe to say that there is in the neighborhood of 1,000,000 tons of what may be termed "probable ore" in this one body, and that amount can be mined before it is necessary to sink 1 foot.

This is not the only ore body on the Britannia. A short distance southwesterly from the northwestern limit of the Mammoth Bluff there occurs another, and although its face does not bear the same appearance as that of the Mammoth Bluff, yet it was on this one that the outcroppings were first prospected by an open cut of considerable extent, in which was found a body of high-grade copper ore, chiefly bornite. In order to prospect this occurrence of ore at greater depth, Mr. Boscowitz started a crosscut tunnel in the schist country rock, which was laid out to intersect the ore body exposed in the open cut, at a depth of 120 feet. This tunnel had been run but a short distance into the face of the mountain, when it was noticed that the schist through which it was being driven was highly mineralized with iron pyrites, and that the material carried low values.

But little attention was paid to this fact at the time, because in the first place the operators were eager to cut into the high-grade ore body they had exposed on the surface, and in the second place because at that time low-grade ore of any description situated only 3 miles from salt water had absolutely no value, owing to the high freight and smelter charges. However, from tests and assays since made, it has been determined that for a width of about 100 feet all the material through which this tunnel has been driven will pay to mine and concentrate.

When the property was taken over in the winter of 1899-1900 this work, which was designated as the "Jane" tunnel, made up the extent of the attempts to develop the property. It was nearly 300 feet in length, and at a point about 200 feet from the portal a drift had been started along the line of strike of the schist which, although it was run in better grade material than the ordinarily mineralized schist, was not run on what might be termed the "ore body proper," as was later determined, when by crosscutting a well-defined body of ore was exposed, that proved to have a width of about 26 feet and to carry values varying from about 4% to 12% copper, with gold values running from \$1 to about \$6 per ton.

Apparently this bluff in which the "Jane" tunnel has been run encloses a separate and distinct ore body from that developed in the Mammoth Bluff, and to what distance the ore body extends behind or southwesterly from the Mammoth Bluff ore body no attempt has yet been made to determine. The grade of the ore exposed by the Jane tunnel is considerably higher than that in the Mammoth Bluff, and will stand smelting without being concentrated. The development work done on this ore body has not yet been sufficient to measure up tonnage of "ore in sight."

Surface prospecting work along the line of strike southeasterly from the Mammoth Bluff exposed other occurrences of the same character of ore as exposed by the open cut above the Jane tunnel, and recently, at no great distance from the southeastern limit of the Mammoth Bluff, and situated in a northeasterly direction, is still another bluff of considerable magnitude, and having nearly all the characteristics of the Mammoth Bluff.

Whether development work will determine that these various bodies of ore are connected with each other, or whether they are disconnected lenses, as they now appear, occurring in the zone of schist, is a question that will probably not be solved for some time to come, because the enormous tonnage that can be mined from either one without drifting from one to the other will require a long time, judging from all the data at present to hand, even at the rate of 1000 to 2000 tons per day—that is, when concentrating ore is considered at the same time as shipping ore.

While the country to the northwest from the Brit-



annia mines has been considerably prospected, and the occurrences of ore are so situated that they should be as easily worked as the Britannia group, yet southeasterly from that group it would depend very materially on the grade of the ore whether or not they could be worked successfully, because as the distance increases from the beach the elevation also increases, and consequently the minimum cost at the Britannia for installation of tramway and for transportation would be proportionately increased.

**PROPOSED METHOD OF MINING.**—Mr. Robinson proposes to adopt the "Glory Hole" method of mining the ore body in the Mammoth Bluff. In order to do this raises will be made from the tunnel and the workings gradually widened out in every direction, the material stopped being dropped into chutes fitted with gates on the tunnel level.

In mining in the Jane tunnel, it is probable that the same method will be adopted, unless it be found that the body of shipping ore cannot be mined safely without the stopes are timbered with square sets.

Judging from the appearance of the material in the Mammoth Bluff, little, if any, timbering will be required, as it is hard and compact and will stand well without timber, but the material through which the Jane tunnel has been run, or at least the mineralized schist in the vicinity of the ore body proper, will probably require timbering as stoping is carried forward.

As soon as the development of the Mammoth Bluff will permit long churn drills will be used, and it is proposed to put in exceptionally deep holes in order to shoot down as large a tonnage with each round as can be done with safety, thus minimizing the cost of mining.

From the foregoing descriptions of the occurrence of the ore bodies on the Britannia property, it would appear at first sight as though quarrying by benches and the use of steam shovels would be the cheapest method of carrying on mining operations, but the climatic conditions along the coast line make it not only very unpleasant, but almost impossible to work out of doors every day in the year. At the altitude of the mine workings (4000 feet above sea level) of this property the snowfall is heavy during the winter months, while during the spring and fall there is considerable rain. With either of these elements to contend against it is much more advisable to mine under cover, and in the end will prove very much more profitable.

**CONCENTRATING AND MINING PLANTS.**—On August 10th last the first stump was removed from the site chosen for the concentrating plant, on the beach where is located the Britannia townsite; but previous to this the right of way for the aerial tramway, which connects the mines with the concentrating plant, had been cleared. A visit recently paid by the writer gave him an opportunity to compare the present conditions surrounding this property with those which existed previous to commencement of operations under the management of Mr. Robinson. The virgin forest which had occupied the townsite had been attacked in such a strenuous manner, and buildings for the concentrating plant, company's offices, residences for officials, hotel for the accommodation of travelers and wharf have been erected with great rapidity, and to-day the picture presented to the traveler, as the beach is approached on the steamer Britannia, which makes daily trips from Vancouver, is that of a growing, progressive town.

In order to describe the plant in course of construction intelligently, and show clearly the connections between each portion, it is necessary to start from the mine itself, situated about  $3\frac{1}{2}$  miles from the beach, and follow the construction of the various parts or units, which, when connected, will comprise an aggregation that will make it the largest and best designed plant of its character in British Columbia, and, for that matter, on the Northern Pacific slope.

The ore to be transported to the beach and treated in the concentrating plant, preparatory to being shipped to a smelter for final treatment, will for the present be mined from the Mammoth Bluff and the tunnel on the Jane mineral claim, which have already been referred to.

Bunkers have been erected at both these locations, from which the ore is carried in cars having a capacity of ten tons each to the storage bunker, having a capacity of 3000 tons, built at the mine terminal of the aerial tramway.

From the Jane tunnel the ore is carried along an automatic incline tramway, 690 feet long, and from the Mammoth bluff it is carried along a horizontal tramway about 500 feet long, both of which are built on trestles. These tramways form a connection on the summit of the mountain, where are located the crusher, storage bunkers and mine terminal of the aerial tramway.

From this point the ore is dumped into a Sturtevant ore crusher (which will take in rocks as large as 13x26 inches), and crushed to a size convenient to be handled on the traveling sorting belt, to which the ore is delivered from the crusher. As the material from the crusher passes along the conveyer, or sorting table, any waste is picked out by ore sorters and the ore conveyed into a bunker, from which it is discharged into the buckets on the aerial tramway. All of the discharge gates, through which material passes from the chutes in the mine, and from the

bunkers outside, are opened and closed automatically by air pressure, instead of by manual labor, which insures not only greater speed and regularity in loading into cars and buckets, but also a minimum of labor on the part of the employees engaged on such work.

The aerial tramway, which is constructed on the Riblet design, has a maximum capacity of 100 tons per hour. It is built in two sections, the first extending from the mine to near the junction of Jane and Britannia creeks, at about 1900 feet lower altitude than the terminal at the mine. This section is about  $\frac{1}{2}$  mile in length, while the second extending to the beach is about  $2\frac{1}{2}$  miles in length, with a difference in altitude of about 2000 feet between the junction of the creeks and the beach.

An ore bunker has been built at this intermediate station, into which the buckets on the first section discharge their contents, and from which the buckets on the second section receive their loads. This bunker has a capacity of 2000 tons. Each bucket on the tramway has a carrying capacity of 1100 pounds.

At the beach terminal of the aerial tramway is situated another bunker, having a capacity of about 3000 tons. Into this is discharged the contents of the buckets. The total storage capacity between the mine and the beach is 8800 tons, which ensures continuous operations of the concentrating plant, and provides against delays which might arise from accidents to any portion of the tramway or to the machinery at the mine.

From the bunker at the beach terminal the ore is delivered into three high-speed crushers, which will take pieces 10 inches by 20 inches in size and break them into pieces small enough to pass into the high-speed Gates rolls. A class, manufactured by the Allis-Chalmers Co. of Chicago. From the rolls the ore is discharged in pieces about of  $\frac{1}{4}$  inch into Huntington and Chilian mills, of which there are two of each pattern. The former are 6-foot mills of the Anaconda type, and the latter 6-foot mills.

The finely crushed material discharged from the mills passes through trommels and sizer, where it is sized delicately and carefully to prepare it for the concentrating tables. This sizer classifies the material into four sizes. From these the pulp is then discharged into sizing boxes, where it is classified into eight sizes, from a 10 mesh down to slums.

All the material oversize—that is, between  $\frac{1}{4}$  inch and 10 mesh—goes to the jig, a machine of a new type, the "Australian," which has been used successfully at the British Broken Hill works in Australia, but has never before been used on this continent. This machine is manufactured by the Allis-Chalmers Co., and its capacity is estimated at 350 tons per day. When this machine begins operation the work done by it will be watched with great interest, especially by concentrating specialists, because of the new features introduced, especially that relating to sizing, for the reason that it is claimed that when using this jig no sizing is necessary, but that its work is satisfactory with material of various sizes. No tailings will be discarded from the material which passes through the jig, but all such material will be conveyed back to the Huntington mills, where it will be ground finer and again passed through the sizer.

The next operation to which all the pulp which has been crushed to 10 mesh or smaller will be subjected is its passage through the concentrating machines, of which there is a total number of seventy. Fourteen are tables of the Wilfley pattern, thirty-eight are Frue vanners, and eighteen are Overstrom tables.

The roughs, or larger sizes, which come from the sizer will be treated on the last-mentioned tables, while the "fines," or smaller sizes, will be conveyed to the other concentrating machines, among which this pulp will be distributed according to its fineness, and treated as dry as possibly can be done, in order to minimize sliming. Each machine acts as a unit, and no material will be passed from one to the other, or, in other words, each will deliver its own finished product and its own tailings. The finished product, or concentrates, will be automatically delivered from the machines into tanks, from which the material will be automatically drawn into cars of ten tons capacity each, and from these discharged into barges or vessels for shipment to the smelter.

The concentrator building is 134 feet square. The machinery at the mines will consist of a 12-drill air compressor and receiver, together with three electric motors. One of these is to be used in running the compressor, another the crusher, and the third a sawmill, the machinery for which will also be installed at the mine.

**POWER AND WATER PLANTS.**—All the power to propel the machinery, and for the lighting plant, will be furnished by electricity generated through water power. The supply of water will be taken from Britannia creek at a point 13,000 feet distant from the works on the beach, to which point the water will be conveyed through a pipe line, a portion of which is installed with iron water pipes 18 inches in diameter, and the remainder with pipes 12 inches in diameter. The pipe line is connected with three Pelton water wheels having a total capacity of 1000 H. P. The water power developed from Britannia creek has an effective working head of 1857 feet and a total static head of 1900 feet.

The water after doing service on the Pelton wheels

will be carried into the concentrating building, where it will again be utilized for concentrating the ore.

The electricity generated by this power will be transmitted to the various points at the mine, as well as the works on the beach, where it will be distributed among the several motors, four of which will be located in the works on the beach, the other three at the mine. The total horse power required for these motors is 600.

The construction of buildings and installation of machinery is progressing as rapidly as possible, about 250 men being employed continuously at this work, and, unless something unforeseen occurs to delay its completion, the plant will be in full operation by about the first of May, 1905.

## Tungsten: Its Use and Value.

Energetic prospecting, due to an increased demand and high prices, has proved the existence of deposits of tungsten-bearing minerals in the United States, Canada, Australia, New Zealand, Great Britain, Saxony, Bohemia and Spain, says the American Manufacturer. But not all of these deposits are productive of good mineral, a fact that partly explains the maintenance of remunerative prices for tungsten. The chief sources of the metal are wolframite, hubnerite and scheelite, in association with which are often found cassiterite, auriferous pyrite and other substances from which the tungsten must be freed to be of value industrially. By hand sorting, crushing and jigging, and magnetic concentration it is possible to eliminate the impurities and enrich the tenor of tungsten in the ore. Not infrequently the ore as mined will contain only 5% to 8% of metallic tungsten, and to be marketable it must be brought to an average of 50% to 70% tungstic acid, the unit basis of selling price. It is essential that ore be free, or nearly so, from phosphorus and sulphur, but the presence of carbon and silica will not be considered injurious. At present an ore averaging 60%  $WO_3$ , and containing not more than 0.25% phosphorus, and 0.01% sulphur, can be sold in New York at \$7 per unit of tungstic acid, equivalent to \$420 per long ton. For higher grade ore, up to \$7.50 per unit is quoted, because just now the demand exceeds the supply. It is customary to contract for ore on a basis of 90% cash on delivery f.o.b. New York, the balance of 10% being retained for a month to allow time for a comparison of assays and adjustment of possible differences between buyer and seller.

Tungsten as a metal of 95% to 99% purity, or alloyed with iron in the proportion of 37% up, finds its greatest consumption in the steel industry, notably in Europe, where the demand is about eight times as large as in America. The world's consumption amounts to something like 700 to 800 tons per annum, which is a relatively large quantity, when it is considered that usually only 5% to 8% tungsten is needed in the mixture of so-called self-hardening steel. A typical ore, used by German steel works, analyses from 60% to 76%  $WO_3$ , 8% to 10%  $FeO$ , 9% to 12%  $MnO$ , and 0.4% to 1%  $CaO$ . Exports from America have been made to Europe, and the ore has been so satisfactory that further inquiries are being received. The annual production in the United States is between 3000 and 5000 short tons of crude ore, which will yield from 200 to 360 tons of 50% to 65% concentrate.

For a long time only a comparatively small part of the domestic ore output was consumed locally, but with continued expansion in the manufacture of metallic tungsten, a marked change has taken place. In 1902 the United States made 82,000 pounds tungsten metal, 14,000 pounds ferro-tungsten, and 3500 tungstic acid and tungstate of soda, all of which products will probably show further increase. Tungsten metal made in the electric furnace, and analyzing 99%, sells at \$1.25 per pound in New York; ferro-tungsten, 37%, at 45 cents per pound. Metallic tungsten has a specific gravity of 18.7, is practically free from carbon, can be welded and filed like iron, and when used in tool steel the alloy preserves its hardness, even when heated to temperatures that would rapidly draw the temper from ordinary high carbon steel. In the manufacture of permanent magnets, used in the construction of electric meters, the steel employed contains approximately 5% to 6% tungsten. An alloy of 5% tungsten and 6% steel will make a shell for lead bullets that has much higher penetrating power than ordinary lead. Tungsten steel may also be used for armor plate. Metallic aluminum can be hardened advantageously with tungsten, its resistance to oxidation making it much superior to copper. A small percentage of tungsten will also greatly increase the carrying power of spring steel. Tungsten steel is employed in the sounding plates of pianos.

Vegetable tissues are rendered incombustible by the use of tungsten compounds. Usually the material to be treated is coated with tungstic acid and glue, or with tungstate of soda and muriatic acid in a thick solution of glue.

In figuring percentages of tungsten ore it must be noted that the atomic weight is very high, 184, so that the difference between the tenor, quoted as metal and as oxide, is not as great as in the case of iron.



## Automatic Excavator for Placer Mining.

Written by JOHN A. YEATMAN.

These plants are designed to meet the conditions of the particular location where they are used, but in a general way the plants are of two kinds:

First—Where they deliver into a sluice, this type being employed where there is a tailing dump available.

Second—The plant is constructed with screens and tailings stacker, for use where it is necessary to "back fill" with the tailings.

The accompanying illustrations are of a plant



The Bucket at Work in the Gravel.

H. P. locomotive type boiler. The hoisting engine has two drums in line on one shaft, each controlled by frictions. The engine has two cylinders, 7½x12 inches, good for nominal 30 H. P. loads, an 8-inch centrifugal pump and a 9x12-inch center crank engine to drive the pump. This pump delivers water into the hopper for washing the gravel and sluicing same away.

For digging the gravel there are two specially constructed excavator buckets, each of these buckets being operated by cable, which is attached to each drum on the hoisting engine and led over sheaves above the upper deck. At the rear end these buckets are yoked together by cable which passes through sheaves at the rear or opposite side of the excavation from the head frame.

These sheaves are attached to a spreader which keeps them spaced a given distance apart, and to each end of the spreader is attached a tackle which runs back at an angle to dead men to which they are securely anchored.

In practice the buckets are operated alternately; as the loaded bucket is drawn up, the empty bucket returns. The capacity of these buckets is about 1½ cubic yard, and they will load themselves as they are drawn towards the head frame, in from 8 to 12 inches, and they discharge automatically into the hopper. Both the head frame and the back hauls are moved by lines which lead to the winding drums of the hoisting engine, so that the entire operation of the plant is under the direct control of the engineer. The crew required to operate the plant consists of three men on each shift.

The capacity of the plant depends somewhat upon depth and character of the ground, and the special condition under which it is being operated—the capacity being somewhat less in deep ground than it is in shallow, but in a general way the capacity of a

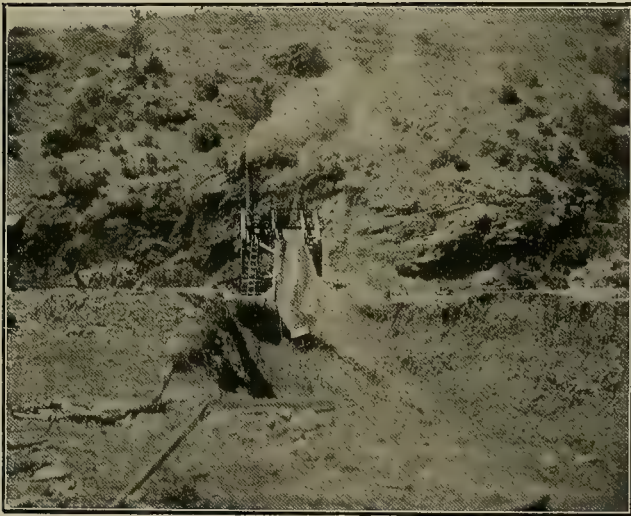
## The East Lode of California.\*

Written for the MINING AND SCIENTIFIC PRESS.

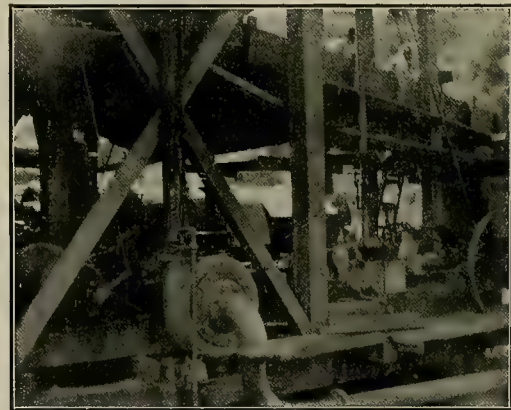
There are several mineral belts in the Sierra Nevada and its foothills in California. These belts are usually distinct, lie several miles apart and have geological, structural and mineralogical characteristics which distinguish each. The most westerly lode occurs in the low foothill region, and in the southerly portion this lies out on the plains of the San Joaquin. This belt carries copper and gold ores. Eastward, at a distance of about 10 miles and approximately parallel to the copper lode, is the mother lode. Between these is a region in which occurs many pocket gold mines and a few milling mines. One of the most noted of these was the Washington mine, near Hornitos, in Mariposa county, worked to a depth of 1500 feet. The Golden City mine near La Grange is another.

From 6 to 10 miles east of the mother lode is the east lode, and between these is a second region of pocket mines and also milling mines. Noted among the pocket mines are the mines on the Bonanza dike at Sonora and the pocket mines of Bald mountain in Tuolumne county. Among milling mines in this area is the Golden Gate, near Sonora. East of the east lode are a number of other belts in which occur ores of gold and silver, usually associated by abundance of base metal sulphides. Often these ores are difficult of treatment—more so as a class, at any rate, than any of those lying to the westward. These zones of mineralization occur in nearly parallel lodes and are found even to the crest of the Sierra, as at Tioga and Lundy.

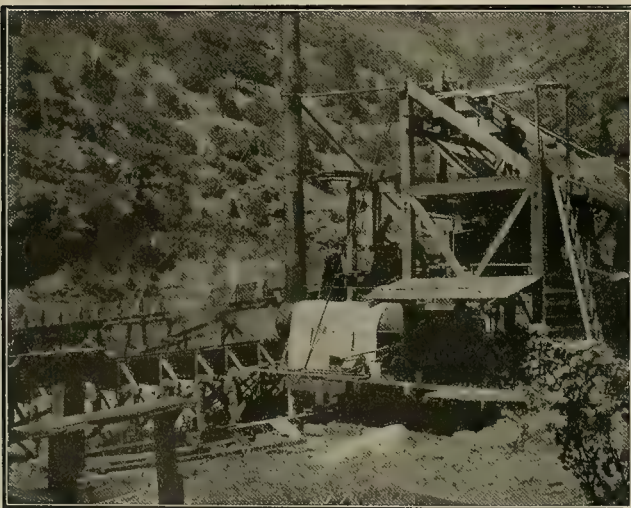
The east lode is the most persistent of these lodes, with the exception, possibly, of the mother lode. The veins of the east lode occur in clay and mica



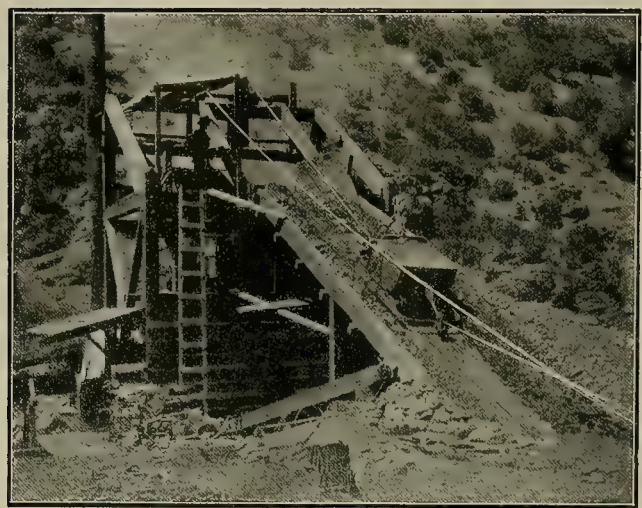
View of the Gravel Pit.



Centrifugal Pump for Washing Plant.



Terminal and Sluices.



Bucket Carrying Gravel Up to Sluices.

erected for the Klamath River Gold Mining Co., and is of the first described type.

This plant consists of a movable head frame, about 18x24 feet, which is mounted on a track parallel with the excavation. The head frame consists of a lower deck, on which the machinery is mounted, and an upper deck which is about 20 feet above the ground in which is the hopper. From this deck there is suspended an apron at an angle of about 40°, the lower end resting on the ground on the side next to the excavation. There is also a platform on this deck for the operator. The hopper is connected by an adjustable chute with the main sluice, which is in the rear end parallel to the traverse of the head frame.

The power equipment in this case consists of a 50

double-bucket plant of the kind here described will be from 1800 to 2500 cubic yards per day of twenty-four hours, and the cost under ordinary conditions it is believed will not exceed 4 cents per cubic yard. The plant permits the use of any gold-saving device which may be best adapted to the character of the ground. The accompanying engravings illustrate the various parts and method of operating a plant of the character here described.

These plants will operate to considerable depth, the capacity, of course, being somewhat less on ground of great depth than on shallow ground, and on any kind of bedrock, soft, hard or ragged. As the bucket is more or less flexible, it is not endangered by bedrock or large boulders.

slates, in mica and hornblende schists, in granite and occasionally in greenstone schists. The ores are for most part unlike those of any of the other lodes mentioned and carry characteristic minerals. In the mica-schist and mica-slate areas the veins when conforming to the formation are lens-like, uncertain and pockety as to values. As a rule the ores, if of value at all, are rich. In the hornblende schist the veins are usually fissures of greater persistence than those in the mica slates. In the clay slates the veins generally (though not always) conform approximately to the strike and dip of the enclosing rocks. The Buchanan mine in Tuolumne county is an important exception, the principal ore shoots occurring in a

\*See illustrations on front page.



fissure striking E.-W. from a N.-S. zone of mineralization. The ores occurring in the clay slates are uniformly more free milling than those in the other formations mentioned, consisting principally of banded quartz with auriferous iron sulphide, little copper, lead or zinc sulphide being observed.

Where the veins in mica schist and slate and hornblende schist cut across the strike and dip of the formation—not an uncommon occurrence—arsenical ores, often of high grade, are of common occurrence. These ores are more expensive to treat, of course, than the lower grade of less rebellious ores, but their richness usually offsets the metallurgical difficulties.

In the granite region of the east lode the ores show a remarkable similarity wherever they occur for a distance of 200 miles. The gangue is chiefly quartz, often accompanied by a greater or less amount of calcite. The minerals are pyrite, chalcopryrite, galena, zinc blende and characteristically pyrrhotite, which latter is found rarely in the other lodes, with the exception of the copper deposits, where it is usually abundant. In the granite the values are, usually comparatively high and galena and zinc blende have come to be recognized as good indications of high values in gold. Silver also occurs, but in relatively small amount.

Among the mines of the east lode the Black Oak, near Soulsbyville, is one of the noted properties, having now been in continuous operation for many years. The veins occur in granite (grano-diorite) and are characteristic of the ore occurrence on the lode. There are in this mine, however, two distinct classes of ore—one a heavily mineralized ore carrying the sulphides of the base metals in abundance, though arsenical and antimonial ores are rare. Pyrrhotite is abundant. These sulphides are high grade—\$100 to \$300 per ton. Telluride of gold also occurs sparingly in the ores of the east lode and is usually mistaken for galena by the miners. The other ore characteristic of this mine is a large vein of white quartz carrying little sulphide mineral, and that, generally finely disseminated in small grains throughout the rock. There is abundance of calcite present in the small fissures which abound in the rock, so that the quartz disintegrates rapidly upon exposure into coarse sandy grains which is ideal material for the stamp mill. In places the Black Oak vein is upward of 30 feet wide. The heavy sulphide ores occur in smaller shoots, but have been sufficiently persistent to admit of shipment of a large tonnage of this class of ore to smelters for years. The low-grade ores are stamped, amalgamated and concentrated, the tailings being cyanided and the concentrates shipped. Two of the illustrations on the front page show the hoist and mill of the Black Oak Co.

The Providence mine is also on the east lode in Tuolumne county and is entirely unlike the Black Oak. This vein occurs in black clay slate. The quartz is of the ribbon variety and the values often higher, several valuable pockets having been discovered in the past ten years. It also supplies a large amount of milling ore. The mine is situated on a steep mountain side and is reached by a road graded at an expense of over \$5000, from the bottom of the canyon of the North Fork of the Tuolumne to the mine—a distance of 1½ mile. The vein is about 5 feet in width and carries chiefly iron sulphide, with occasionally galena.

These two mines represent a large number of mines on the east lode, whose mineralogical and structural characteristics are similar to the two classes thus briefly described. The third engraving shows the Providence property and its surface equipment. Ores of the kind encountered in the Providence are usually treated by amalgamation and concentration, with occasional treatment of tailings by cyanide.

### Quicksilver Production in 1903.

California, Texas and Nevada are the only States in the Union that produced quicksilver during the year 1903. California mines yielded 30,526 flasks, worth \$1,330,916. The production of quicksilver in Texas amounted to 5029 flasks, valued at \$211,218. Nevada could claim only 65 flasks as the year's output. The total production for the three States was 35,620 flasks of 76½ pounds each, valued at \$1,544,934. This was an increase in quantity of 1329 flasks, and in value of \$77,086, as compared with the 34,291 flasks, valued at \$1,467,848, which constituted the production of 1902.

A notable instance during the year was the publication by Professor W. B. Phillips, director of the University of Texas Mineral Survey, of a carefully prepared statement in regard to considerable extensions of the area in Texas where quicksilver is found. It is evident that quicksilver mining in Texas should increase for several years before reaching the maximum.

The average price of quicksilver per flask in San Francisco during the year 1903 was \$45.29.

During each of the last ten years the amount of quicksilver imported into the country has been small. The quantity imported during 1903 had a value of \$1065. The quicksilver exported during 1903 amounted to 17,577 flasks, valued at \$719,119, of which 10,722 flasks, worth \$446,845 were shipped from the port of San Francisco.

The above figures are taken from a brief report on

the production of quicksilver in 1903, which is embodied in the volume entitled, "Mineral Resources of the United States, 1903," published by the United States Geological Survey. The report is also pub-

### The Opening of a Quarry.

In the mineral industry the business of mining or quarrying structural materials is a large and impor-



Quarry Site Being Prepared for Quarrying.



The Quarry After Stripping.



Spheroidal Weathering of Grano-Diorite at Nevada City, Cal.

lished in pamphlet form and may be obtained, free of charge, from the Director of the United States Geological Survey, Washington, D. C.

tant factor. In some States the value of structural materials—granite, sandstone, marble, slate, bricks, terra cotta, onyx, etc.—greatly exceeds the value of



the metallic substances or coal mined. Quarries, like mines, must be made, and their site is not always a matter of choice any more than in the location of a mine. The prospector takes up his claim where he finds the most promising surface indications, whether on the summit of a great mountain or in the bottom of a deep and rugged canyon. It may be in the midst of a great forest, near beautiful streams, or in the middle of a barren desert many miles from water. So with the quarry, the locator begins operations at a place where the material sought is apparently abundant and of good quality, and so situated as to be readily marketed. The latter is, of course, a desideratum, but is usually less important. It is rarely that the stone can be quarried with advantage at the surface if the rock be in place, a greater or less amount of stripping being required. The accompanying engravings illustrate this fact. The first picture shows the outcrop of beds of sandstone, near San Jose, Cal., where a quarry has been opened. It gives an idea of what is usually found essential in opening a sandstone quarry anywhere, though often the amount of surface debris is much greater than in this instance. The second illustration shows the debris removed and the strata of sandstone exposed ready for channeling. In the instance here illustrated the jointing planes of the rock are coincident with the bedding planes, but often by metamorphism, the latter have been nearly or entirely obliterated.

In granite there are no bedding planes, the planes of jointing being the only ones to which the quarrymen can work. In some of the most important granite quarries, like those in Madera county, Cal., the granite lies in great concavo-convex lenses, a sort of concentric or shell-like structure, and but one of these shells or layers is quarried at a time. At the Raymond quarry one of the great shells was exposed for a distance of 360 feet, over 60 feet wide and from 4 feet minimum to 25 feet maximum thickness.

In some regions the granite in situ is too soft and too much decayed to be made available as structural material, and yet the region is strewn with boulders of granite which are worked up into fine structural material. The region about Prescott, Ariz., is an instance in point. Here granite boulders from 3 or 4 feet to those 20 feet or more in diameter are strewn over the surface of the rotten bedrock granite. These have been extensively worked up and employed in the construction of buildings.

There are many instances of this kind in the granite regions of the West. This peculiar weathering of massive rocks is well illustrated in the third accompanying engraving. It is known as "concentric decomposition" or "spheroidal weathering" of massive rocks. It also occurs to some extent in sandstones, as shown in the second illustration.

In the case of granite, these boulders strewn on the surface are identical with the underlying bedrock, of which they originally formed a part, but for some reason the meteoric agencies have been unable to effect them in the same manner as the main mass of the rock. Often these hard unaltered granite boulders are found lying on a bedrock of granite in which a shaft may be sunk with pick and shovel to a depth of 50 or 60 feet.

## THE PROSPECTOR.

The mineral specimens from Quartzsite, Ariz., are as follows: No. 1 is quartz carrying chalcocite (copper glance) and small amount of malachite (green carbonate of copper), with limonite (brown iron oxide); the free gold occurs in a small fissure or crack between brown iron ore (limonite) and quartz, and also in the quartz; why the gold does not appear in the copper glance is a question difficult to answer; the small purple spots are bornite (copper sulphide); neither the bornite nor glance are normal ores, but are due to a process of enrichment from low-grade copper-iron sulphide ore; free, visible gold is rare in copper ores. No. 2 consists of brown and red iron oxides and a little chrysocolla (copper silicate). The free gold in this specimen occurs in the brown iron oxide (limonite). No. 3 is fibrous malachite (green copper carbonate); on one side it is incrustated with calcium carbonate, an infiltration from percolating water. No. 4 consists largely of quartz and brown iron oxide, in which is disseminated chalcopryrite (copper-iron sulphide); occasional flakes and grains of copper glance, copper oxide (cuprite) and malachite are observed in the specimen; it is probably also gold bearing, though no gold is seen. No. 5 consists largely of iron carbonate, silica and lime, with brown and red iron oxides and a little green carbonate of copper; also some white talc. No. 6 is largely iron oxide from which all, or nearly all, the copper has been leached, leaving the iron, altered to oxide, behind; this is the "gossan" of the copper miner. No. 7 is quartz; the dark portion is also siliceous and looks like altered hornblende. No. 8 shows similar conditions; it also shows scales of mica and is due to the alteration of country rock; these numbers (7 and 8) also carry a small amount of copper. No. 9 is mostly specular iron, a variety of hematite with a micaceous structure; it shows also a small amount of copper carbonate (malachite). No.

10 (two pieces); the larger piece is made up chiefly of crystallized quartz with iron oxides, both limonite and hematite; it shows no copper minerals; the white incrustation is carbonate of lime; the smaller piece consists of quartz which has been crushed by pressure and recemented; it contains brown iron oxide and a small amount of malachite. No. 11 is a quartz rock, seemingly an altered dike rock or a quartz schist; it is filled with minute scales, grains and dustlike particles of hornblende, or its alteration product chlorite, which gives it a slightly greenish color; no sulphide mineral was observed in this last rock, though one would expect to find such in the rock; "quartzite dike" is a misnomer; dikes are intrusive and can not be properly applied to metamorphic sedimentary rocks like quartzite; none of the rocks or ores of this lot contain mercury (cinnabar); the bright red mineral in each instance is hematite (red iron oxide); the appearance of crystal quartz in these ores can not be considered as particularly significant; in some gold regions veins carrying quartz crystals are apt to be pockety in the distribution of the gold.

The rock from White River, Tulare county, Cal., is aplite, a type of granite.

## Deep Hoisting on the Mines of the Rand.\*

Written by J. B. CARPER.

The question of hoisting on the mines of the Rand is working its way to a satisfactory solution along the lines advocated by those who favored the tandem sheave and endless rope with a tail rope attached, to balance the weight of the working parts, commercially known as the Whiting system.

Since 1900 this system has successfully overcome on the Geldenhuis Deep, Ltd., City & Suburban Gold Mining Co., Robinson Gold Mining Co. and the latest installation at the Robinson Central Deep, Ltd., all the obstacles which Hans C. Behr attributed to it in his valuable contribution on "Winding Plants for Great Depths." The Whiting system, however, exercises no monopoly over the field here for hoisting plants, for there is scope for the other types advocated, such as the conical drum, the tapering rope and the parallel drum types, and the men behind these systems have the ability to work them successfully.

The Whiting hoist, from the standpoint of economy in first cost of boiler plant, attendance in the boiler house, first cost of the engine and appliances required for hoisting from 1000 to 3000 feet or over, stands in a class alone here to-day, which I will endeavor to prove to be true also in regard to the costs of operation.

First, we will review the conditions existing at the City & Suburban Gold Mining Co., where a Whiting system has been in constant service since 1899. Dimensions, 16 and 38 by 60; 16 and 28 by 60; horizontal compound tandem Corliss engine, direct-connected to the rear sheave and by side rods to the forward sheave, run condensing, and controlled by a centrifugal governor.

Load of reef, 7600 pounds.  
Weight of skips, 6500 pounds.  
Diameter hoisting rope, 1½ inch.  
Diameter of balance rope, 1½ inch.  
Depth of shaft, 1450 feet.  
Running time per diem, 11 hours.  
Number of skips hauled in 11 hours, 200.  
Tons hoisted per month (waste and milled), 22,700 tons.

The cost of coal for power on this property to mine, hoist, sort, crush and mill, and treat the sands and slimes, is 9.77d per ton handled. The average cost of coal for power purposes on the Rand is 27s per ton, and a consumption of 285 pounds of coal to extract and treat a ton of reef.

Hennen Jennings, in his comprehensive discussion before the South African Association of Engineers in 1902, on the subject of "Winding From Depths," gave data from which he estimated the cost per ton for "hoisting reef down as deep as 1000 feet as 7.04d per ton mined and 8.53d per ton milled." These figures were principally compiled from high-pressure cylindered hoists, non-condensing, non-governed. With the modern appliances attached to the City & Suburban hoisting plant, the costs for hoisting are 2.2d per ton mined and 2.6d per ton milled—a saving of 4.84d and 5.93d, respectively, per ton.

At the Geldenhuis Deep, Ltd., it is operated in a combined vertical and incline shaft with the balance rope.

The conditions of operations are:  
Depth of vertical shaft, 800 feet.  
Depth of incline shaft, 446 feet, ultimately.  
Load of reef, 5200 pounds.  
Weight of skips, with chains, etc., 3986 pounds each.  
Diameter of hoisting rope, 1½ inch.  
Diameter of balance rope (old winding rope), 1½ inch.  
Loads of reef per diem, 280.

\* London Min. Jour.

Velocity in the shaft in feet per minute, 2500 feet. Capacity of 200-stamp mill, 1000 tons per diem.

Dimensions of engine, 16 inches and 28 inches by 60 inches; 16 inches and 28 inches by 60 inches; twin comp. horizontal tandem condensing governed.

The conditions as fulfilled at the Geldenhuis Deep, Ltd., are raising of a load of 5200 pounds up an incline shaft 446 feet at an angle of 35° around a bend whose radius is 75 feet from the incline to the vertical shaft, thence 800 feet on the vertical to the automatic tipping arrangement (where the reef is dumped for crushing without cessation of speed from the box at the level to the tip-in the headgear). The starting momentum required for the Whiting system is also appreciably less than that required by any other type of winder, with possibly the exception of the flat rope reels, which are proven to be too expensive in the wear and tear of ropes to justify further use here. Hence the fundamental requirements for hoisting, viz., (1) minimum initial expenditure of capital, (2) minimum running costs, are being fulfilled at the Geldenhuis Deep plant.

The Whiting hoist at the Robinson Central Deep embraces all the improvements which the past five years' experience with the Whiting system have taught us, of which the following are the most noticeable: Sixteen feet diameter sheaves from 10 feet diameter. Five grooves per sheave instead of three. Surface condensing plant of 3000 square feet cooling surface. Post and crank-disc brakes operated by steam and foot levers. Indicator of the dial type constructed with a slip motion, to permit engine to automatically correct its reading once for each run, if necessary; diameter of dial, 6 feet.

A safety brake, by means of which pressure is applied to the rope between the sheaves; it consists of two strong V clamps, having brass faces grooved to the rope, and operated by toggle joints by means of a foot lever and screw-down wheel. The engineer's platform has its level such that the engineer can easily see over the top of the drums, and is located between the engines; upon this platform all hand levers, foot steps and gauges used in the operation of the plant are mounted. The main brakes are applied by means of dead weights and released by a direct-acting steam engine, equipped with the oil-cataract cylinder. The reversing gear is of the Allan type, with straight link, and is operated by means of a direct-connected steam engine designed with the oil cataract and floating levers. The cut-off is effected entirely by the Corliss cut-off gear, under control of a standard centrifugal governor.

The hoisting engine is to raise 8000 pounds of ore from a vertical depth of not more than 5000 feet, the skips to weigh 4500 pounds each; steam pressure at throttle, 140 pounds per square inch. A tail rope is used to fully counterbalance the effect of the working rope. Every engine of this type is of the same cylinder dimensions, which minimize the amount of extra parts carried in stock, especially when one group of mines have nine Whittings working, and another twenty to thirty on order or awaiting Chinese laborers before the full number is placed.

The cross-compound hoisting engine in use since 1899 at the Catlin shaft of the Jupiter Gold Mining Co. has given general satisfaction in hoisting from a vertical depth of 3907 feet.

The particulars of this plant are:  
Dimensions, 28 inches and 50 inches by 72 inches.  
Cylindrical drums, 14 feet diameter by 4 feet 3 inches wide.

Load of reef hauled in pounds, 2000.  
Weight of cage and car, 3820 pounds.  
Size of rope, 1½ inch diameter.  
Depth of shaft to lowest developed working, 3907 feet.

Maximum velocity of winding in feet per minute, 3150 feet.

Minimum velocity of winding in feet per minute, 2400 feet.

Non-condensing on governor.

This engine was designed to work a depth of 3000 feet only, and will be replaced by an engine designed to haul from 4400 feet depth. As this engine was installed more for the purpose of getting the shaft sunk to the reef as quickly as possible, questions of economy in steam consumption had to be of a secondary consideration.

Taken as a whole, the mining industry here suffers materially from the want of initiative to scrap the obsolete machinery equipment and its replacement with economical power and maintenance-saving appliances. For instance, I have in mind a mine where a high-pressure winding engine is using up winding ropes at the rate of two every four months at a cost of £1200 per year. The cost of ropes alone in three years would buy and install a cross-compound condensing governed hoist.

The hoist which suits best the working conditions of the shaft and the mine, with the minimum of cost and maximum of economics, and the fulfillment of the necessary requirements of safety to life and limb of the employes hauled, and freedom from smashing up of the shaft timbers, is the hoist the engineers in this country are anxious to install and maintain. I believe that the output demanded from even the very deepest mine does not require the lift to be made in two stages, because with one stage located on the surface 2000 tons per diem can be hoisted through two compartments of a shaft.

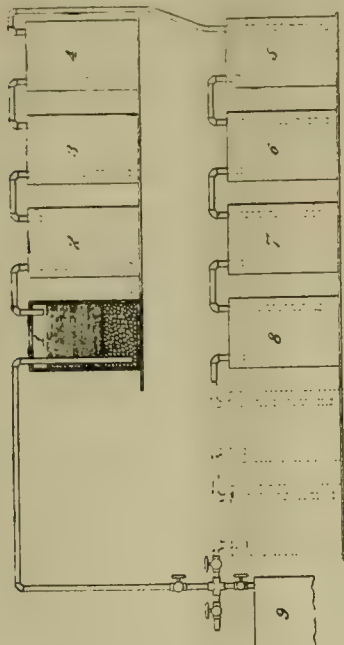


## Mining and Metallurgical Patents.

PATENTS ISSUED DECEMBER 6, 1904.

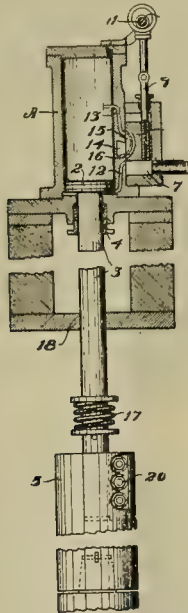
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

PROCESS OF TREATING GOLD AND SILVER ORES.—No. 776,424; C. H. Rider, St. Louis, Mo.



Process of treating gold and silver-bearing ores, which consists in placing charge of approximately five hundred pounds crushed ore in each of four receptacles, adding in each receptacle solution composed of one hundred gallons of water, three to five gallons of commercial sulphuric acid, and fifteen to twenty gallons of commercial nitric acid, and after silver is dissolved removing resultant solution to new receptacles, adding fresh solution to undissolved ore in first receptacle, solution comprising forty gallons of water, five gallons of nitric acid, and ten gallons of hydrochloric acid, dissolving gold in first receptacle, then combining two solutions and precipitating silver.

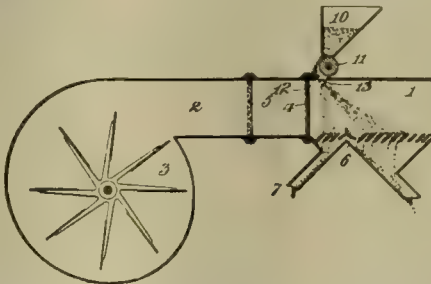
STAMP MILL.—No. 776,159; D. I. Whiteside, San Francisco, Cal.



Combination with reciprocating stamp or like stem, of cylinder axially in line therewith and having valve face provided with inlet and exhaust ports, piston fitting cylinder, to which piston stamp stem is secured, valve chamber, valve, means for reciprocating valve, rotatable means for imparting reciprocatory movement to valve, valve having recess in lower face and curved port extending around recess and adapted to bridge space between first-named ports, first-named ports connecting above and below piston and one of ports entering cylinder near middle thereof to provide relative large chamber into which expansion from opposite end of cylinder may take place, valve adapted to first admit elastic medium to cylinder to impel piston in one direction, then portion transferred to opposite end of cylinder and por-

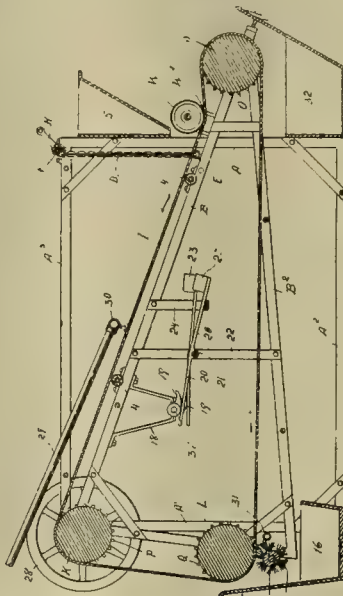
tion remaining in first-named portion of cylinder exhausted to enable transferred portion to return cylinder to its first position.

DRY SEPARATOR.—No. 775,965; T. A. Edison, Llewellyn Park, N. J.



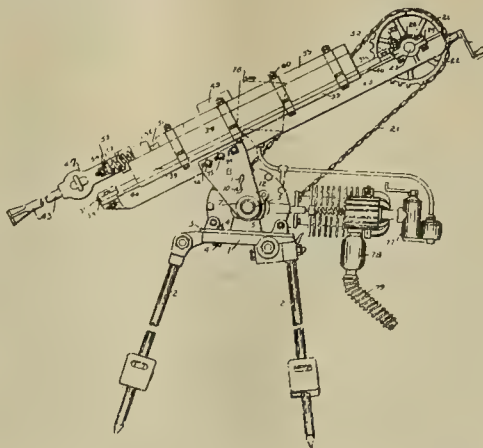
In dry separator, combination of blast tube substantially uniform in cross area, means for producing air blast through tube, screen pressure equalizing diaphragm across whole area of tube, second and finer screen diaphragm placed farther from blast inlet and at distance beyond first-mentioned diaphragm sufficient to form in tube pressure equalizing chamber, feed opening in top wall of tube immediately in rear of finer screen and extending across tube, means for feeding pulverulent or granular material in thin, uniform, vertical sheet falling across whole area of tube, and receptacles for grades produced.

CONCENTRATOR.—No. 776,662; H. E. Horn, Denver, Colo.



Concentrator provided with endless traveling belt or apron, and adjustable means engaging belt or apron from above to form transverse valley or depression therein, comprising shaft, vertically adjustable boxes in which latter is journaled, and number of separated wheels mounted on shaft and engaging upper part of belt from above between head and tail extremities of belt, latter being mounted to give its upper portion downward inclination from head of machine and actuated to cause it to travel upwardly.

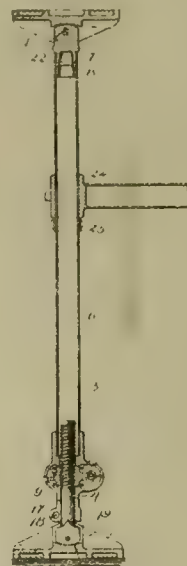
ROCK DRILLING MACHINE.—No. 776,613; L. S. Pfouts, Canton, O.



In rock drilling machine, combination of support, turntable carried by support, motor connected thereto and carried thereby, support provided with upright members spaced from each other, drill frame pivotally connected at right angles to pivotal connection of motor turntable, sliding carriage and drill

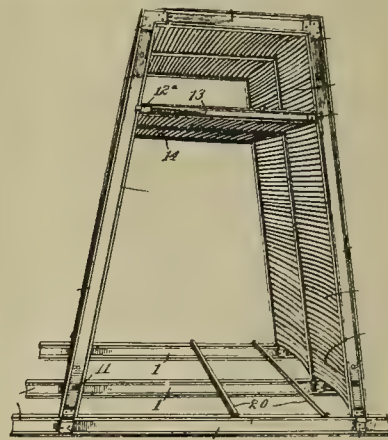
frame carrying operating mechanism, and drill operating mechanism driven from motor pinion having common center with pivotal connection of drill frame and motor supporting turntable.

MINING COLUMN.—No. 776,881; R. L. Ambrose, Tarrytown, N. Y.



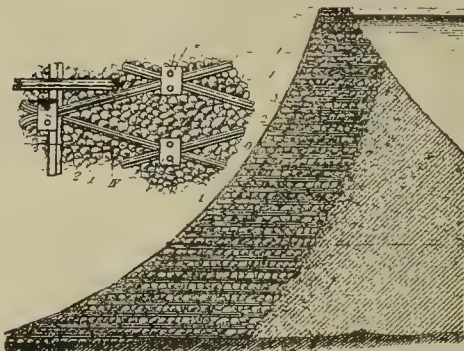
In device of character described, combination with casing containing longitudinal bore and enlarged chamber, of threaded rod fitted to longitudinal bore of casing, worm wheel fitted to chamber and engaging upper and lower walls thereof, worm wheel internally screw threaded and fitted to threaded rod, operating worm engaging teeth of worm wheel and located in recessed portion of chamber, chamber provided at another part with side opening through which worm wheel and worm may be removed and replaced, cap or closure for opening and operating stem for worm passing through from recessed part of chambered portion of casing to exterior thereof, bearings therefor being in an integral portion of casing.

LINING FOR SUBTERRANEAN PASSAGES.—No. 777,013; A. Fernandez, Pachuca, Mex.



Lining for subterranean passages, having base sills, upstanding side beams, cross beams connecting upper ends of side beams, and transverse braces engaging opposing side beams intermediate their ends.

DAM.—No. 776,799; F. H. Reed, Claremont, Cal.



Dam comprising rubble interlaced with metal bars of greater specific gravity than rubble, embedded in and resting on rubble, bars arranged horizontal, but at angles with respect to one another.



# Mining Summary.

SPECIALY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

Capital has been secured for the construction of the Tanana Mines Railway from Fairbanks to the mines on Cleary, Pedro and other gold-producing streams, and several thousand tons of rail are now at Hootalinou and Dawson, while orders are in for enough to complete 30 miles. Two locomotives have also been ordered.

### Yukon Territory.

No newspapers are being carried in the mails this winter from Dawson or other points to Yukon river points above or below Dawson, except points on the overland trail from Dawson to Whitehorse. This new ruling bars all papers mailed for the Fortymile country, Eagle, Circle, Rampart, Fort Yukon, Fairbanks, Nome, St. Michael or any other points north of Dawson. The only way by which papers can be delivered to those points is to have them placed in envelopes and first-class postage paid on them.

## ARIZONA.

### Cochise County.

The South Bisbee mining suit has been settled and the local stockholders will receive \$525,000. G. Neale represented the local stockholders in their endeavor to make the original directors of the old South Bisbee Copper & Townsite Co. show what had become of 1,800,000 shares of the stock for which no accounting had been made. The suit was brought in May, 1902, and tried in Tombstone first, and then carried to California. The defendants effected a compromise by agreeing to pay the full amount demanded by the appellants.

The Tombstone Consolidated are pumping 3,000,000 gallons a day and are sinking steadily. Part of the old tailings that have been worked over four times by Chinamen and whites by various processes are now being treated again by cyanide. The company is sinking a shaft, 10 by 24 feet outside timbers, to mine heavily when ore is opened. This company is a consolidation of most of the Tombstone companies, which abandoned the ground many years ago. Their ores ran into base at water level and there was nothing with which to treat them, as the former process was futile. Tombstone, which dwindled into a deserted village, is now a thriving camp of 6000 people.

### Graham County.

During the month of November the Shannon Co. produced 1,020,000 pounds of copper. The Arizona Copper Co. shipped 1231 tons of Bessemer copper.

### Maricopa County.

(Special Correspondence).—G. W. Guise has out several tons of free milling ore which he will have milled at the Union mill, north of Phoenix. A custom mill would undoubtedly pay if it was erected in the Union district.

Brashear Bros. encountered considerable water at a depth of 65 feet while sinking a shaft on the Lone Jack claim, south of the old Union mine.

Phoenix, Dec. 10.

(Special Correspondence).—John Montgomery and William Waddington have a force of men at work on their property, south of Mullin's Well, 70 miles west of Phoenix. About 125 feet of work will be done. The ore carries good values in copper, gold and silver.

Considerable prospecting is being done in the mountains south of Phoenix. George McCarthy is developing a claim in that section which he located some time ago.

Charles Rampf is down from his claims near the head of Lime creek. He has done considerable work on his property during the past summer.

Hurley Brothers have let a contract for sinking 100 feet in a shaft on their property, near the Red Rover mine, north of Phoenix.

Phoenix, Dec. 10.

(Special Correspondence).—James Boyd has two men at work on his property, 18 miles north of Phoenix. The ore is of a good quality and Mr. Boyd intends to ship several carloads of it.

John Maddox is up from the White Tank mountains. He reports an increased activity in the mining industry in that vicinity.

The Palace G. M. Co. have put a force of men at work on the Union property, north of Phoenix.

Coyle Bros. have a force of men at work on their property, 8 miles south of Phoenix.

Phoenix, Dec. 10.

### Santa Cruz County.

F. Cox, superintendent of the Black

Mountain M. Co., owning the Cerra Prieto, near Magdalena, was a visitor in Nogales, and reports that work has been resumed, under the management of N. Banks of Pittsburgh. Machinery will be installed.

### Yavapai County.

(Special Correspondence).—The White G. M. Co. of Yavapai county, Ariz., have contracted with Allis-Chalmers Co. of Chicago for a 20-stamp mill, with power for a 40-stamp mill, also cyanide equipment for same. They are at present employing fifty men in grading millsite and road from Wickenburg to Congress Junction, at which point machinery will be received, and expect to have the mill running not later than May 1, 1905.

Wickenburg, Dec. 11.

The Lincoln mine is to have a 20-stamp quartz mill. The Burlington G. M. Co. is installing a hoisting plant with a capacity of 800 feet, on its mine near the McCabe mine in the Big Bug district. A 4-drill air compressor has been put in. This company is planning to pump water from the Big Bug creek, and machinery for the plant is on the way. The White mine on the Hassayampa river, 12 miles above Wickenburg, has been sampled and machinery for a 20-stamp mill has been ordered as a result of the examination. The mill will have 1000-pound stamps. Forty men are now employed at the mines.

Engineer Merritt is making a survey for a wagon road from Crown King station to the properties of the Colonel (formerly Cadillac) M. Co., a distance of 1½ miles. The expense is shared by the Wildflower group—F. M. Murphy and J. R. Liston—and the road will probably be extended to the latter properties.

The Tiger G. M. Co. is using oil for fuel.—A. P. Anewait is president of the Baumann Copper Co. of Prescott, and J. Baumann is general manager and secretary. Development machinery will be placed on the mines.

## CALIFORNIA.

### Amador County.

(Special Correspondence).—The Pioneer Reduction Works at Sutter Creek, owned by E. C. Voorhies, is being overhauled, gasing tanks being repainted, filter bottoms being renewed, etc., preparatory to handling auriferous sulphides.—The 2000-foot drift of the Lincoln is advancing rapidly southeasterly toward the Mahoney shaft. During the month ending Dec. 7th 180 feet were driven with one machine drill, with two shifts during the first part and three shifts during the last part of the month. This drift will be continued until under the Mahoney shaft when a raise will be made to the bottom of the shaft. After this a similar connection will be made to the Wildman shaft.

Sutter Creek, Dec. 12.

(Special Correspondence).—One hundred stamps are now dropping at the Kennedy mill. The vertical shaft is now down 2700 feet and is to be sunk deeper. A new level will be run at 2700 feet and another at 2850. It is estimated that the vein is 500 feet west of the shaft at the 2700-foot level. Two veins about 100 feet apart are being worked and are designated as the hanging wall and foot wall veins respectively.

Jackson, Dec. 14.

### Butte County.

There are twenty-seven dredgers now at work near Oroville, and one new one is being built. These dredgers require 130 electric H. P. per day. Each boat digs from 1500 to 2500 cubic yards a day, or a total of about 54,000 cubic yards a day.

### Calaveras County.

On the Stanislaus river below Collier, 6 miles east of Murphys, the Bourbon M., M. and Electrical Co. have acquired water rights along the river and intend to transmit power into Sonora and other Tuolumne points by July, 1905. Beach Thompson is the general manager. Peter Copella of Douglas is local superintendent. Fulcher of Sonora is making a preliminary survey of a 2-mile ditch and flume.

The Etna King M. Co. of Stockton has put a hoisting plant upon the Zeigler property in Angels Camp, and will sink a three-compartment working shaft for the development of two shoots of ore. F. D. Cobb of Stockton is president. F. F. Ames is superintendent at Angels Camp.

The Union Copper Co. at Copperopolis is hauling lime to build a smelter. A pole line leading from Telegraph City to the mine has been completed to supply the power. Forty men are at work at the mine.

### El Dorado County.

The Crystal mine, near Omo, is being reopened.—A. P. Grasser will place new machinery in the Smith Point mine, near the Zantgraf, preparatory to the reopening of the mine.

—The Stillwagon mine has been sold to the company operating the Eagle mine. There are six men at the Eagle and the tunnel is being driven.—The large cribdam on the American river, below Josephine, is completed, and the Eagle Bar Co. will commence piping.

### Fresno County.

(Special Correspondence).—Near Trimmer, on Hughes creek, the Eliza Jane mine, formerly the property of V. F. Moore, is being developed by the Hughes Creek M. Co., who are putting in a 5-foot Huntington mill, air compressor, etc.

Trimmer, Dec. 10.

### Kern County.

At the Yellow Aster a new cone has been installed in the rock crusher at the 100-stamp mill. Nearly all the ore now going through comes from the glory holes and is let down to the Rand level. A new crusher is soon to be installed at the 30-stamp mill. The company have decided to work the tailings pile and a 100-ton cyanide plant has been ordered and will soon be in operation. This will work about one-fifth of the daily accumulation.

### Nevada County.

L. Rosenfeld and F. R. Webe of San Francisco have ordered sinking on the Inkmarque ledge at Grass Valley to commence at once.

At the Idaho-Maryland mine the old shaft has been cleaned out and retimbered to a depth of 300 feet. It has been found necessary to put in new sets all the way down. When the 500 level has been reached it is expected that the vein at that point will be worked while the re-opening continues. In the mill new mortar blocks and timbers are being put in. The old floor in the concentrator room has been torn up and will be replaced with new material.

### Placer County.

(Special Correspondence).—The Tadpole Con. G. M. Co., near Westville, Canada Hill mining district, has been prospecting the ledge during the past season by shafts from 4 to 12 feet deep. They have purchased nine claims traversed by two canyons having water sufficient to run a mill. A tunnel has been driven 255 feet. The company intends to install power drills and a 50-ton mill. H. M. Morton is superintendent.

Westville, Dec. 14.

### Plumas County.

C. Standiford, at Quincy, in the employ of H. H. Yard of the North Carolina M. Co., has charge of extensive assessment work at Humbug valley and Rush creek; 150 men are at work. The Plumas Independent reports that orders have been given for 200 M feet lumber, to be used in the construction of houses and flumes on the claims. Roads and trails will be built to make the claims more accessible, then will follow tunneling and ditching.

J. N. Gable of Bucks ranch has bought the Gravel Range gravel mines, 8 miles southeast of Bucks ranch, from J. L. Blevins.

### Trinity County.

The Yellowstone mine, 25 miles from Weaverville, comprises sixteen locations. The water right is ample to furnish power for a 20-stamp mill throughout the year. The property is equipped with a 10-stamp mill. In the spring Superintendent Manley will install a sawmill with a capacity of 5000 feet a day, and an electric plant. The main ledge lies between slate and porphyry, is free milling and easily worked.

### Tuolumne County.

Men at the Green Jumper are running a tunnel to cut the ledge and if the ore is found as good as it is on top a mill will be erected. Wm. Conn is superintendent, under the management of John Ryan, at Sonora.—About 250 men are employed at the Eagle-Shawmut, near Chinese.

## COLORADO.

(Special Correspondence).—If plans do not miscarry, the new United States mint at Denver will be used as a coinage mint the coming year. Congress has been asked to appropriate \$200,000 for operating same. This is considerably in excess of what has been used heretofore, but if they make it a coinage mint it will require a large force of assistants and machinery.—The leasing system inaugurated at the Stratton's Independence, in the Cripple Creek district, has proved a success financially. Since the adoption of this system the profits have been satisfactory and a dividend has been declared to the stockholders.—The American Mining Congress, with headquarters in Denver, and some of the prominent mine operators of the State will endeavor to have a cabinet position created and called a department of mines and mining.

Denver, Dec. 14.

### Boulder County.

(Special Correspondence).—The Moxon G. M. Co., in sinking a shaft on Gold Hill,

has opened up 22 inches of telluride ore. The 115-foot shaft will be sunk deeper. They expect to start shipping shortly.

Rowena, Dec. 12.

### Clear Creek County.

F. F. Reed, manager Bonieta mill in Idaho Springs, has leased the dump of the Saratoga mine, and the Bonieta mill will be run exclusively on the material. It has been recently remodeled and enlarged by the addition of rolls and jigs to one section. The mill now has ten stamps of the slow-drop pattern used for amalgamation, the other fifteen stamps being used for regrinding for the concentrating section.

### Chaffee County.

The Liberty Bell M. and D. Co. at Salida contemplate erecting a concentrator. D. J. Cramer is president.

### Fremont County.

The old National mill tailings dump, near Florence, is to be cyanided by W. G. Brown and associates, who are erecting a mill for that purpose. The dump contains now about 12% of the original values in the ore. The entire dump is to be worked over.

### Gunnison County.

At the Cortland mine, Ohio City, a steam hoist has been put in, and it is reported that a mill for handling the dump will be put up in the spring. G. Brant is manager of the company.

F. H. Neff of South Pass, Fremont Co., Wyoming, has been experimenting with a cyanide process on tailings of the Mineral Hill mill dump near Iris, and expects to treat the ores of the Continental mine on Beaver creek.

### Park County.

(Special Correspondence).—The London Twist M. & M. Co. has leased the Hard to Beat and Venture claims, adjoining the London mine. The tunnel is in 1200 feet, being driven by electric drill.

Alma, Dec. 12.

### San Miguel County.

At Ophir ten stamps of the Suffolk 40-stamp mill are crushing ore belonging to G. Smith, L. Sears and E. P. Hathaway, leasing the Wilson vein of the Suffolk.—Twenty-five men are employed working at the Carribeau, operated by the Yellow Mountain M. Co. O. Erickson has charge of the mine and mill.—The Tidal Wave, under the management of G. B. Pickett, is working a small force. F. E. Trumble is operating the Morning Star, on Sunshine mountain, under lease.—The Carbonero is shipping two carloads, of 20 tons each, per month.

### Summit County.

At the Excelsior mine, near Frisco, manager Calcord has recovered the vein which was lost in a fault and work has been resumed. The big bore of the North American Mines Co. is being driven into Peak 1, under the management of J. A. Parker of Memphis, Tenn. The Achmal tunnel is in 1400 feet, having crossed a number of veins. J. J. Deminy, Charles Brown and E. C. Gard have leased and bonded the Juno tunnel and are preparing to put a force of men to work on the property on January 1. The Troublesome mine is being worked under the direction of M. W. Palmer of Memphis, Tenn.

### Teller County.

R. P. Russell and W. G. Rice of Cripple Creek have leased 50 mining blocks of the Stratton estate, including the Badger Boy, Pride of the Rockies, part of the Lady Smith, the north end of the Proper, and part of the Durham, at 10% royalty. The lessees will erect a large cyanide mill on the ground for the treatment of the lower grades.

The new 25-ton cyanide plant at the Santa Rita property, near Victor, is now operating under lease to Denslow & Hopkins.

## IDAHO.

### Boise County.

V. Thorne of Idaho City will purchase a mill for his property, 6 miles northeast of Idaho City.

### Idaho County.

About 80 miners are at work at Hump, many having gone out to spend the winter, but with the determination of returning in the spring. The ground is covered with about 18 inches of snow, but the weather continues cold, which is not calculated to increase the water supply. The Jumbo, the Atlas, the Mother Lode and the Big Buffalo are all working.

A postoffice has been established at the town of Logan on the Big creek flats. W. A. Edwards is postmaster. During the winter, mail will be supplied twice a month via Warren. Two routes have been surveyed for wagon roads—one from Johnson creek, to connect with the Roosevelt road, and the other from Warren. These roads will probably be completed during 1905. At Logan S. L. Edwards is developing the Sunday.

### Latah County.

The board of regents of the Idaho State University at Moscow propose to



tory, to cost \$35,000, including the cost of a building already completed. The equipment proposed consists of a plant for crushing, screening and sizing of ores for dressing and concentration. The concentration plant will consist of jigs, vanners and Wilfley tables, along with elevators, trommels, settling tanks, and hydraulic classifiers. A small stamp mill, with plates for amalgamation, is included in the plant, and also a set of roasting furnaces, a leaching plant for work in chlorination and cyanidation; a pan and settler for the handling of silver ores and for working of the cyanide method where agitation is required. The plant will also contain a magnetic separator for magnetic concentration. All machines are to be made working size and capable of handling from 500 to 1000 pounds.

#### Owyhee County.

The Trade Dollar Extension M. Co. have discharged all the men working on that property, near Silver City, leaving only a caretaker in charge.

#### Shoshone County.

J. S. Brice has written an account of the Snowstorm mine, near Mullan, Idaho, for the Idaho Press, from which the following is condensed:

The Snowstorm has proven the existence of economic copper deposits in the Cœur d'Alenes, at present sending to the smelters ore at the rate of 160 tons per day. Between September 15 and October 10 the lessees, J. C. Heward & Co., shipped 155 cars, or approximately 3000 tons, from the upper workings. The shipping ore is in the form of oxides and carbonates, malachite predominating. Much of the oxide is a hydrated cuprite. Colors are brick-red, brown and black. All the commercial ores of copper, with the possible exception of the silicates, make their appearance. The ore is an impregnation of quartzite between stratification planes and on either wall bodies of slaty quartzite. The gangue of the ore is a true quartzite with little or no alumina or magnesia.

Fifty farmers have brought suit in the U. S. Court at Boise against the Bunker Hill & Sullivan M. & C. Co., the Federal M. & S. Co., the Gold Hunter G. M. & S. Co., the Hecla M. Co. and Larson & Greenough for \$800,000, alleging that the companies dispose of their refuse matter in the Cœur d'Alene river, causing the water in the river to back up and wash over the banks of the river and overflow their land, and that by reason of the chemicals and other poisonous matter used in their works the water of the river and the Cœur d'Alene lake has become poisonous, causing the death of their stock.

#### Washington County.

In the Seven Devils district the Idaho-Gold Coin M. Co. is working thirty men at its mine and a full crew at the 100-ton cyanide mill. The Iron Spring Co., since the reorganization, has resumed activity, and twenty-six men are employed. The mill at Council will be brought in when spring comes.

The \$33,000 wagon bridge across the Snake river, at Weiser, has been completed.

### MONTANA.

#### Jefferson County.

F. T. Morgan, near Basin, is developing the East Hiawatha in the Cataract district. C. Cochran is operating the Deer Lodge under lease from R. McCaffery. H. W. Bagley has resumed work on the E. F.

#### Powell County.

As a result of an injunction order obtained by State Coal Mine Inspector Welsh, the Gebo coal mine at Red Lodge has been closed. It is claimed that the Clark Ford Coal Co. is disobeying the State laws by failing to provide a proper ventilation and in not having a manway for the use of miners independent of the regular haulage way. About 300 men are affected.

### NEVADA.

#### Esmeralda County.

A postoffice is established at Gold Center, Nevada, 80 miles from Goldfield. B. E. Burger is postmaster.

B. Shear, developing the Homestake mine at Silver Peak, says that they have nine claims on the Drinkwater and Homestake vein. The vein dips at an angle of 35° and is made up of a series of quartz lenses carrying free gold and sulphides of lead and iron. A 5-stamp mill is now being built with Wilfley table, belt machine, canvas tables and cyanide tanks, which will be running by the first of the year. The present cost of mining, milling, etc., is estimated at \$8 per ton, which will be reduced to \$3 when the tunnels on the lowest level cut the ore bodies.

P. J. Somers and M. D. Kelly, of Milwaukee, have bought the White Cloud group, 1 mile northeast of the Black Buttes, and the White Rose claim on the north slope of Vindicator mountain, from

W. J. Hurley and M. Rankin. J. Mack install a complete metallurgical laboratory has charge of their interests at Goldfield.

The Bullfrog Mine Syndicate is developing with ten men. J. W. McGalliard has charge. A road from Goldfield to Bullfrog will soon be completed, making 50 miles from Goldfield to Bullfrog. H. H. Clark, manager of the Bullfrog M. Co. and the Amargosa townsite, is building a telegraph and telephone line between Goldfield and Amargosa.

A part of the Red Top claim, near Goldfield, has been leased to Harrison, Atteaux & Lazard, who are planning a 200-ton milling plant.

A. W. Broughton, manager of the Florida, south of Goldfield, has twenty men working on the property. A steam pump is keeping the mine clear of water, and a \$3000 steam hoist and steam drills will soon be put in.

#### Lincoln County.

Morris & Schultz of San Diego, Cal., have purchased the Golden Eagle group of gold claims from Boyd & Larned for \$15,000. The twelve claims are between the Muddy and Virgin rivers, south from Moapa.

#### Nye County.

The west drift from the 540 level of the Silver Top shaft at Tonopah is in good ore on the Valley View vein. The 22 H. P. gasoline hoist is being replaced by the 44 H. P. hoist which was used in sinking the Belmont shaft on the east side of Mt. Oddie, and the Tonopah City engine house has been removed and is being built over it. The developments in the Tonopah Extension of the east and west drifts on both veins are in ore. The west drift on the 270 foot level of the south vein is now out 310 feet and the east drift on the 400 foot level of the north vein is out 205 feet. Shipments amount to about one carload a day, but to increase this, a new 100-ton ore crusher has been ordered, and will be installed as soon as received.

### OREGON.

#### Baker County.

W. L. Vinson of Baker City has leased the Magnolia mine in Granite district, with an option to purchase, and will reopen the property at once. Ten men are employed and the force will shortly be doubled. The 10 stamps will be dropping within 10 days. A standard concentrator will be added to the present battery of two Wilfley tables, and two vanners. The product will be shipped to the Sumpter smelter.

The Uncle Sam M. & M. Co. in Mormon Basin district is erecting a hoist and intends erecting a 20-stamp mill.

W. L. Vinson of Baker City has leased the Magnolia mine. The mill is being overhauled and additional concentrating tables are being installed, it being the intention to ship the product to the Sumpter smelter. Development of the mine will be under the supervision of A. P. Jones; E. P. Torrey will have charge of the mill.

H. T. Hendryx of Sumpter says that the Geiser-Hendryx Co. intends to open up the Golconda mine, treating the ore removed in development in the mill and after paying operating expenses the remainder of the proceeds are to go into a sinking fund to pay the interest on bonds issued to proceed with development.

The Mayflower mine, near Cornucopia, is shipping ore to the smelter at Sumpter. G. W. Boggs is general manager.

N. J. Sorenson & Co. of Sumpter have contracted for a testing plant to handle fifty to seventy-five tons daily, and will install it at the Highland mine.

The Highland, of the Rock Creek district, under control of the N. J. Sorenson Co., is shipping from 150 to 160 tons of ore to the smelter at Sumpter each month. High-grade ore has been struck in the Glasgow tunnel. The tunnel is now in 900 feet, giving a depth of 400 feet. They are now driving a crosscut tunnel below the Glasgow. This will give a depth at contact with the vein of 600 feet and also enabled underground mining clear across the mountain on which the property is located. The Highland now has 3000 tons of ore on the dump.

The Golden Chariot Co. has purchased the mining and milling plants of the Golden Wizard Co., consisting of two Nos. 7 and 9 pumps, a 7x10 hoist capable of sinking 1000 feet, a 12-stamp mill and 750 feet of wire cable, for \$15,000. The mill has never been operated. Both the Wizard and the Chariot are flooded, but it is the intention of the latter company to install the pumps immediately and get the mine free from water, when the hoist and mill will also be erected.

#### Josephine County.

J. F. Wickham, manager of the Alameda mine, is building a wagon road from Leland station, on the Southern Pacific, to the mine, which will be the main road to Galice. Merlin has

been the point at which travel and traffic for Galice were diverted from the railroad, but to reach the Alameda property by that route required twice ferrying Rogue river, which at some seasons of the year is difficult and always consumes some time. Grades on the old roadway are heavy. The new road will have a maximum grade of 3%, will be 6 miles nearer to the railroad than by the present road, and will avoid crossing the river.

R. Sinden is operating a small quartz mill at his mine on Kanes creek, near Grants Pass. H. W. Reynolds has the Henry Wines placer mine, on Jump-off Joe, adjoining the Cook & Howland mine, in order and ready for piping as soon as there is water in the creek. He will operate two giants, No. 2 to work on the bank and No. 1 to handle the tailings.

A new strike in copper has been made in the Butcher Knife, of the Josephine County mountains, in Deer Creek district. Seventeen claims have been taken up, some of which are already under development. The Improved Minerals Smelter Co. of British Columbia agrees to install a smelter on the ledge as soon as required. The owners of several adjoining claims are considering signing a contract with the smelter company for the installation of a plant.

### SOUTH DAKOTA.

The mines of South Dakota have produced \$7,090,481.71 in gold bullion for the twelve months ending Nov. 1, 1904. The following schedule shows the production by companies:

Alexander Maitland	\$ 315,078 16
Black Eagle	6,000 00
Clinton	317 98
Clover Leaf	166,290 00
Cochran	3,500 00
Columbus Consolidated	36,000 00
Dakota	90,955 84
Extreme	2,500 00
Golden Crest	32,875 00
Golden Reward	414,190 61
Hidden Fortune	168,000 00
Homestake	4,800,538 48
Horseshoe	356,121 28
Imperial	235,000 00
Lundberg, Dorr & Wilson	125,000 00
Monarch	2,208 84
National Smelting	45,056 00
Placer (estimated)	5,000 00
Portland	3,619 72
Spearfish	230,000 00
Wasp No. 2	111,000 00
Total	\$7,090,481 71

In his annual report the State Inspector of Mines states that Branch Mint M. Co. is building mill of 120 stamps and 3 miles of narrow gauge railroad in Bear Butte district. Golden Reward M. Co. is operating only its cyanide plant in Deadwood. Ore is taken from the northerly mines of the company's group. Some shipments have been made to outside smelters. At the Hidden Fortune G. M. Co. the new mill has been running the greater part of the year, with gradually increasing capacity. The ore is taken from the flat, siliceous formation and from the tunnel in the vertical. Clover Leaf G. M. Co. is operating sixty stamps and adding \$200,000 worth of new machinery. The shaft is being deepened from the 700 to the 1000-foot level. Ventilation is good, produced by connection with open cut and circulating water. At the Gilt Edge-Maid M. Co. a new mill is to be run by electric power. At the Homestake mine steady production has been maintained throughout the year. One hundred stamps have been added to the Amicus mill, giving a total of 1000 stamps. The deepest shafts are 1250 feet deep, from the bottom of which development is under way. Portland & Clinton M. Co. are mining on the old workings and making shipments to the cyanide plant of Lundberg, Dorr & Wilson, and to outside smelters. They are under one management. At Wasp No. 2 M. Co. the mill is receiving additional crusher and rolls, to avoid loss of time from closing down when repairs are necessary. An improved system of mining has been inaugurated.

### UTAH.

#### Beaver County.

Hoisting works are to be put up at the mine of the Frisco M. Co. of Salt Lake City, D. P. Rohlfing, manager.

#### Juab County.

The Gemini and Godiva M. Cos., J. I. Packard, president, L. S. Hills, secretary, have decided to install pumps at the 1600-foot level in the Gemini as soon as possible. J. C. McChrystal is superintendent at Eureka.

#### Piute County.

The Alta St. Louis M. Co. has filed articles of incorporation. W. J. Craig is president, and G. O. Ellingwood, secretary. The company owns claims in Little Cottonwood mining district. The capital stock is \$300,000.

The Golden Star M. & M. Co. has filed articles of incorporation at Salt Lake City. They own the Grasshopper, Blue Bird, Rio Bird and Last Chance claims in the Gold Mountain district, Piute county.

W. P. Belding of Salt Lake City is president, and S. D. N. Bennett of Salt Lake City, secretary.

#### Salt Lake County.

H. M. Atkinson, manager of the New England G. and C. Co. at Bingham, Utah, contemplates putting in machine drills and air compressor.

#### Summit County.

T. F. Danaher is president, Forest City, Iowa; A. M. Spooner, Salt Lake City, is secretary and superintendent, and A. H. Elftman is consulting engineer of the Mount Masonic M. Co., developing ground adjoining Park City, Utah. As a result of the surface work, it was determined to run a 1200-foot tunnel on the vein from the base of Mount Masonic. This tunnel has been driven 400 feet.

### WASHINGTON.

#### Stevens County.

The Washington Powder Co., J. B. Tuttle, Jr., of Seattle, treasurer and manager, has been successfully tested a silicate of aluminum, analyzing 69% silica and 20% alumina, as an absorbent for nitro glycerin, finding no difficulty in making dynamite carrying 70% nitro glycerin. The test was made under the supervision of E. H. Rothrock. This deposit is 3 miles west of Blue Creek station on the S. F. & N., and is closely akin to the German kieselsuhr. The company owns water power on Wright's creek not far from the deposit, and the powder mills will be at once erected there. The company expects to make its own nitro glycerin by nitrating raw glycerin.

#### Whatcom County.

The Eureka mine, in Slate creek district, has been purchased by C. H. Ballard, superintendent of the neighboring Mammoth property. The price is reported at \$420,000. Arrangements are under way to operate the Eureka extensively next season. The deal includes a 10-stamp mill and sawmill plant.

### FOREIGN.

#### AUSTRALIA.

##### New South Wales.

At Broken Hill the new machinery in connection with the magnetic zinc separation process at the Junction North is being put in. It comprises two ball mills and automatic percussion feeders. One mill is already in place. The mine continues to make from 20,000 to 25,000 gallons of water daily, which is being pumped to the British mill. The foundations for the Wilfley tables are laid; and, as the plans of the ball mill are to hand, preparatory work is being commenced. Initial arrangements for unwatering the New White Leads have been completed. At present the water is just at the back of the 120-foot level.

##### Western Australia.

The Mining Journal reports that interesting experiments are being made in the Kalgoorlie mines by the State Mines Ventilation and Sanitation Commission. In several instances the faces of the drives are being heavily charged with as many as sixteen shots. Immediately after the firing, the experimenters, wearing respirators, visit the face and test the fumes, the idea being to determine the effects occasioned by undercharging and overcharging holes. It is stated that no instance of miners' phthisis originating in the State has been discovered. Every sufferer examined had contracted the disease before arriving in Western Australia. An investigation to determine the shape of the sulphide rock dust particles and their effect on the lungs is being carried on.

##### Queensland.

The fire at the Brilliant P. C. mine, Charters Towers, is being extinguished, and work resumed at the New Queen, Queen Cross Reef, Victoria & Queen, Victoria & Caledonian Block and others. The mines thrown idle will be the Brilliant P. C., Brilliant Block, Brilliant Extended, Brilliant & St. George United, Brilliant Central, Phoebe, Brilliant Freeholds and East Mexican. The Brilliant P. C. is one of the oldest mines on the field and has been worked for about eighteen years. It covers an area of twenty-five acres, but the known reefs have been practically worked out. Operations have lately become considerably restricted and confined mostly to tributers, who have obtained fair results. The company consists of 260,000 shares of £2 each, all fully paid up; the value of the gold obtained aggregated £1,382,000, from which about £677,186 has been paid in dividends.

### BRITISH COLUMBIA.

#### Atlin District.

Dredging for gold has become an important industry, though a large number of men still find employment in drifting, sluicing, etc., on their individual claims.



On the larger holdings suited to dredger operations considerable "bore hole" prospecting has been done as preliminary to the installation of dredgers. A dredger has been placed on a group of claims on Gold Run creek and a 500 H. P. electric power plant installed on Pine creek near the falls by the British-American Dredging Co. They also constructed 1½ mile of ditch, laid 1800 feet of 30-inch steel pipe, built 400 feet of flume, set up 6 miles of pole line, put in other equipment and made improvements at the dredging camp.

An effort is again to be made to employ Asiatic labor in the Atlin hydraulic mines. Two years ago a number of Japanese were taken into the country, but the white miners drove them out. The opposition of the whites was so determined that the mine owners considered it was best to defer introducing the unpopular Asiatics. According to H. W. Ebbs-Canavan, there is to be a second attempt made. The mine owners urge that conditions have changed considerably, there being far fewer white miners in the district than formerly, and that it is not possible to operate many of the Atlin hydraulic properties without largely reducing the cost of labor. At the same time, they say, they will increase the wages of the white miners now in the district by employing them as foremen or overseers.

#### Trail Creek District.

The Trail smelter has a daily capacity of 900 tons of silver lead ore; the lead refinery can produce 25 tons of pig lead per day; 500 men are necessary to run the plant. Electric power is transformed 30 miles from the Bonington Falls power plant at 20,000 volts and is transmitted at the smelter to 550 volts, furnishing 1000 H. P. to 16 motor units for handling ore and running machinery. The furnaces are charged automatically from cars on a track beside the furnaces. The contents of each car are mechanically fed into the furnace so as to evenly spread the charge.

#### Rossland District.

At a meeting of the Rossland Board of Trade it was resolved that in view of the great disadvantage which gold-copper mining is laboring under in that province, and the vast revenue derived from it by the Dominion Government, the Rossland Board of Trade take steps to petition the Dominion Government to grant a bonus on copper, as it has done on lead and iron.

The concentration and reduction plant of the Rossland Power Co. at Trail has closed. The mill company has been engaged for several weeks in its trial run. The tailings, all below ½ inch in size, were pulverized in Chilian mills to 50 mesh for cyaniding. The test runs showed that the coarse concentrates were low in grade and under smelter rates prevailing they yielded little return. The finely disseminated sulphides remaining with the jig tailings were of very much higher grade than the rest and contained the bulk of the values. This unexpected peculiarity of the ore impoverished the coarse concentrates and carried high-grade sulphides worth \$100 to \$200 per ton into the cyanide treatment, thus making its operation impossible. It has, therefore, become necessary to add a plant of concentrating tables sufficient to treat the pulverized product of the Chilian mills before it goes to the cyanide plant and thus extract its rich sulphide contents. It will require several months to secure and install this plant, together with some additions to the slime settling facilities. It has therefore been decided to suspend operations until these improvements have been made and the smelting rates for concentrates have been determined.

### CANADA.

#### Ontario.

A deposit of corundum has been found on the farm of J. T. Vosper, Methuen township, Peterboro county. An analysis showed specific gravity to be 3.99, while that of good corundum is 3.85. The value of the mineral is \$390 per ton.

### MEXICO.

The "Free Zone" is a strip of Mexican territory 12 miles broad, extending along the entire frontier between the United States and Mexico. It was first established as far as Matamoros in 1855, when goods were admitted free of duty. In 1885 it was extended along the entire border, and duties, amounting to about 11% of the national duties, including fees for certificates, were assessed. A reduction of 89% in duties admits of considerable importation of goods from Europe, which cross the United States in bond and then come into direct competition with American goods in the stores of the Free Zone. Goods manufactured within the Free Zone when shipped across the Free Zone line into Mexican territory must pay the full national duty the same as foreign goods. The very low

tariff rates charged on goods entering the zone—almost no duty—apply only to goods consumed in the Free Zone, for which reason there are no factories therein.

The secretary of the treasury announced that in accordance with the law of November 25, 1902, the rate of exchange for liquidating import duties on merchandise entering the maritime or frontier custom houses during the month of December will be 220%, and that the commercial value in silver coin of one kilogram of gold at which to calculate the 3% stamp tax and the 2% coinage dues during December will be \$1,432.35.

#### Chihuahua.

The Minas Almoloya S. A., D. W. Shanks, general manager, and N. O. Bagge of Los Angeles, Cal., the principal owner, is working its property at Cerro Almoloya, between Jimenez and Parral. Eleven hundred feet of sinking, 600 feet of tunneling and 360 feet of drifting have been done. A telephone line is being built from Dorado station, on the Parral branch of the Mexican Central, 5 miles to the mines.

The Parral Miner says that during November there were 8500 tons of ore shipped from the Palmilla, Refugio, Quebradillas, Descubridora, Clarines, San Francisco del Oro, Santa Barbara and Inde mines.

#### Sonora.

Nogales, Ariz., Oasis says the Dewey mine, near Hermosillo, has shipped a carload of graphite to Hamburg, Germany, via Galveston, Texas, and also a carload of copper ore. A market for both has been offered, with a lower freight rate through from Hermosillo to Hamburg than to New York, where hitherto the graphite has gone; and, if the trial shipments prove satisfactory, both graphite and copper will be shipped regularly. The Dewey has also a large deposit of fine fire clay, a shipment of which is to go to Zubiarte for lining roasting furnaces.

The Golden River Placer M. Co. of Port Huron, Mich., is preparing to ship in hydraulic machinery to work forty-three pertenencias of placer ground on the La Canada branch of the Badoyhu, a branch of the El Fuerte river. It is expected that this machinery will be on the ground by February 1. General Manager Patterson and Scott have gone to the States to buy the machinery. Four giants are to be placed on the property. The machinery is to be shipped to Topolobampo, thence by the Orient Railroad to El Fuerte, thence by wagons to the mines.

The Sonora G. M. Co. of Battle Creek, Mich., is prospecting placer ground and three or four quartz mines and is shipping ore to El Fuerte. The company is capitalized at \$2,000,000 gold and is under the management of Mr. Clapp.

Below the Golden River Co. on the La Canada the Sonora Gold Placer M. Co., R. D. Hughey, manager, is working 100 men on fifty-seven pertenencias on pure placer ground. Manager Hughey has gone to the States to buy hydraulic machinery.

### PHILIPPINE ISLANDS.

The Philippine G. M. Co. has purchased a 10-stamp mill for erection in the Benguet district. J. Kelley at Antinook, Benguet, will order two 3-stamp batteries to work in connection with a cyanide plant.

At Masbate the Orion G. M. Co. are installing a 10-stamp mill from the Joshua Hendy Co. of San Francisco. Mr. Kimball of New York is superintending the erection of a Risdon bucket dredger of 3000 cubic yards daily capacity for the Masbate G. M. Co. M. A. Clarke of Manila proposes to erect a 10-stamp mill on his claims in the Benguet region.

### Trade Treatises.

"Worthington Pumping Machinery, Catalogue W-30," from Henry R. Worthington, New York City, is a typographic gem. The illustrations are types of fine pictorial portrayal.

Special Gear Catalogue No. 10, from C. O. Bartlett & Snow Co., Cleveland, O., illustrates and describes spur, angle, miter, bevel and worm gears, it being supplementary to their general catalogue No. 11.

Standard size (6x9 inches) bound in red and bound to be read, the 1904 manufacturers' catalogue of the American Well Works, Aurora, Ill., (Chicago office, 45 W. Randolph street) is a good epitome of well sinking and prospecting machinery. Its 160 pages contain much of interest and value on these subjects and also concerning compressed air pumping machinery, gasoline and steam engines, drilling tools, pipe and cylinders.

### Personal.

E. A. WILTSEE is in San Francisco from Denver.

W. J. RICKELL has started an assay office at Sodaville, Nev.

G. GILLET is manager of the Quebradillas mine in Parral, Mex.

C. C. JONES of Salt Lake City, Utah, is East on professional business.

F. E. HIGSON has charge of the Bullion-Beck assay office at Eureka, Utah.

H. C. NEWCOMB is superintendent of the Buena Vista M. Co., operating at Hancock, Colo.

FRANK CAPP is superintendent of the Florence G. M. Co. at Sugar Loaf, Boulder county, Colo.

ERNEST LEVY has succeeded P. S. Coudrey as manager of the Le Roi No. 2 at Rossland, B. C.

DOANE MERRILL is vice-president and manager for the Southwestern S. & R. Co., at Benson, Ariz.

C. B. NEIL of Helena, Mont., is manager of the Buckeye mine, near Basin, Jefferson county, Mont.

L. S. COTES has been appointed superintendent of the Boston Consolidated mine at Bingham, Utah.

A. M. ROCKWELL is superintendent at Wickenburg, Ariz., of the White G. M. Co. of Yavapai Co., Ariz.

W. J. WALTERS is manager of the Smuggler G. & C. M. Co., Index district, Snohomish county, Wash.

WILLIAM SCHWARTZ is general manager of the Santa Cruz M. Co. at Patagonia, Santa Cruz county, Ariz.

A. JACKSON, superintendent of the Rocco-Homestake mine, Hamilton, Nev., is in San Francisco for the holidays.

L. C. DOTY, formerly superintendent of the Eureka Hill M. Co., has charge of the Bullion-Beck mine at Eureka, Utah.

E. F. BRADT, of Hibbing, Minn., is superintendent of the mines of Pickands, Mather & Co., on the Mesabi range.

R. S. NORRIS, manager of the York-Alaska Tin Co., operating in the York district, Alaska, is at Brandon, Wis.

W. G. PAGE is manager of the Red Elephant group of mines at Hailey, Idaho, belonging to the Quincy, Jr., M. Co.

HENRY WENCHTLAND, who is interested in mining properties at Alamos, Estado de Sonora, Mex., is in Chicago.

C. E. WOLFF of the Zarina M. Co. is operating the Snoozier mine, on Russian creek, near Etna, Siskiyou county, Cal.

JOHN MCKELVEY, operating the South Fork mine, near Graniteville, Nevada county, Cal., has returned to the mine.

J. FARRIN, superintendent of the Glasgow M. Co., accompanied by D. Bailly, has been examining the mines in Rocky district, Utah.

F. H. METTS of Youngstown, O., president of the Ouray Chief M. Co., has been examining the company's property in Ouray, Colo.

T. T. HARDING, manager of the Gladstone M. Co., operating the Macedonia and Arizona mines north of Nogales, Ariz., is in Pittsburgh.

W. J. SANDO has been appointed manager of the Allis-Chalmers Co.'s pumping machinery department, with his headquarters in Milwaukee.

W. WEARNE, late superintendent of the Winifred Iron M. Co., of Minnesota, succeeds E. F. Bradt as superintendent of the Leonard mine, near Hibbing, Minn.

J. W. MESSNER is general manager of the Indiana copper mine, near Medical Springs, east of Baker City, Or., and of the Prairie Diggings mine in Grant county, Or.

R. E. HANLEY of San Francisco has an office with E. A. Sessions & Co., in the Canterbury building, Portland, Oregon. He is now examining Levens Ledge property of Douglas county, near Riddles, and also the Goldbug for T. T. Burkhart.

R. H. PASCOE of Rossland, B. C., who has had charge of the Standard mine, has been made superintendent of the Standard and Mammoth mines, owned by the Federal M. and S. Co., having been recently consolidated as the Mace mine.

E. H. STROUD of E. H. Stroud & Co., Chicago, Ill., manufacturers of the Cyclone pulverizers, addressed the Association of Portland Cement Manufacturers

on the subject of the Cyclone system of burning powdered coal, at their annual meeting at the Hotel Astor, New York City, December 14.

### Book Reviews.

"Geology of the Bitter Root Mountains," by Waldemar Lindgren, forms professional paper No. 27 of the U. S. G. S. The Bitter Root mountains, together with the Clearwater mountains, are in Montana and Idaho, bordered on the south by the Salmon river and on the north by the north fork of the Clearwater. The Bitter Root range, which attains an elevation of 11,000 feet, merges into the great dissected high plateau of the Clearwater mountains. These descend rather abruptly to the plateaus of Camas prairie and Cold Springs prairie, which form part of the Columbia river lava plateau. This plateau has a general elevation of 2500 to 3000 feet, and it is built up of horizontal lava flows. From great glacial cirques in the western slopes of the Bitter Root range the Salmon river and the several forks of the Clearwater river find their way westward through canyons from 3000 to 5000 feet deep. The canyon of the Salmon is especially remarkable for its great length and depth. The area indicated forms a wild and very sparsely populated mountain region, which is heavily timbered except on the highest ridges. The main Bitter Root range and the larger part of the Clearwater mountains consist of a massive biotite granite, or a quartz monzonite, which is the northward continuation of the great batholith of the same rock that occupies so large an area in southern central Idaho. A very remarkable fault of exceptional length and displacement separates the eastern slope of the Bitter Root mountains from the valley of the same name. The valuable minerals contained in this area are confined chiefly to the western slope of the Clearwater mountains. The most important are the gold deposits, which occur as fissure veins and gravels. At the foot of the Bitter Root mountains, some 12 miles north of Hamilton, Mont., is the Curlew mine, where a body of galena was found on a fissure that had limestone and quartzite as its footwall and the gravels of the Bitter Root valley as hanging wall. On the upper south fork of the Bitter Root river prospects of copper, silver and silver-lead ore have been worked. Hughes creek, in the same vicinity, contains gold bearing gravels which have been worked for many years. Elk City, where mineral deposits were discovered in 1862, is the center of the gold mining industry on the west slope. Gold to the value of several million dollars was extracted here from late Tertiary bench gravels, and placer mining is still prosecuted on a small scale. Quartz veins have also been opened in this old mining district. The well-defined quartz veins of Buffalo Hump, discovered in 1897, are actively worked, though not on a very large scale. These deposits occur in granitic rocks, accompanied by contact metamorphic slates. Florence, located 40 miles southwest of Elk City, is another of the old placer camps, discovered about 1861. The gravels were rich and the camp has yielded gold to the value of many million dollars. At present a few placers and quartz mines are worked there also. Pierce City, on Orofino creek, about 50 miles north-northwest of Elk City, is also a well-known placer camp, discovered in 1861, and worked continuously since then. The present yield from these placers is probably about \$30,000 per annum. The gravels occur as creek alluvium and as benches up to 500 feet above the present drainage level. Quartz veins have also been found near Pierce, and many of them now are worked on a small scale. The veins occur on gneisses and schists. The total production of this gold-bearing region is at the present time probably about \$160,000 per annum. Coal of fair quality has been found on the upper South Fork of the Bitter Root valley, and the beds are here associated with rhyolite. The developments have not yet shown the extent of this occurrence. Lignite of fair quality also occurs on Orofino creek below Pierce, and is associated with basalts, but the beds are probably not thick enough to make development work profitable.

### Obituary.

W. P. HARLOW, associated with W. H. Green of New York in copper mines in Arizona and New Mexico, died at St. Luke's hospital Dec. 6, 1904, as a result of an operation for appendicitis.



## Commercial Paragraphs.

ELLIOTT & DRESCHER of Prescott, Ariz., have finished plans for a 120-stamp mill for the Amalgamated G. Co., Quartzsite, Ariz.

THE Denver Tank Co., Denver, Colo., has recently furnished the following cyanide plants: 100-ton plant to Magnolia, Colo., 50-ton plant to Arizona and 50-ton plant to Silver City, N. M.

MR. PARK of the Park Gale Mfg. Co., Chicago, Ill., manufacturers of the Park automatic loading machine, is visiting the Pacific coast. This company is making an automatic loader which is creating some interest. Their offices are at 34 W. Monroe street, Chicago, Ill.

RECENT sales of second-hand machinery from the stock of the S. H. Supply Co., Denver, Colo., have been one 50-ton concentrating mill to Arizona and one to Boulder, Colo., 100-ton concentrating mill with crushing plant to Washington, and 50-ton crushing plant with gasoline engine to Tonopah, Nev.

JEANESVILLE IRON WORKS CO., through their Denver branch, late shipments of two electric driven power station pumps, 1000 feet lifts to Camp Bird mine, Ouray, Colo.; one station pump, compound condensing, to Parral, Mex.; one station pump to Nevada; one sinker to Central City, Colo.; five Wyoming steam separators to Bisbee, Ariz.; one to Crested Butte, Colo.; and one to Parral, Mex.

THE Lawrence Pump & Engine Co., Lawrence, Mass., is organized to make centrifugal pumps and vertical steam engines. H. L. Mellor is president of the company. Their line of pumps and engines are to be built from new patterns, and are designed to embrace new features. The company has just shipped a centrifugal pump of 3,000,000 gallons capacity, to be operated by an electric motor, to the Ticonderoga Pulp and Paper Co., Ticonderoga, N. Y., to be used in connection with their water filtration system.

THE Stow Flexible Shaft Co. of Philadelphia, while not desirous of making any forecast for the future business conditions, express themselves as being perfectly satisfied with the existing conditions. Among orders received during the past month they report the following: A Halsey portable drill for a firm in Vancouver, B. C.; an 18-foot flexible shaft, and a large crank pin turning machine from their St. Louis agent, together with three complete electric hammer outfits, shipped to Italy, for use in the government navy yards.

THE Brown Corliss Engine Co., Corliss, Wis., have a contract from the city of Milwaukee to furnish and erect complete one triple expansion high duty crank and fly wheel 20,000,000-gallon pumping engine. The amount of contract is \$64,500. They write that the contract was awarded after a thorough inspection of their plant by City Engineer C. J. Poetsch and the Milwaukee board of public works, finding that the concern is amply able to execute the contract with efficiency and dispatch. They are extending their foundry 60 feet to take care of the large amount of work on hand and in view.

THE California Gas and Electric Corporation of San Francisco, Cal., has a contract to supply the United Railroads of San Francisco with electric power for the operation of its entire street railway system and has let the contract for the generators of the new plant to the Crocker-Wheeler Co., through their Pacific coast manager, the Abner Doble Co., of San Francisco. The three machines will have a capacity of 4000 kilowatts each, and will be directly connected to gas engines. The generators will deliver twenty-five cycle, three-phase alternating current.

## Books Received.

In "The Black Hills Illustrated" the Black Hills Mining Men's Association has published a terse but complete description of conditions in this region. The attractive appearance of this large 200-page book cannot fail to give a favorable impression of the region. The good illustrations and printing enhance the value of the descriptive matter. A general description of the various resources and improvements is followed by descriptions of important mines of Lawrence, Pennington and Custer counties.

"Annual Report of the Chief of the Bureau of Steam Engineering" from the Government Printing Office at Washington.

## Latest Market Reports.

SAN FRANCISCO, December 16, 1904.

### METALS.

SILVER.—Per oz., Troy: London, 28d (standard ounce, 925 fine); New York, bar silver, 60c; refined (1000 fine); San Francisco, 60c; Mexican dollars, 49c San Francisco, 48c New York.

COPPER.—New York: Standard, \$14.87; Lake, 1 to 3 casks, \$14.67@15.12; Electrolytic, 1 to 3 casks, \$15.00; Casting, 1 to 3 casks, \$14.50; San Francisco: \$16.00. Mill copper plates, \$17.00; bars, 18@24c. London: \$66 spot per ton.

LEAD.—New York, \$4.70; Salt Lake City, \$3.50; St. Louis, \$4.12; San Francisco, \$4.50, carload lots; 4c 1000 to 4000 lbs.; pipe 6", sheet 7", bar 5c; pig, \$4.85. London: £12 17s 6d long ton.

SPELTER.—New York, \$5.87; St. Louis, \$5.00; London, \$25 per ton; San Francisco, ton lots, 6c; 100-lb. lots, 7c.

TIN.—New York, pig, \$29.12@29.60; San Francisco, ton lots, 29c; 500 lbs., 29c; 200 lbs., 30c; less, 31c; bar tin, \$32@35c. London, £136 spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@82c per gram.

QUICKSILVER.—New York, \$40.00@41.00, large lots; London, £7 15s San Francisco, local, \$39.00 per flask of 75 lbs.; Denver, \$45.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6c; extra, 17c; genuine, 31c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 19.50c; San Francisco, Plumbers', 100 lb. lots, 16.25c.

ZINC.—Metallic, chemically pure, \$3.50, 50c; dust, \$3.10; sulphate, \$3.10, .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

### STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$15.85 @16.10; gray forge, \$16.60; San Francisco, bar, 3c per lb., 3c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$21.00; open hearth billets, \$21.00; San Francisco, bar, 7c to 12c per lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, 1c per lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, 1c per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

COAL.—San Francisco, coast, yard prices: Wallington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

### GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7c; Hallett's, 6c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8c; 100-lb. lots, 10c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15c; less than one ton, 17c. No. 1\*, 60%, carload lots, 13c; less than one ton, 15c. No. 1\*\* 50%, carload lots, 11c; less than one ton, 13c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9c; less than one ton, 11c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$8.50@6 per 1000; 4x, \$6.50 @7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet; double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c per set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 23@24c per lb.; carloads, 23@24c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3c per lb.; caustic soda, in drums, 3@3c per lb.; Cal. s. soda, bbls., \$1.10@1.20 per 100 lbs.; sds., 90c@1.00; chlorate of potash, 12@13c; nitrate of potash, 6c@7c; caustic potash, 10c in 40-lb. tins; roll sulphur, 23@24c; powdered sulphur, 2c@2c; flour sulphur, French, 2c—c; alum, \$2.00@2.25; California refined, 1c@2c; sulphide of iron, 8c per lb.; copper sulphate, 5c@5c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66c, B, 1c@2c per lb.; nitric acid, carboys, 8c per lb.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, \$3.50, 7c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

MOLYBDENUM.—Best, 2 over 75c per lb.

CHROMIUM.—90% and over, \$3.50, 80c.

PHOSPHORUS.—American, \$3.50, 70c.

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FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

TRAVELING HARVESTER.—No. 776,167. Nov. 29, 1904. Daniel Best, San Leandro, Cal. This invention comprises mechanism by which the thrashing and cleaning mechanism of the apparatus may be maintained substantially level while the machine is traveling upon side hills or inclined ground which would otherwise throw the mechanism out of level. It also comprises a novel means for preventing twisting strains upon the frames, means for more equally dividing the weight carried upon each of the main bearing wheels, and in dividing the power transmitted from said wheels.

JAR CLOSURE AND FASTENER.—No. 776,162. Nov. 29, 1904. E. Abramson, San Francisco, Cal. The object of this invention is to provide a simple locking means applicable to a variety of jars and bottles, but especially to fruit or preserve jars, which fastener can be quickly and easily put on or entirely removed from the jar, which will serve to hold the cover tight, and which will enable the jars to be piled one on top of the other, if desired.

SUCKER ROD GRABS.—No. 776,749. Dec. 6, 1904. O. A. Mann, Oil Center, Cal. This invention relates to improvements in means for recovering broken sucker rods, or other and similar obstructions from oil wells. It consists essentially of a hollow cylinder having a hinged bifurcated member arranged to bridge the opening and of guide means on the cylinder for engaging the sides of the bifurcated member to prevent the latter from spreading, the object being to render the device practicable in case the couplings have become badly worn and tapered, and where there is a heavy strain to contend against.

COIN BOX.—No. 776,768. Dec. 6, 1904. John Williams, Oakland, Cal., assigned to Security Coin Box Co., San Francisco, Cal. The object of this invention is to provide a light, compact and convenient receptacle in lieu of the usual bags and trays which are used in banks, treasuries and other depositories. The advantages of this construction are that the capacity of a vault may be nearly eight times as great when these boxes are used as compared with the usual system of sacking coin, while the boxes, being of metal, are practically indestructible. When the box is sealed all the coins in the box may be simultaneously seen, touched and counted, and when the cover is removed the box may be used as a counter tray and any particular stack or number of coins may be instantly and easily removed without disturbing or interfering with any part of the remainder of the coin in the box.

MEANS FOR OPERATING WATER GATES.—No. 776,727. Dec. 6, 1904. A. J. Collar, Yreka, Cal. This invention comprises the combination in a water gate of a casing having a rectangular valve chamber, a valve in said chamber, said valve having a tiltable disk or plate on one side adapted to close over the inlet to the chamber, and transverse rollers on the opposite side of the disk, said rollers being arranged to bridge the outlet from the chamber, said disk or plate having a limited up and down movement independent of the valve.

EYEGLASS.—No. 776,739. Dec. 6, 1904. R. R. Hall, San Francisco, Cal. This invention comprises in eyeglasses the combination with lenses, posts and guards of a spring having a central horizontal portion bendable in a plane parallel with the plane of

the lenses but arranged in advance of the plane of the lenses and having short lateral substantially vertical portions engaging the posts and made substantially rigid, said central horizontal portion concaved on its inner edge to accommodate the nose when the glasses are in position on the wearer. With a pair of glasses of this type in position on the wearer very little metal is visible, simply the posts, the edges of the guards, and a straight, narrow line indicating the spring across the nose.

## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING DECEMBER 6, 1904.

776,637.—STEAM ENGINE—G. A. Aldrich, S. F.  
776,689.—SAWING MACHINE—N. Blair, Buell, Or.  
776,690.—GRADING MACHINE—S. B. Bloomer, Seattle, Wash.  
776,726.—BELT TIGHTENER—H. E. Clark, S. F.  
776,727.—BELT TIGHTENER—H. E. Clark, S. F.  
776,727.—WATER GATES—A. J. Collar, Yreka, Cal.  
776,649.—CIGAR PACKAGE—Dumont & Sentegnan, Los Angeles, Cal.  
776,628.—PRUNING SHEARS—J. Earnhart, Santa Paula, Cal.  
776,635.—PUMP—T. R. Goth, S. F.  
776,739.—EYEGLASSES—R. E. Hall, S. F.  
777,031.—Pliers—L. Hanson, Seattle, Wash.  
776,615.—LOCOMOTIVE—Kelly & Plough, Spokane, Wash.  
776,746.—CABINET—D. R. Kinsey, Sedro-Woolley, Wash.  
776,599.—PREVENTING RAILWAY HOLDUPS—S. A. Kitchener, Stockton, Cal.  
776,760.—TOBACCO POUCH—E. G. Lundquist, Los Angeles, Cal.  
777,040.—COUPLING—A. L. Malone, S. F.  
776,748.—SUCKER ROD GRAB—O. A. Mann, Oil Center, Cal.  
776,536.—TELEGRAPH KEY—McKinsey & Nelson, Susanville, Cal.  
776,544.—PENCIL SHARPENER—C. Payne, Los Angeles, Cal.  
776,665.—DRILL AND REAMER—L. C. Preston, Weston, Or.  
776,799.—DAM—F. H. Reed, Claremont, Cal.  
776,627.—GARMENT SUPPORTER—E. J. O. Rother, San Diego, Cal.  
776,619.—THRESHER—B. W. Salmon, French Camp, Cal.  
776,553.—GREASE CUP—F. Soler, San Bernardino, Cal.  
776,764.—BRACKET—G. E. Squire, Bellingham, Wash.  
776,700.—SPARKING DEVICE—C. E. Sterne, San Diego, Cal.  
776,625.—SPACING RACK—E. A. Stickney, Sacramento, Cal.  
776,812.—GROCERY BIN—J. Strine Sr., Downey, Cal.  
776,663.—LOAD LOADER—E. E. Thomas, Portland, Ore.  
776,664.—BAND SAW MILL—E. E. Thomas, Portland, Ore.  
776,668.—FENCE POST—W. L. Vestal, Redlands, Cal.  
776,975.—WINDING CABLES—A. F. Wheaton, Menlo, Wash.  
776,768.—COIN BOX—J. Williams, Oakland, Cal.  
776,879.—WIRE GRIP—J. M. Wolfe, Seattle, Wash.

## DELINQUENT SALE NOTICE.

GOLDEN WEST MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice—There are delinquent upon the following described stock on account of assessment (No. 2) levied on the 17th day of September, 1904, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Co.	No. Co.	Assess.	Am't.
T. W. Stone	115	20,000	\$200 00	
T. W. Stone	116	20,000	200 00	
J. P. Mundy	41	500	5 00	
D. Berlin	44	500	5 00	
D. Berlin	45	500	5 00	
T. P. Moore	48	1,000	10 00	
T. P. Moore	49	1,000	10 00	
T. P. Moore	50	1,000	10 00	
T. P. Moore	51	1,000	10 00	
T. P. Moore	52	1,000	10 00	
T. P. Moore	53	5,000	50 00	
T. P. Moore	54	5,000	50 00	
Joshua Reaves	69	600	6 00	
E. E. McLeod	107	500	5 00	
W. L. Dimock	108	200	2 00	

And in accordance with law and an order from the Board of Directors, made on the 17th day of September, 1904, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 207 Battery street, Room 15, San Francisco, California, on MONDAY, the 28th day of November, 1904, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHAS. BOVONE, Secretary.  
Office—207 Battery street, Room 15, San Francisco, California.

### POSTPONEMENT.

By order of the Board of Directors, the sale day of the above delinquent stock has been postponed to SATURDAY, the 17th day of December, 1904, at the same hour and place.

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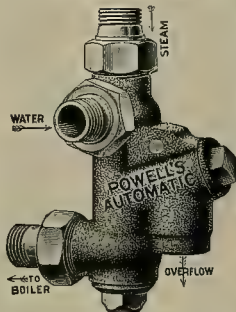
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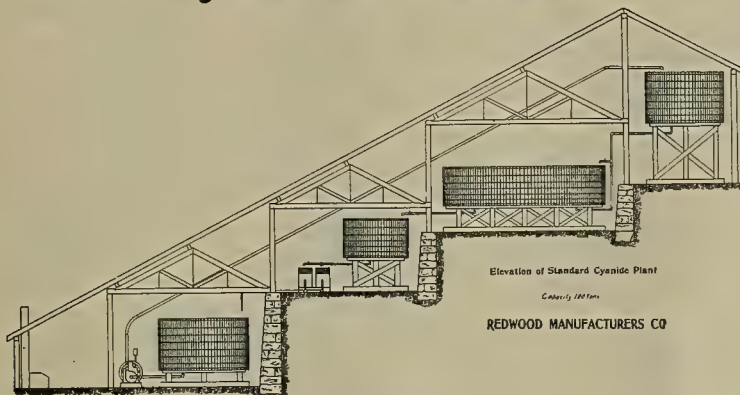
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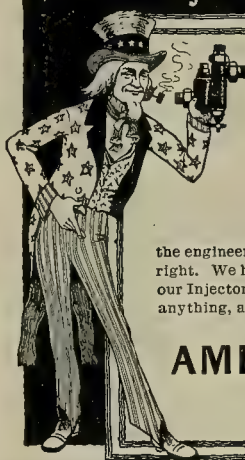
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# MINING AND SCIENTIFIC PRESS

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Number 26.

SAN FRANCISCO, CAL., SATURDAY, DECEMBER 24, 1904.

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## Life in the Yukon Basin.

The impression which most people have of Alaska is that of a vast wilderness, great mountains and desolate valleys, buried beneath a mantle of eternal snow. In midwinter this idea is not far from correct, but in summer the snow disappears, excepting from the mountain tops, and the valleys are bathed in the warm sunshine of the long Arctic days. The Forty Mile section is tributary to the Yukon, which it joins in the Northwest Territory, about 30 miles above the international boundary. The drainage of Forty Mile lies wholly within what is known as the Yukon plateau. The Forty Mile river is lined in its upper portion by high, flat terraces, 400 feet above the bed of the river, giving to the scenery a picturesque effect. The river flows through a narrow canyon the greater part of its way, leaving it about 20 miles from its confluence with the Yukon, and from there to the latter river it flows through a broad, open valley. The name Forty Mile was given the stream and town in 1886 by the miners, from the fact that it was 40 miles below Hudson Bay Co.'s post, old Fort Reliance.

The climatic conditions on the coast of Alaska and those of the interior are widely different. On the coast the rainfall and snowfall are abundant. At Sitka, for instance, the annual rainfall for a period of seven years, during which careful record was kept, was 111.7 inches, and at Juneau 94 inches.

The temperature on the coast rarely falls much below zero, but this is due to the warm water of the Japanese current, which greatly modifies the temperature along the coast, and also induces the heavy rain and snowfall on the coast. In the interior, however, beyond the great range of mountains, conditions are very different, almost as different as those of the California coast as compared with the climate of the Great Basin beyond the Sierra Nevada mountains. The climate of the interior of Alaska is dry and the range of temperature is much greater than on the coast, but the intense cold of winter is not so great a drawback to a comfortable existence as may be supposed, owing to the dryness of the air. In this respect it is not very unlike the winters of Montana, the Dakotas, Wyoming or Colorado. The accompanying illustrations indicate that a home in the Yukon basin on Forty Mile can not only be made habitable, but as comfortable, attractive and homelike as in any other mining camp isolated from



A Yukon Home—Taken Nov. 19, 1904. (See Page 426.)

metropolitan centers. It is true that few people go to Alaska with the expectation of remaining there the rest of their days, but for the purpose of accumulating a fortune in a few years, by taking advantage of the unusual opportunities presented. As a result, houses are usually built of logs, like the cabins here illustrated, sometimes hewn, as in this instance, but often without attempt at unnecessary display or ornamentation. That a log cabin can be made a comfortable place to pass a few years is clearly indicated by the interior of the cabin shown. Many of the household necessities and even luxuries are seen to have been taken into that far north region, showing that one who determines to make Alaska their home for a time need not be compelled to live in a house of ice, the interior of which is

reached by crawling upon hands and knees through a low passage, such as the Esquimaux are supposed to inhabit beyond the Arctic circle. Windows are conspicuous by their absence.

The miners of Forty Mile were among the first to introduce the thawing methods practiced in recovering the gold from the frozen gravels of the basin. Owing to the intense cold of the long winter, the ground is frozen for seven or eight months of the year. To sink a shaft, the miner waits until winter has set in and then sinks a shaft in the frozen gravel by alternately thawing and removing the ground. The shafts and drifts stand without timber. The pay dirt is raised to the surface during the winter months and washed in the spring, when water is available, and the gravel is thawed out by the warmth of the sun. Sometimes these underground excavations are made of considerable size. One on Miller creek, in the Forty Mile district, measured 64 by 32 feet and was 19 feet in height; it was carried to within 8 feet of the surface. With the coming of spring this stope caved, but the gravel was all available for washing.

As has been the case with other countries, those who first visited the Alaska region gave little attention to its mineral resources. Captain Raymond, who first took charge of Fort Yukon, Alaska, for the United States, after the purchase of the Territory from Russia, said in his official report, "No valuable minerals in workable quantities have been found up to the present time." The repeated discoveries of payable gravel in widely separated districts has done more to make known and develop the resources of the country than anything else could have done, although the difficulties in the rapid development of the great north are numerous. The summer season—that is, the season when outdoor work can be economically done—is short, while the winters are long and cold. In ordinary years the ice in the streams of the interior breaks up by the middle of May, and by June 1 the floods are mostly over and miners promptly begin work. By the last of September the winter gives warning of its rapid approach. The ground first freezes, then the streams turn to ice, and outdoor mining is at an end for that season. From that time on the thawing and mining process is employed.



Interior of a Yukon Home. (See Page 426.)



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FOR the forty-fifth time the MINING AND SCIENTIFIC PRESS wishes its readers, the world over, a pleasant Christmas and a prosperous New Year.

SEVERAL mines of southern Nevada outside of Tonopah and Goldfield section have been enabled recently to declare a dividend to their stockholders, which is the surest indication of prosperity that a mine can give. There are without doubt many other places in the great Southwest which only require the stimulus of a Tonopah or a Goldfield to bring them into prominence as producers. The unqualified success of one district lends encouragement to all in the region about it. Since the discovery of Tonopah, Goldfield, Lone Mountain, Gold Mountain, Crater, Hanapah, Bullfrog and a number of less prominent new districts have been discovered and opened, and without doubt others will follow. There still remains a large territory between Goldfield and El Dorado canyon in southern Nevada in which the prospector is almost certain to find new mineral fields. Several old camps—Reveille and some others—have also taken on new life, exemplifying in the most pronounced way that nothing succeeds like success.

THE students of the Mining College of Washington State University have embraced an opportunity to extend their knowledge by practical experience during the holiday vacation, it being the intention to carry out all the varied operations of practical mining in a copper mine at Index, Snohomish county. The property has been idle for some time; but it affords an opportunity for the students which could not, perhaps, be had at a going concern. Net profit is not the object aimed at in this instance, but practical experience, which means more to them than the intrinsic value of the output. This idea is along the line of that adopted by several of the Eastern universities, which jointly leased a mine in Colorado last summer and carried on the work of mining, to the great advantage of the students who were fortunate enough to enter the class. In the mining States of the West there are opportunities of this kind, or, if such do not exist, they can be created.

## Certificates of Competency.

In many mining States and Provinces mine managers, hoisting engineers and others who would hold positions of trust and responsibility are required to pass an examination as to their competency. In many instances and along some lines, this is undoubtedly of advantage to the best conduct of the business, but in others it seems not only unnecessary, but an absurdity. The questions usually asked of candidates for mine management are partly of a practical kind, and partly are theoretical, and if not immaterial to success of a competent man, are at least not of paramount importance. Still, these questions are asked and, failing in giving satisfactory answers, the applicant is disqualified and is denied a certificate. There are many men who have had the management of mines for years, whose success is the best index of their knowledge and ability, and yet who could not, to save their lives, pass a technical examination such as is usually required, without abundant coaching, and were it demanded, the man of years of hard, practical experience—the man on whose accurate, practical knowledge the whole fabric of technical education is based—would fail. The college graduate, fresh from the university, would take this examination with flying colors, and would secure the much-desired certificate and then, in many cases, would have to fall back on a practical man (such as the one he has just defeated in examination) for aid to successfully manage the business he was apparently fully able to handle unaided.

It is true, in some instances, large percentages are allowed for "previous experience," which usually serves to make the average of the applicant whose technical education is not finished, sufficiently high to enable him to pass, and thus secure the coveted certificate. Men who may be able to pass the examinations with credit often lack business and executive ability, and a knowledge of men and affairs. These are all as important as the possession of technical knowledge.

In the case of hoisting engineers a certificate of competency seems desirable, but here, too, are found many men whose competency has never been questioned—and still they would be unable to pass the examination in that branch. With the hoisting engineer the personal equation is a large one, but accidents which occur to hoisting plants are usually of a character which could not have been anticipated by the engineer or they would not have occurred. It is true that some men under excitement lack that important requisite in one in this position—presence of mind. Cables part, brakes suddenly refuse to work, engines get beyond control, and then the practical engineer and technically educated engineer stand alike at their brakes absolutely helpless and unable to avert the catastrophe they know must happen in a few seconds. They see what the difficulty is, but are unable to remedy it. An engineer may hold his position for many years, and have no accident, but some unfortunate day he may hoist a load of men into the sheave, or a rope may part, the cage rushing to destruction at the bottom of the shaft, if the "safeties" do not hold. These are trying situations which years of experience nor volumes of technical knowledge can neither obviate nor alleviate.

WITHIN the past year a great deal has been said in reference to a new and deeper drainage tunnel for the Cripple Creek region of Colorado, and recently it was announced that the preliminary arrangements, surveys, etc., were being made to start a new tunnel which when completed would be 3 miles in length and be driven about 1500 feet lower than the El Paso drainage tunnel. Realizing the vast benefit to be derived from the driving of this proposed new tunnel, it is hard to believe that there are those who would vigorously protest and obstruct the work; but such, nevertheless, is the case, and unless some special legislation or congressional action can be enacted, as was done in the case of the Sutro Tunnel, which was run to drain the Comstock Lode at Virginia City, Nev., it is doubtful if the proposed new Cripple Creek drainage adit will become an accomplished fact. Mining is not recognized as a public utility, and, such being the case, the law of eminent domain can not be depended upon. The condition at Cripple Creek is much like that at Virginia City be-

fore the Comstock was cut by the Sutro Tunnel, except in the fact that water in Cripple Creek mines is more abundant than in the Comstock Lode; for it is a fact that several of the larger shafts on the Comstock had sunk far below the level of the Sutro Tunnel before the tunnel reached the Lode. Such, however, is not likely to be the case at Cripple Creek, for the proposed tunnel will cut 1500 feet below the present lowest drainage of those mines, where about 5000 gallons of water are now flowing every minute. As the drainage area is extended by working at greater depth, the flow of water is likely to increase, though in some mining regions the flow decreases with great depth—below 2000 feet—until at 3000 to 5000 feet the mines are practically dry. That this will also prove to be the case at Cripple Creek there is at present nothing to suggest. Thus far the quantity of water has increased with depth. When the Sutro Tunnel proposition was obstructed in its early history, relief was sought in Washington, and on July 25, 1866, the Sutro Tunnel Act was passed by Congress.

EACH early winter there are numerous mines in Colorado which are obliged to suspend operations due to shortage of water. This is a misfortune which it would be difficult to avoid unless storage reservoirs were built, and the water taken from the lower portion of the reservoir and conveyed in buried flumes or pipes to the several points of use. In the high mountain regions of Colorado winters are long and usually severe, and the streams freeze early in the winter, thus depriving the mines of the needed water. In California, for the greater part, there is usually no shortage of water due to frozen streams, but in the late fall the snows on the Sierra have either all melted or the warmth of the sun is insufficient to thaw what remains in sufficient amount to supply the requirements of the mines. In the latter State this loss could be obviated by the impounding of the abundant waters of summer in numerous reservoirs, which would insure a continuous supply throughout the year. In the Black Hills of South Dakota the winter season lasts from December 1st to April 1st, a period of four months, but during this time there are many warm pleasant days when the weather may be likened to spring, but there are weeks at a time when the thermometer remains many degrees below zero and running waters freeze. Still there has never been reported a serious shortage of water in that region. During summer, when the melting snows of the Rocky mountains supply Colorado, and that on the Sierra supplies California and western Nevada, there are frequent rains in the Black Hills, which afford to every canyon and gulch a living stream throughout the year. In the mining regions of the West no two States have the same climatic conditions, and as a result the water problem in each must be handled differently, but there is a laxity generally to take full advantage of what nature has provided. The reason may be found in the fact that it is usually too large a proposition for one mine to handle alone, and there is a lack of unity on the part of mine owners looking to their common interest.

ONE of the marked features of the copper mining industry is the steady price of copper at above 15 cents per pound, while some of the most important stocks show weakness of a marked character. There is said to be no surplus of ingot copper on the Lake, and the Western production is apparently absorbed as fast as it is offered. It is stated on reliable authority that for the past two or three months the demand has exceeded the supply, although above 15 cents the tendency of consumers to wait for lower prices is always noticeable. In view of the existing relative condition of the copper consuming and producing factors of the industry, there is little likelihood of a lower price, and this being the case copper shares should seek and reach their normal level, but under the strenuous manipulation which has recently been such a sensational feature of the business it could not be expected, and it is difficult to predict the immediate future of the copper stock market. Strangely, the price of listed mining shares is determined to a great extent by the desire of the public to buy and hold them rather than by the intrinsic value of the mines they represent.



## CONCENTRATES.

A TWO-COMPARTMENT shaft can be enlarged at one end, or the work may be done at each end, depending upon the requirements of the case.

A PLACER claim of 160 acres, owned by a company, only requires \$100 worth of assessment work, the same as the 20-acre claim of a single individual.

WHEN connecting levels the work may be hastened to advantage by sinking and raising at the same time. The more quickly the connection between the levels is made the sooner will natural ventilation be secured.

THE static pressure upon the pipe of water under 1950 feet head, as at Electra, Cal., is 854.32 pounds. There is no reduction in pressure upon opening the gate at the bottom of the line, if the head is kept at a constant level.

THE superficial area of a sphere is ascertained by multiplying the square of the diameter by 3.1416. The volume of a sphere of given diameter is only a little more than half as great as the volume of a cube one of whose edges equals the diameter of the sphere.

MINING claims located in 1904 require no assessment work during that year, unless there are local or State laws which demand it. The Federal statutes fix the minimum requirement, to which States may add such additional legislation as they see fit, so long as it does not conflict with the Federal statutes.

THE Calumet & Hecla copper mine is said to have about 200 miles of workings. Its deepest vertical shaft is only a few feet short of a mile, and one incline shaft, sunk at an angle of 37°, is down 8100 feet. Next to this the Quincy mine has the most extensive development, among the mines on Lake Superior.

THE price of black diamonds, used in drilling, has advanced the past thirty years from \$8 or \$10 per carat to \$45 or \$50 at present. The price in 1895 was \$18.50; this nearly doubled in 1896, the lowest price that year being \$28 and the highest \$36. In 1898 they were sold as high as \$60 per carat and as low as \$35.50. Since 1900 the price ranged from \$45 to \$50.

WHEN an ore is to be tested by amalgamation the tests should be made along lines similar to the conditions under which the ore will be milled. Thus a gold ore which is carefully ground in an iron mortar with mercury, and the amalgam carefully collected, is not a fair representation of the conditions under which amalgamation will take place in a stamp mill.

MOLYBDENITE occurs in a great many kinds of rock—in limestone (marble), in mica schist, in granite, in veins of quartz, in various schists, sometimes in veins with other sulphide minerals and gold, sometimes with copper ores. It is associated with many minerals. It is usually recovered by crushing the ore in rolls and passing product over magnetic separators.

MAGNETITE is one of the commercial ores of iron and also one of the most universally distributed of minerals. It occurs in grains scattered through a large number of rocks, often in crystals too small to be seen without a microscope. It is the principal constituent that gives some black aphanitic rocks, like black diorite, its dark color, the remaining minerals being feldspar and hornblende.

CYANOGEN, HYDROCYANIC ACID AND ALKALI CYANIDES in aqueous and alcoholic solutions all absorb free oxygen slowly, and this action is accelerated by heat and also by direct sunlight. This absorption is stated to be most noticeable in potassium cyanide, and most feeble in hydrocyanic acid. When the experiment is carried on over mercury, a small amount of that metal is dissolved.

THERE occur from time to time in the older copper mines of the Lake Superior region what are locally termed "air blasts," caused by the fall of large areas of hanging wall country in the old and abandoned workings of the mines and the slipping of the hanging wall downward. These air blasts are at times so pronounced that the country in the vicinity is shaken as by an earthquake. The most noted disturbances of this kind occur in the Quincy mine.

ALKALI lakes and marshes as understood in the West are drainage basins with no outlet, where the waters accumulated from rains evaporate, leaving the mineral salts carried into the basins by the water as residuary deposits. An alkali is a compound of hydrogen and oxygen with either of the elements, potassium, lithium, sodium, rubidium, or cesium, or with the radical ammonium. These substances are very soluble in water, and have the property of neutralizing acids.

THE size of 1½-inch machine powder is, diameter 1½ inch, length 7½ inches. There are 100 sticks, more or less, in a 50-pound box. This varies somewhat, the

manufacturers weighing out 50 pounds net for each box. A 50-pound box of 1-inch sticks contains 135 sticks and of 1½-inch, 180 sticks. There is a Federal law requiring that "any person or persons shipping explosives without delivery notice at the time of shipment, a note in writing expressing the nature and character of such merchandise, shall forfeit to the United States \$1000."

TWO GOOD machine men should set up a column bar, mount their drill and begin drilling in from fifteen to twenty minutes after arriving at their place of work, and in many cases it can be done more quickly than this. Where it is necessary to use a large number of blocks, it will usually require longer than where a minimum of blocking is required. When setting up on the upper floor of a square-set stope, the drill runner must look to the probable effect of his shots in anticipation of the next round of holes.

GILSONITE and ELATERITE are hydro-carbons found in Utah. Gilsonite is a variety of asphalt, color black, hardness about like gypsum. It has a brilliant lustre, like pitch. It burns with a bright flame, like sealing wax. Elaterite is elastic bitumen—soft, and resembling India rubber; occasionally hard and brittle; usually dark brown. Ozocerite is what is known as mineral wax, and resembles wax in appearance and consistency. It is colorless to white when pure. It is also a hydrocarbon, and is essentially paraffin. It also occurs in Utah.

SEVERAL attempts have been made to treat auriferous pyrite by direct cyanidation, but the success of the process depends upon fine grinding. Cyanide solutions will not extract high percentages of the values from even comparatively fine sulphides. The material must be almost in the condition of slimes to make high extractions possible, which shows how impervious is the thin film of iron sulphide enveloping the minute particles of gold. When the gold is exposed to the direct attack of the solution, then extraction may be expected to be high, but not otherwise.

CRUDE PETROLEUM has not been successfully employed as a substitute for coke in blast furnaces, so far as known to "Concentrates," though oil is successfully used in reverberatory furnace work. The use of fuel in a reverberatory is entirely different from its use in a blast furnace. In the latter the fuel, usually coke or charcoal, comes in direct contact with the charge of ore and flux. In the reverberatory the flames from the burning fuel—oil, coal, gas, wood, or other fuel—passes over the charge of ore, which is usually in a pulverulent condition. The intensity of the flame is often such that the charge is smelted, as in matting reverberatory furnaces.

THE trend of an ore shoot is sometimes indicated by striations on the vein walls, but this indication is not reliable, as in some instances two or more sets of striations are found striking in different directions, indicating more than one period of movement, and that the stresses producing the movement were exerted in different directions. Rolls or grooves in the walls, rather than mere striations, are a better and more reliable indication of the trend of the ore shoot. Shoots may be hundreds of feet in length and depth, but they usually have limits which may be reached by mine workings. All ore shoots do not come to the surface, many shoots having their apices many hundred feet from the surface.

MAGNETIC separators have been in use for many years in the concentration of iron ores, but it is only within the past two years that separators of the electromagnetic type have been largely employed in the separation of zinc blende from the associated sulphides. In the case of iron ores magnetic separators are used to recover the magnetic oxide from the associated sulphide, which cannot be readily accomplished by water concentration, owing to the slight difference in specific gravity of these two minerals. All iron minerals are more or less magnetic, their relative susceptibility to magnetic attraction being in about the following order: Magnetite, franklinite, ilmenite, pyrrhotite (sulphide), hematite, siderite (carbonate) and limonite.

IN order that assessment work or improvements on one of several mining locations owned by one person may be of benefit to all of the claims, these several claims must join each other. If there are, say, seven claims in all, and four of them are adjoining in one group and three in another group, if extensive improvements have been made on one of them, it can be claimed that these improvements were made for the benefit of the larger group (four claims) and the assessment may then be done on the remaining three claims. If the expenditure has been in the nature of machinery, buildings, etc., some of these might be credited to one group and the remainder to the other. A resumption of work on the claim upon which no assessment work has been done, and continuing the work into 1905, will save the claim against any other person who may attempt to relocate them.

THE statistics of mining in Great Britain, where such things are more carefully kept than in the United States, shows that the number of men injured and killed by explosives resulting from thawing nitropowders is more than one-half the number killed and injured by accidents from other causes. Among the many convenient methods resorted to by miners for thawing dynamite, all of which are extremely danger-

ous, are placing powder on the top of steam boilers; in cook stove ovens; in cans over stumps of lighted candles; on shovels held over a fire; laid on an inclined board before an open fire; holding a stick in the hands over a fire; placing on a blacksmith forge; carrying in the back pants pocket and in the boot leg, and plunging sticks in hot water. Any one of these methods of thawing powder is a source of imminent danger, and should not only be discouraged, but prohibited by mine superintendents and others responsible for the conduct of mine operations. Some of the most careless among the miners are they who have been engaged at it longest.

A BUCKET may be prevented from swaying from side to side in a shaft and the tendency to spin around almost obviated by the use of a crosshead running in guides above the bucket. It will pay to put in temporary guides, if it is not desired to use them permanently, when sinking is discontinued. The crosshead should be about twice as high as it is wide; be provided with iron shoes which enclose three sides of the guides, and be strongly built. It can be kept at any desired point above the bucket by securing a clip to the rope which will prevent its coming lower than desired. By allowing the rope free play blocks may be placed at the lowest set of timbers upon which the crosshead will rest while the bucket is lowered to the bottom to be filled. The length of free rope—generally not over 20 feet—does not admit of the bucket swinging very much when hoisted. Upon the clip on the rope reaching the crosshead, the clip carries the crosshead upward with it. There are several ways in which the bucket may be dumped at the surface with which the crosshead will not interfere.

IN order to determine the height of a column of water which has found an outlet into the mine workings, it would be necessary to confine the water, so as to produce a static pressure, which may be measured with an ordinary pressure gauge. To do this the drift or other opening must be bulkheaded, a pipe fitted with a valve being securely anchored in the bulkhead, the valve being left open during construction of the bulkhead. When finished the valve may be closed, the pressure gauge having been placed back of the valve. When the water fills the drift the pressure will begin to show on the gauge, rising until the maximum is reached. Each pound pressure indicated by the gauge equals a head of 2.3 feet. Should a pressure of 100 pounds be indicated, the column of water would be 230 feet in height, but this is no index of quantity. It would be impossible to determine the height of such a column by the force with which the water issues from a crack or drill hole. In the case of the latter, a pipe provided with the gauge as described might be inserted in the hole and a measurement made without constructing a bulkhead.

At the Hidden Fortune mill, near Deadwood, S. D., is the only place known to "Concentrates" where amalgamation and cyanidation are practiced simultaneously. At that mill the ore is crushed in cyanide solution in double discharge mortars having five stamps each. The pulp passes from the battery to launders or sluices, in the bottoms of which are arranged a series of riffles similar to those used in placer mining. These are intended to catch the coarser particles of gold, too coarse to be dissolved by the KCy solution. From these sluices the pulp passes to separators, the sands going from the bottom of the sizer to one set of leaching tanks and the slimes flowing from the top of the separator to other tanks. The coarse particles of gold not saved by the riffles pass out of the separator with the coarse sands, and this gold is not acted upon by the solution and would be lost were not the tailings from the leaching tank passed over amalgamated copper plates. The gold caught in the sluices is sent by launder to a cleanup pan and there the further separation of sands and gold is carried out. This cleanup pan is similar to the arrastra, and is said to be very effective for the purpose. Attempts have been made to amalgamate in cyanide solutions in South Africa and elsewhere, but is not the regular practice, as far as known, except in the case above cited.

THE appearance of foul air in mine workings is not always easily accounted for. Thus a shaft 100 feet deep had to be artificially ventilated when the wind was from the north, but required no artificial ventilation when the wind was from the south. Another shaft in the same vicinity was nearly 200 feet deep and no trouble was experienced with bad air. One shaft, the first, was sunk through sandstones, limestone and quartzite, the other in trachyte. It may be that the gas issued from the rocks. Foul gas may sometimes be displaced in a shaft by rapidly hoisting and lowering a bucket in the shaft a number of times. Showering water down the shaft also sometimes starts a fresh air current. In a drift from a shaft in Tuolumne county, Cal., several men worked from 7 A. M. until noon without inconvenience, when they came to the surface for lunch. At 1 P. M., on going down into the shaft—100 feet deep—a candle could not be made to burn, and, not having means of ventilating at hand, the work had to be temporarily abandoned. The morning's work had been in cleaning out a caved drift and retimbering the ground. The face of the drift was still obstructed from floor to back with rubbish—rocks, dirt and old timbers—and in all probability the foul air from the open space beyond the working place had been able to penetrate into the drift, and rendered it an impossible place for men to work without artificial ventilation.



## Water Rights in California.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by  
SAMUEL C. WIEL.

WHERE AN APPROPRIATION CAN BE MADE (CONTINUED).—As to private or occupied lands: No appropriation can be made on or injuriously affecting any private or occupied lands whatsoever. The point of appropriation must be itself unoccupied, and all lands affected injuriously in their use of water by another's appropriation must also be unoccupied. If the point of appropriation is on lands already occupied any acts done on them without the occupant's consent are unlawful, just as trespassing on any private property. (42 Cal. 339, 106 Cal. 660 at 670). If other occupied lands, though the point of appropriation is not upon them, are affected injuriously in their use of the water the appropriation is likewise unlawful, because it has been held that the Government impliedly grants to all prior occupants at least the riparian rights of the common law. This was the first great cutting down of the law of appropriation. A later appropriator cannot take away an occupant's riparian rights, though he goes on vacant lands to do it. (*Lux vs. Haggin*, 69 Cal. 255).

Every bona fide settler is protected as an occupant in this riparian right. He need not be the absolute owner of the land. If he has made an entry under the homestead or pre-emption laws it is enough. Even, it is held if he has made no entry, so long as he bona fide intends to make one. (*Sturr vs. Buck*, 133 U. S. 541). Those holding patented mining claims are within the protection given to occupants, since they are absolute owners of the land; and even unpatented mining locations have riparian rights. (8 Cal. 136, 8 Cal. 323).

In this way agriculturists and others in the neighborhood are protected first, without any formalities of appropriation at all on their part. It remains true, however, that the occupant will not be protected against appropriators if he is a mere intruder or squatter not intending to settle (113 Cal. 142), or if the land was known to contain mineral at the time he entered, since in neither case he would be a bona fide settler. (115 U. S. 392).

No appropriation can be made on or interfering with private or occupied lands as thus explained, because an appropriation cannot be initiated by a trespass, and cannot interfere with established riparian rights.

2. An appropriator must not interfere with prior appropriators. (C. C. 1414). There may be several appropriators on the same stream; but the later comers can only take the surplus left by those who came first. Whether the prior appropriator is himself a miner or not makes no difference. "No partiality for one pursuit over another has been evinced." And so, while a miner prior to a sawmill was protected in 6 Cal. 548, on the other hand, the sawmill being prior was protected in 5 Cal. 395 and 13 Cal. 33.

3. The larger part of the lands in California being occupied or privately owned to-day no appropriation can be made on or affecting them injuriously, and hence it is that the law of appropriation is to-day overshadowed by the other rule of riparian rights, which rule governs land so occupied or privately owned. In the mining regions there is still much land unoccupied, or land staked out for mining claims that will be in the future abandoned, or land subject to water rights of appropriation before they become private, in all of which the law of appropriation applies. But in the State at large most land is privately owned, not subject to appropriation, and the law of riparian rights is applied instead.

WHAT CAN BE APPROPRIATED.—1. Water flowing in watercourses is the usual case. (Civil Code, 1410.) Close questions arise as to what is and what is not a watercourse. In *Sanguinetti vs. Peck*, 136 Cal. 466, at 471, the court says:

"A watercourse is defined to be a 'running stream of water'; a natural stream including rivers, creeks and rivulets. (Black's Law Dictionary, title Watercourse.)' Further defining the term, this court said: 'There must be a stream, usually flowing in a particular direction, though it need not flow continually. It may sometimes be dry. It must flow in a definite channel, having a bed or banks, and usually discharge itself into some other stream or body of water. It must be something more than a mere surface drainage over the entire face of the tract of land occasioned by unusual freshets or other extraordinary causes. It does not include the water flowing in the hollows or ravines in land which is mere surface water from rain or melting snow (i. e., snow lying and melting on the land) and is discharged through them from a higher to a lower level, but which at other times are destitute of water. Such hollows or ravines are not, in legal contemplation, watercourses.' The evidence does not bring the depression, or swale, in question within this definition. This so-called watercourse is nothing more than a local drainway to a limited amount of land which has neither a definite beginning nor ending and is like hundreds of similar swales found in land whose surface may be called generally level."

In *Lux vs. Haggin*, 69 Cal. 255 at 419, it is said

that a channel is necessary to the constitution of a watercourse, and also a tendency of water to flow in it, more or less regularly. This second requisite is not fulfilled by a chance flow in a channel usually dry all year round. (Ib.) It is a question depending on the facts of each case whether water from freshets and melting snow is mere surface water flowing irregularly in hollows and ravines, as said in 136 Cal. 372, just quoted, or is water feeding its own channel under a tendency to a more or less regular flow.

2. Diffused surface water from rain and melted snow, and not in a watercourse, cannot be appropriated, as the cases just referred to point out. Its presence and movements are too capricious to found any right upon, distinct from the land where it is gathered. In fact, the question that usually gives difficulty is not who can use it, but how to get rid of it, some courts calling it a common enemy; but that is another question.

Whether waters of a lake or pond can be drawn off by appropriation is seldom discussed. The cases almost invariably speak only of "flowing water," "running streams," "water in watercourses," and likewise C. C. 1410. However, riparian rights attached at common law to lakes and ponds as well as streams, and the law of appropriation was assumed to apply to them also, before the Code, in 15 Cal. 271, involving three lakes above the Yuba river. It may be that lake water can be appropriated, though not mentioned in C. C. 1410, for that section is not exhaustive of the kinds of water that can be appropriated (141 Cal. 116).

Swamp or overflowed lands are owned by the State, unless already passed into private hands, and are dealt with by special statutes and rules of their own. The law concerning them is discussed in *Lux vs. Haggin*, 69 Cal. 255.

3. Underground water is the kind concerning which the law has undergone its greatest of all changes in California. It may be said tentatively that underground water is to-day in California treated like water on the surface.

The first class of underground waters is water flowing in a definite underground stream. It can undoubtedly be appropriated (53 Cal. 578), for such streams have always, even by the common law, been treated on the same principles as surface streams (69 Cal. 217).

The second class is water seeping underground from beneath definite surface streams. Such water is as much part of a stream as the surface flow, for it is a scientific fact, that below every river bed, not absolutely impervious, there is a more or less deep substratum of flow, seeping along with the stream through the soaked soil, the drawing off of which results in a tapping of the stream itself. Whether this subflow of a stream can be appropriated depends on whether the stream itself could be appropriated, and that, as we have seen, depends on whether there are already occupants or appropriators whose use of the stream would be interfered with. For example, in 126 Cal. 486, the appropriation of the subflow by means of a tunnel was upheld, as against later claimants. On the other hand, in the recent and much talked of case of *Montecito Water Co. vs. Santa Barbara*, 28 Cal. Dec. 405, the city was denied the right to withdraw water by means of a seepage tunnel from a surface stream already appropriated by the water company. At the same time it was pointed out that it is a difficult matter to prove just how much the company's stream was, in fact, tapped by the tunnel, since water must have seeped into the tunnel from all directions. To the extent which, on proof, it is shown that the tunnel tapped the surface stream, however, it was held unlawful.

The third class is water percolating underground, diffused, without connection with any definite channel. In 126 Cal. 486, it is said that "percolating waters" is a phrase of well-defined meaning within the law, adding:

"It is essential to the nature of percolating waters that they do not form part of the body or flow, surface or subterranean, of any stream. They may either be rainwaters which are slowly infiltrating through the soil, or they may be waters seeping through the banks or the beds of a stream which have so far left the bed and the other waters as to have lost their character as part of the flow."

The law in this wide class of underground water may be said to be now in the making, both as respects appropriation and as respects riparian rights, if that term may be applied to this new subject. There have been seven cases in our Supreme Court dealing with or discussing percolating water within the last two years. In this place it is enough to say that it seems well established that percolating water is subject to appropriation. It was so directly held in *Cohen vs. La Canada Water Co.*, 142 Cal. 437. There the first comer had appropriated, on vacant public land, water percolating in springs, by means of pipes. The springs were not fed by any known stream running in any defined channel—it was purely diffused percolating water gathered underground from rains, etc. A later comer drove tunnels nearby, which caused the springs to dry up. Judgment was given against him for doing this. That is the only California decision holding directly that mere percolating water can be appropriated; the other cases deal with the appropriation of it only incident-

ally, being chiefly concerned with the so-called riparian or landowner's rights therein. The leading case of *Katz vs. Walkinshaw*, 141 Cal., 116 was of that kind; but, taking occasion to speak of the rights of appropriators, says that they will come within the same rules here as in other kinds of water; that is, prior occupants of overlying land, or prior appropriators of the percolating water, must be protected first.

This treatment of percolating water is entirely novel. In the old law no rights whatever were recognized in diffused percolating water as a separate thing; it was regarded as a mere ingredient of the soil—one of the constituents of the soil—just as feldspar and mica are constituents of granite. The man who owned water-soaked soil had a right to do with it what he wanted, and he could dig out the soil, carrying the water with it, or he could leave the soil and take out only the water; and to look into any change resulting in the constituents of his neighbor's soil was deemed beyond the province of the law. So long as the percolating water stayed in the soil, the owner of the soil could take it, and take all that came there; likewise his neighbor, who could hence drain it all away. This old rule of diffused underground water is somewhat like the law of diffused surface water, already mentioned; both were too uncertain in their movements to found any right upon distinct in itself. It still remains the rule in California as to diffused surface water. Until the case of *Katz vs. Walkinshaw* (141 Cal. 116), two years ago, it was thought firmly established by several decisions as the law of percolating water also (e. g., 42 Cal. 303); but the recent cases have now settled the new rule.

This new rule was fixed purely out of public policy. The old rule was unsuited to conditions in California at large where, with its large extent of arid land, the widest prosperity depends on putting the land under cultivation by making the underground water serve the largest number of people, and lands, and uses. It is a rule grounded on public policy, but the interests of the agriculturist carried the determination of that policy. The importance of it to the miner lies in the fact that mines are likely to drain wells, and springs, and the subflow of streams in the neighborhood. Will the miner be held liable for taking water that belongs to another? It will be proper to consider that again later. It is enough here to point out that underground water, whether in a defined stream, seeping from a surface stream, or percolating, diffused, unconnected with any stream, may be appropriated for use.

4. It may be added that the surplus over what has been claimed by prior appropriators (13 Cal. 220) or reserved for prior occupants, under the doctrine of riparian rights (102 Cal. 151; 69 Cal. 255), can be appropriated. As to the latter, what constitutes such a surplus over riparian use cannot be examined here. It is enough to say generally that anything over the amount needed for domestic use or for reasonable needs in developing the occupant's land can be appropriated. In fact, a riparian owner is bound to return all surplus to the stream, and so cannot lead the water over a watershed whence it would be impossible for it to flow back. (126 Cal. 135; 113 Cal. 142; 77 Cal. 66).

[NOTE.—The case in 126 Cal. 486, is referred to as upholding the right to appropriate the subflow of a stream by means of a tunnel, as against later claimants. The facts of that case are worth stating. The stream in question was the San Gabriel river, where it flows over Government land. There were three sets of claimants to the water; first, those who had appropriated all the surface flow; then an irrigation company, who posted an appropriation notice and began work on a tunnel for developing water, and who continued the work on the tunnel later under compromise agreement with the surface owners; finally, an irrigation district which began another tunnel on the opposite bank, and finished it first. The tunnel of the company was upheld against that of the district—chiefly because the surface claimants had agreed to it and had not agreed to the district's tunnel; partly also, because the company's tunnel, having been started with a notice prior to the district's tunnel, was, as between the two, prior in time by relation, though completed later than the other one.]

(TO BE CONTINUED.)

## Rock Cleavage.

A publication that will be of material assistance to all structural geologists is a paper on "Rock Cleavage," by Dr. C. K. Leith, which the United States Geological Survey has recently published as Bulletin No. 239. It embodies the results of a very careful and laborious investigation of facts concerning rock cleavage and a discussion of their theoretical significance.

Cleavage is commonly defined in geological textbooks as a structure by which some rocks part or break along certain parallel planes more easily than along others. A considerable proportion of the rocks of the earth's crust possesses lines or planes of cleavage. These lines or planes of parting are either original or secondary—that is, they were either induced in the rock during its solidification from a magma or during its deposition in water, or they were induced by deformation through metamorphic processes subsequent to the formation of the rock. Generally, in discussions, the secondary structure only has been considered as cleavage; but Dr. Leith believes that there is no essential difference between



the original and the secondary structures, and that the term rock cleavage should be applied to both. As used in this paper, therefore, the term cleavage is confined to structure, and has no significance as to origin.

It is fundamentally assumed that secondary cleavage is of two kinds, which are widely different in their essential causes and conditions. The form of cleavage which develops during rock flowage, or the deformation of rock without conspicuous fracture, is called by Dr. Leith flow cleavage and is discussed in the first part of his paper. The other form of rock cleavage, which develops through the deformation of rock by fracture and subsequent cementation, is denominated by Dr. Leith fracture cleavage and is the subject of the second part of this bulletin. Original cleavage of bedding and flow structure are treated independently in Part III. Heretofore one of the principal causes of confusion in the discussion of cleavage has been the attempt of some authors to make the explanation of one kind of cleavage apply to all kinds. Dr. Leith lays especial emphasis on the proof that incipient or cemented parallel fractures, yielding what he calls fracture cleavage, will not explain what he calls flow cleavage, or cleavage dependent upon the parallel arrangement of the mineral constituents. To show this he discusses in detail the internal arrangement of the mineral constituents

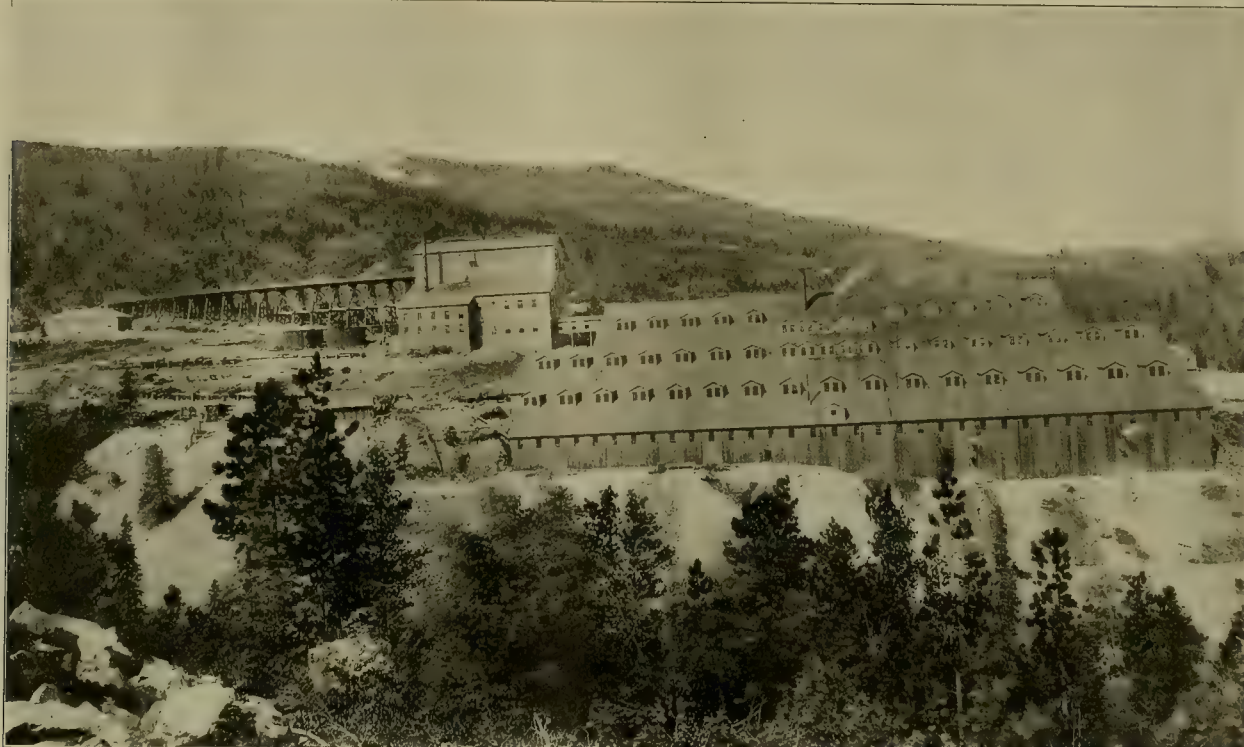
find out the actual costs of upkeep of a machine placed in the hands of competent miners and subject to special supervision. The machine was specially prepared before being sent underground, the cylinder being very carefully bored out to insure a glassy-like surface inside and to make it perfectly parallel. A special piston, made from high carbon steel, was made and ground into the cylinder, great care being taken to insure the tightest possible working fit; all of the piston was made dead hard, except the chuck-rod and chuck, a special arrangement being provided on one of the lathes to grind the piston down to the required size. A special valve of tool steel was formed and fitted to the valve chest, after it had been carefully bored out, the same precautions being taken to insure a good tight fit as in the case of piston and cylinder. The remaining portions of the machine received very careful attention, and everything possible was done to insure the machine being in perfect order.

The machine ran fourteen months, double shift, in the hands of the same men, with the exception of four occasions, when it was in the shops for extensive overhaul of cradle and front-head; on each occasion it was laid aside for twenty-four hours. During the entire period under observation there were four new valves fitted, nine chuck-bolts, eleven chuck-bushes, six rotating nuts, twelve sets ratchet pawls and

## The Horseshoe Mines of South Dakota.

The most extensive mining operations in the Black Hills of South Dakota, the Homestake excepted, is the Horseshoe combination of mines, located about the northern base of Terry Peak and vicinity. It comprises some of the oldest and best known mines of the Cambrian formation. The town which has grown up about the Horseshoe properties and its neighbor, the Golden Reward, is called Terry, and is situated at an altitude of 5700 feet, which is the greatest altitude of any town of considerable size in the Black Hills. The Horseshoe mill of 120 stamps, with its extensive cyanide equipment, is situated on the hillside near the town.

The illustration is that of this plant. The company owns 2100 acres of patented mining ground, of which 1000 acres are on Bear Gulch and the remainder on the depression east of Terry Peak known as Ruby Basin. The mill is on the Great Mogul claim. Other mines are the Welcome and Snowstorm—two of the first mines extensively opened on this formation—the Horseshoe, Hardscrabble, Ben Hur and several others. Prior to 1902 these mines produced over \$2,500,000 in gold, most of which was obtained by the chlorination process at the mill at Pluma, on White-



120-Stamp Cyanide Mill Horseshoe Co., Terry, S. D.

of rocks that is peculiar to each kind of cleavage, the relations of this arrangement to the observed cleavage, the nature of the processes that bring about the arrangement, and the relations of the arrangement to pressure. He points out that there is need of systematic microscopical study of cleavage of rocks of all kinds from many localities for the purpose of ascertaining the exact arrangement of the mineral particles, the relations of the observed arrangement to cleavage and the relations of cleavage to the deformation of rocks. In the present paper Dr. Leith has made an attempt to supply in some degree this observational deficiency.

Bulletin No. 239 is among the Survey's gratuitous publications. It may be obtained on application to the Director of the United States Geological Survey, Washington, D. C.

## Maintenance of Rock Drills.

The cost of repairs on rock drills is an important matter in their operation, but it is one which is often not carefully followed by the superintendents of mines. No rock drill, no matter how efficient, can be operated without more or less frequent renewal of working parts, and sometimes of parts which, with proper care, should never require renewal, such, for instance, as the shell, or the heads, front or back. The former are occasionally broken by a careless chuck tender, and the latter by a drill runner who neglects to give proper attention to his work. In time the piston requires renewal and small parts must frequently be replaced by new. The South African Mines publishes the following on the cost of drill maintenance on the Rand. The cost seems excessive—over \$38 per month:

"In the early part of 1897 an effort was made to

springs, three feed-screws, three feed-nuts, six sets front-head bushings; no work was done on the piston proper. So pleased were the men with the performance of the machines that they preferred to lie off during the periods referred to rather than handle another machine. The costs might have been followed up for a longer period, but, unfortunately, the machine got injured due to blasting. On being brought to the surface the wear between the cylinder and piston amounted to  $\frac{1}{16}$  of an inch, as measured by the micrometer. The following were the costs:

	£	s.	d.
Machine repairs at start	15	0	0
Eleven chuck-bushes at 12s.	6	12	0
Nine chuck-bolts at 4s. 9d.	2	2	9
Four new piston valves, including reaming chest	4	15	0
Six rotating nuts at 12s. 6d.	3	18	0
Twelve sets ratchet pawls at 9s.	5	8	0
Three feed-screws at 21s.	3	3	0
Three feed-nuts at 21s.	3	3	0
Six sets front-head bushings and leathers at 20s.	6	0	0
Labor	26	0	0
Allowance for mechanical power	17	10	0
Supervision, office charges, etc.	14	0	0
Total	£107	11	9
Equal to £7 13s. 8d. per month.			

"The approximate footage drilled was 13,104 feet."

In a paper read before the recent meeting of the Physical Society at St. Louis, says the American Manufacturer, W. J. Humphreys gave the results of spectroscopic examination of over 100 samples of fluor spar from all parts of the world. In nearly all the samples yttrium was found to be present in varying proportions, and those richest in this element also contained ytterbium. Three specimens, one from Virginia, one from Texas and one from Bolivia, showed the presence of both elements in considerable proportion. All three were very sensitive to temperature changes, one of them phosphorescing even on being held in the hand.

wood gulch, 2 miles above Deadwood. The company also controls the National smelter at Rapid City, where the high-grade ores are treated, the low-grade material being treated by cyanidation in the mill at Terry.

The peculiar ores of this section—a highly siliceous quartz rock, occurring in beds interstratified with the formation—are found through a vertical range of several hundred feet. It is said that the best ore mined by the Horseshoe Company is from the deepest workings on the lowest contact—that of the Archaean schists with the basal Cambrian quartzite. In the Ben Hur the ore shoots range from a few feet to 100 feet wide, lying nearly flat and from 2 to 12 feet in thickness. This mine produces about 100 tons of \$10 ore daily. The mill is 2 miles from this mine, and the ore is hauled by contract with the railroad company for 25 cents per ton. In the Sunnyside mine is an ore body 40 feet in thickness. This ore body lies 600 feet higher than the ore bodies of the Ben Hur and almost directly over them; but as the Cambrian formation in which these ores occur is known to be not over 250 to 300 feet in thickness, it is presumable that a portion of the 600 feet is represented by one or more intrusive laccolitic sheets or sills of rhyolite, or other eruptive rock. All of the mines of this locality are found under conditions approximately similar. The Ben Hur is opened by a tunnel which has a slight downward grade through the Archaean schists, and, cutting a dike inclosed in the schists, beyond which a fault has brought the quartzite of the Cambrian down to a level with the tunnel, the porphyry dike turning over towards the west into a sill, there being about 6 feet of calcareous shale between the quartzite and the sill. Immediately on the east of the dike and beneath the sill is a large body of ore. This ore is believed to have resulted from solutions passing upward through a vertical fissure associated with the intruded dike rock. This fissure was about 3 inches



in width and filled with large, well formed crystals of quartz, which were attached to a thin selvage of silica lining the fissure, the crystals projecting from either side into the open crevice. This peculiar fissure was also the repository for rich ore. In another mine, about a mile to the northwestward, a vertical fissure, passing through a body of siliceous ore rich in gold, contained a high percentage of lead and was rich in silver and gold. The flat bed of ore associated with the fissure contained no more than a trace of lead, but carried good values in gold. At another claim a white saccharoidal quartzite contained 2000 ounces silver per ton, which was disseminated in grains and scales of chloride of silver.

At one locality in the Ben Hur mine, above referred to, the Cambrian ore bed lies directly upon the up-turned schists of the Archæan.

The number of separate ore horizons in the property of the Horseshoe Co. is not definitely known as yet. Here is an opportunity to do some economical prospecting with diamond drill. The territory of the company has been more or less developed for a distance of 2½ miles.

One of the largest ore bodies known in the Cambrian formation in this district is partly exposed in the Passaic mine in the upper portion of the Cambrian. The ore body has been cut through by a railway cut. The top of the shoot lies just under the grass roots; it is known to be 80 feet in thickness and the bottom not yet reached. It is not less than 100 feet wide. Its length is entirely unknown. It is believed to be the largest body of ore of this character thus far found in the Black Hills.

When the ores of the Cambrian shall have been exhausted there still remains a large zone of gold ore in the underlying Archæan schists, which in some respects resembles the Homestake. Concerning it, the Black Hills Mining Review says it is an enormous vein of free-milling ore in the slates underlying the Cambrian ore in the Great Mogul mine. This body of ore has been developed to a width of 300 feet. In character it is similar to the Homestake.

The cyanide mill of the Horseshoe Co. is the largest wet-crushing cyanide plant in operation. It has 120 stamps and has a capacity of approximately 500 tons per day. At present ninety stamps are operating, handling 350 to 400 tons a day. By the first of the year the company hopes to have the entire mill running. Installations of machinery are now being made with that end in view.

The mill practice at the Horseshoe does not differ materially from other similar plants of the Hills, with the exception of the precipitation method. This is being altered from zinc thread to zinc dust.

The gold-bearing solution is pumped into a vat having a series of small pipes in coils on the bottom which are perforated with small holes, and, when the vat is nearly full, compressed air is turned into the pipes, creating a violent agitation, and a bucket or two full of zinc dust is thrown in. The agitation is continued for several minutes, during which time the solution has come into close contact with the zinc, which precipitates the gold in the form of a fine powder. By forcing the contents of this vat through a filter press, the precipitated gold is separated from the solution and is melted down into marketable bars.

This process is now being introduced at the Horseshoe mill and a new melting room and refinery for the bullion is also being constructed. Other improvements and repairs are constantly being made and the plant is always maintained at the highest standard of efficiency.

E. B. Alsop of Pittsburg, Pa., is president and R. H. Binns of the same city treasurer. W. L. McLaughlin of Deadwood is general manager and Edward Manion of Terry, mine superintendent. John Gross, superintendent of the Maitland, is consulting chemist and spends a portion of his time in looking after the Horseshoe mill.

### Notes on Concrete in Mining and Metallurgical Engineering.\*

Written by F. T. HAVARD, Silberhutte, Anhalt, Germany.

In discussion of Mr. Edwards' interesting and valuable paper, I submit the following notes concerning the advantages and disadvantages of the concrete flues and stacks at the plant of the Anhaltische Blei- und Silberwerke. The flues and smaller stacks at the works were constructed of concrete, consisting generally of one part of cement to seven parts of sand and jig tailings, but in the case of the under-mentioned metal-concrete slabs of one part of cement to four parts of sand and tailings, the cost of constructing the concrete flue approximated 5 marks per square meter of area (equivalent to \$0.11 per square foot).

**EFFECT OF HEAT.**—A temperature above 100° C. caused the concrete to crack destructively. Neutral furnace gases at 120° C., passing through an independent concrete flue and stack, caused so much damage by the formation of cracks that, after two years of use, the stack, constructed of pipes 4 inches thick, required thorough repairing and auxiliary ties for every foot of height.

**EFFECT OF FLUE GASES AND MOISTURE.**—The sides

of the main flue, made of blocks of 6-inch hollow wall sections, 100 by 50 centimeters in area, were covered with 2-inch or 1-inch slabs of metal concrete. In cases where the flue was protected on the outside by a wooden or tiled roof, and inside by an acid-proof paint, consisting of water-glass and asbestos, the concrete has not been appreciably affected. In another case where the protective cover, both inside and outside, was of asphalt only, the concrete was badly corroded and cracked at the end of three years. In a third case, in which the concrete was unprotected from both atmospheric influence on the outside and furnace gases on the inside, the flue was quite destroyed at the end of three years. That portion of the protected concrete flue near the main stack which came in contact only with dry, cold gases, was not affected at all.

Gases alone, such as sulphur dioxide, sulphur trioxide and others, do not affect concrete; neither is the usual quantity of moisture in furnace gases sufficient to damage concrete; but should moisture penetrate from the outside of the flue, and, meeting gaseous SO<sub>2</sub> or SO<sub>3</sub>, form hydrous acids, then the concrete will be corroded.

**EFFECT OF THE ATMOSPHERE ALONE.**—For outside construction work, foundations and other structures not exposed to heat, moist acid gases and chemicals, the concrete has maintained its reputation for cheapness and durability.

**EFFECT OF CRYSTALLIZATION OF CONTAINED SALTS.**—In chemical works floors constructed of concrete are sometimes unsatisfactory, for the reason that soluble salts, notably zinc sulphate, will penetrate into the floor, and, by crystallizing in narrow confines, cause the concrete to crack and the floor to rise in places.

### The Sargent Expansion Gas Engine.

Herewith is illustrated the Sargent double-acting tandem gas engine, which expands the burning charge to practically atmospheric pressure, varies the point of cutoff of the admission inlet with the

extends from end to end of the engine, thereby giving a flat planed surface upon which the engine is erected and aligned. The sub-base and main frame are bolted to the foundation, and the cross head guide, cylinders and distance head, which fasten to the main frame, can come and go as the temperature varies, sliding on the hollow supports rising from sub-base, which maintain the cylinders in line and convey the gas and air from the hollow divided sub-base to the explosion chambers.

The admission of gas and air at full load is cut off from five-eighths to three-quarters of the admission stroke, depending on the fuel used, which after compression and ignition is expanded to the cylinder volume and is released a little above atmospheric pressure with a corresponding temperature of about 400° F.

A side shaft driven by the crank shaft and governor through a pair of worm gears running in oil, carrying two cams for each explosion chamber, one for the igniter and one to operate the valve, comprises all the moving mechanism, except the valves and lever, as shown in Fig. 1, the other side of the engine being plain.

Fig. 2 shows a section through the valves of one of the explosion chambers. By removing six nuts, valve bushing and valves can be removed from the cylinder for regrinding or inspection.

Gas is piped to the chamber A in the sub-base and air to the chamber B, which pass through the cylinder supports to the chambers A and B, ready to pass in the mixing chamber when the cam depression MN passes the roller and the ports F in the piston valve register with the ports E and D in the bushing. When the piston valve goes down to this position, the confined air in the piston valve dash-pot forces open the poppet valve, thus giving free admission to the charge. When the point N of the cam reaches the roller, it is forced down, while the other end of the lever goes up, carrying the piston valve, which cuts off the admission. The poppet valve seats and both valves remain in normal position during the compression, ignition and expansion,

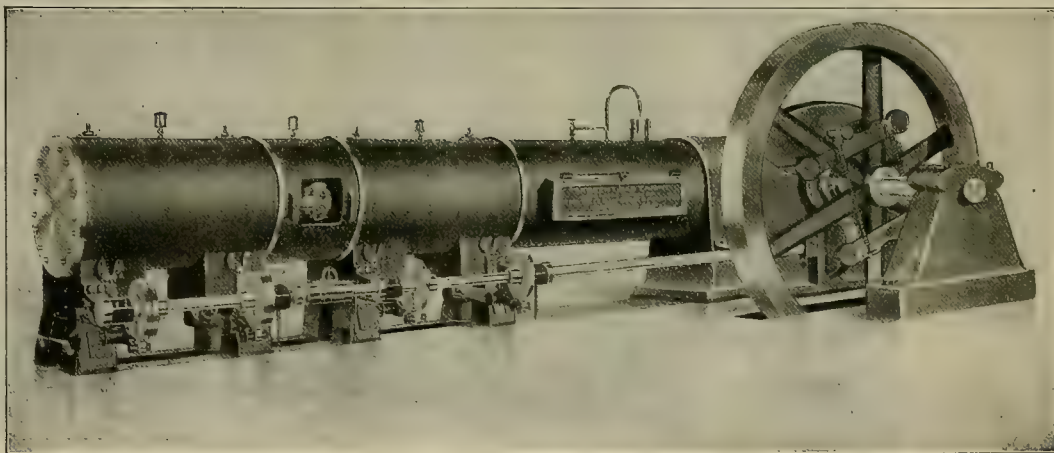


Fig. 1.—The Sargent Complete Expansion Gas Engine.

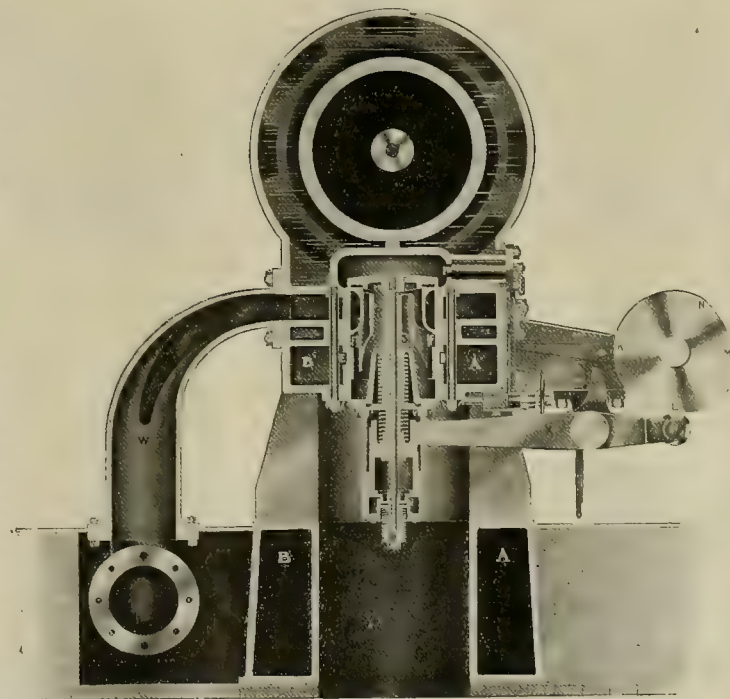


Fig. 2.—Valve Section.

load, advancing the time of ignition as the mixture gets weaker and the inflammation slower.

The general design is shown in Fig. 1. The sub-base, the top of which comes flush with the floor line,

on at one cylinder puts the starting mechanism into operation and at the same time puts the cylinder out of service as a gas engine.

All mechanism is above the floor line, yet below

\*Discussion of paper by H. W. Edwards, Trans. A. I. M. E.



the center line of the engine. Every explosion chamber is accessible by simply removing the cylinder head, which can be done without further dismantling the engine. The time of ignition and the ratio of the gas and air may be changed while the engine is in operation. This engine is made and furnished by the Wellman-Seaver-Morgan Co., Cleveland, O.

## Cyanide Practice at the Maitland Properties, South Dakota.\*

NUMBER III—CONCLUDED.

Written by JOHN GROSS.

All the zinc used is cut by the mill engineers, who easily cut the 70 pounds per shift that is required, and can cut more than double this quantity if occasion arises.

Data for the last eleven months on zinc box flow are given in Table II.

TABLE II.—DATA OF ZINC BOX RECORDS DURING ELEVEN MONTHS, 1903-1904.

	Solution—Tons.	Zinc—Cable Foot Content.	Quantity of Solution per Day—Tons.	Quantity of Solution per Day—Tons.
1903.				
July	10,365	194	331	1.71
August	15,130	188	388	2.00
September	14,130	200	485	2.43
October	14,777	212	477	2.25
November	12,703	200	426	2.13
December	12,501	220	403	1.75
Average during 6 months in 1903		204	435	2.13
1904.				
January	14,306	230	461	2.00
February	13,696	250	489	1.96
March	14,038	265	453	1.71
April	13,859	237	462	1.95
May	14,753	217	476	2.20
Average during 5 months in 1904		240	465	1.94

Daily measurements of the zinc box flow and assays on the head and tail solutions are taken so that we are enabled to keep very close check on the extractions. The actual bullion returns exceeded the precipitation record by 3.4% for the last six months of 1903, and by 4.7% for the first five months of 1904.

Of the barren solution, about 25% goes for the treatment of sands and the balance for slimes.

The zinc consumption for the past eleven months is detailed in Table III.

TABLE III.—CONSUMPTION OF ZINC DURING ELEVEN MONTHS, 1903-1904.

	Quantity per Ton of Ore Treated.	Quantity per Ton of Solution of Zinc Box Flow.
1903.	Pounds.	Pounds.
July	1.86	0.810
August	1.08	0.291
September	1.50	0.316
October	1.15	0.267
November	1.37	0.317
December	1.19	0.300
Average during 6 months, 1903	1.33	0.298
1904.		
January	1.48	0.309
February	1.17	0.242
March	1.37	0.329
April	1.19	0.285
May	1.27	0.309
Average during 5 months, 1904	1.34	0.295

**CLEANING UP.**—A cleanup is made twice a month, and, in starting, the flow of one box is shut off and water passed through for about fifteen minutes, being sufficient to replace practically the cyanide solution. The zinc from the first compartment is washed in the box and removed, the water being transferred to the second compartment, bailing out as close to the precipitated material as possible; the plug in the bottom is then opened and the remaining water, together with some of the precipitates, flows direct to the acid tank. The precipitates remaining are placed in a tub and carried to the acid tank. The compartment is washed out with a little water, the plug and screen are replaced and the zinc is replaced. The other compartments are cleaned in the same manner, except that the zinc is continually moved to the head compartments until they become filled. As soon as the head compartment is filled, the flow of solution is slowly started in order to avoid undue exposure to the air. The water from the last compartment is poured into an adjoining box. One man in this manner can clean up the five boxes in twelve hours.

The precipitates are allowed to settle in the acid tank until practically clear water remains on top; it is then siphoned direct into the waste sump. When siphoned down as closely as possible (this larger portion of the surface of precipitates being exposed), concentrated sulphuric acid is added and stirred just fast enough to avoid boiling over, the brisk action of the acid raising the temperature. The stirring is done by hand, and no ill effects have been experi-

enced from the fumes, even with the acid tank open. The tank, however, is situated in a well-ventilated portion of the precipitating room. The acid treatment is accomplished in about one hour, at the expiration of which the tank is partly filled with water and filtering is begun at once; no further washing is now attempted; the absolute washing so as to avoid the subsequent production of matte cannot be done, because of the presence of calcium sulphate; furthermore, as explained later in this paper, the production of this matte has become a desirable feature with us.

A vacuum filter is used for filtering the precipitates, which are then taken to the melting room and simply dried in a muffle furnace.

The melting is accomplished with a flux composed of dried precipitates, 10; bicarbonate soda, 4; borax glass, 1, sand tails (60% available  $\text{SiO}_2$ ), 1.5; fluor-spar, 0.2 part, which give good satisfaction; the charge melts easily and quietly and gives a clean and liquid acid slag. The melting is done in a No. 200 crucible and forced draft is used, no skimming is done, as the losses from dusting, in recharging the pot after the skimming, are too heavy.

The bullion goes to the United States assay office at Deadwood and the slags are shipped to smelting plants at Denver.

Formerly, it was customary to add wrought-iron scrap to the melt for the purpose of impoverishing the matte, but later developments, giving us an excess of silver above gold, has led us to flux without iron, thus producing a matte very rich in silver and carrying as high as \$10 per pound in gold. This matte is remelted with sand; a small quantity of flux, and about 10% of its weight in iron, giving a coppery bullion high in silver and low in gold. The average composition of this bullion is about 700 parts silver and 80 parts gold, which we now treat in a small parting-plant. The bullion, in the shape of a button weighing in the neighborhood of 200 ounces, is treated with concentrated nitric acid in a heated porcelain-lined kettle; the operation of parting is not long or tedious, a slime residue being produced that assays 50% gold and 25% silver, which is added to the next clean-up. The silver solution is treated with sodium bicarbonate precipitating the silver as a carbonate, which is roasted at a low-red heat with the formation of silver oxide forming a product which is ready for fluxing and melting into bar silver.

Just beneath the acid tank is placed a waste sump of a capacity of twenty-five tons of water, into which all of the solutions from the acid tank and vacuum filter are allowed to flow. The contents of this sump are found to assay appreciable quantities in soluble gold, but rarely more than a value of \$2 per ton. This solution is treated with fine zinc obtained from the zinc lathe, and sulphuric acid, and is well stirred and allowed to settle after the action has ceased. At the expiration of this time it is found that about 90% of the soluble gold has been precipitated. The sweepings around the zinc boxes after a clean-up are also thrown into this waste sump. These waste sump settlings are cleaned up every six months. All ashes of sufficient richness are crushed, and all sweepings from the melting room are mixed in with slag shipments.

**CYANIDE CONSUMPTION.**—The consumption of cyanide and lime per ton of ore treated during the past eleven months, both for the chemical and mechanical losses, is given in Table IV; the mechanical loss being that which passes out in the waste solutions.

TABLE IV.—CONSUMPTION OF CYANIDE AND LIME PER TON OF ORE TREATED.

TIME.	Consumption of Cyanide.		Consumption of Lime.
	Chemical. Pounds.	Mechanical. Pounds.	
1903.			
July	0.93	0.67	7.18
August	1.03	0.42	7.91
September	1.07	0.46	7.36
October	1.08	0.38	6.14
November	0.82	0.62	5.48
December	0.89	0.41	5.36
Average during six months in 1903	0.98	0.49	6.54
1904.			
January	0.52	0.51	5.03
February	0.80	0.39	5.95
March	0.76	0.39	6.34
April	1.04	0.36	5.24
May	1.23*	0.59	4.93
Average during five months in 1904	0.84	0.45	5.49

\*The increase in the consumption of cyanide during May was due to having raised the solution strength for precipitation purposes.

**GENERAL.**—Although the mill is one of the most modern, the general plan of placing the sand vats higher than the slimes vats was followed; an arrangement which assumes that clean sands are not to be made and requiring an overflow of slimes from the sand vats to pass to the slimes vats. If clean sands are produced in the separation (this can be accomplished), the logical position for the sand vats is at a lower level than that of the slimes vats for two reasons: First, the slimes can be delivered at a higher level than the sands; second, the decantation of the richer solutions from the slimes can be run direct on the sands charges, thus avoiding the unnecessary expense of repumping this solution, and, at the

same time, the gold value of the solution going to the battery is kept lower.

**EXTRACTION RESULTS.**—Table V gives the data of the extractions from the starting of the mill; the returns for both bullion and slag being quoted separately for the gold.

TABLE V.—MILL RESULTS FROM JULY, 1903, TO MAY, 1904.

Time.	Gold.			Silver. Total.
	In Bullion.	In Slag.	Total.	
Average during the first half of 1903	Per Cent. 46.75	Per Cent. 1.81	Per Cent. 48.56	Per Cent. 22.6
1903.				
July	50.23	1.39	51.62	36.8
August	58.09	0.49	58.58	26.6
September	60.26	0.80	61.06	18.6
October	63.44	0.49	63.93	17.8
November	67.32	2.02	69.34	21.4
December	68.23	1.64	69.87	49.2
Average during second half of 1903	61.15	1.07	62.22	26.1
1904.				
January	60.81	1.12	61.93	46.2
February	75.16	1.04	76.20	57.3
March	76.57	3.15	79.72	42.1
April	74.08	1.64	75.72	43.2
May	81.81	1.44	83.25	39.3
Average during five months in 1904	73.81	1.71	75.52	44.3

The extraction shown in Table V, though not high, is regarded as very hopeful, owing to the fairly regular increase, and compared to the difference between head-contents and contents in sands-tails, slimes-tails and waste solutions, show several per cent higher; cyanide tests on mill samples have been made regularly for nine months, and the actual returns exceed the test extractions by from 5% to 10%. Of the extractions 47.9% are obtained in the battery, 27% from the sands leaching and 25.1% from the slimes treatment during the past seven months.

**COST OF TREATMENT.**—The working costs vary from month to month, for the reason that all expenses are taken up and charged out at once, and where these expenses cover several months or more they cause that particular month to have an unduly high cost-sheet; an average of the first five months in 1904 is given in Table VI, whereby the larger part of this discrepancy is eliminated:

TABLE VI.—AVERAGE WORKING COSTS AT THE MAITLAND MILL, JANUARY TO MAY, 1904.

Department.			
Crusher:	Power.....	\$0.014	
	Labor.....	0.049	
	Repairs, etc.....	0.026	
			\$0.089
Sampling:	Power.....	0.004	
	Labor.....	0.013	
	Repairs, etc.....	0.001	
			0.017
Stamps:	Power.....	0.270	
	Sand-pumps.....	0.023	
	Labor.....	0.083	
	Repairs, etc.....	0.073	
			0.449
Leaching:	Pumping solutions.....	0.050	
	Sluicing sands.....	0.009	
	Handling slimes.....	0.022	
	Labor.....	0.069	
	Repairs, etc.....	0.018	
			0.168
Chemicals:	Lime.....	0.027	
	Cyanide.....	0.305	
			0.332
Precipitation:	Labor.....	0.011	
	Zinc.....	0.069	
	Repairs, etc.....	0.005	
			0.115
Clean-up:	Labor.....	0.006	
	Acid.....	0.012	
	Fuel.....	0.005	
	Fluxes.....	0.013	
	Crucibles.....	0.006	
	Repairs, etc.....	0.002	
			0.044
	Assaying.....		0.038
	Mill engineers.....		0.076
	Electric light.....		0.034
	General expense.....		0.244
Total expense of milling one ton of ore.....			\$1.606

NOTE.—The treatment cost is increased by the lack of railroad facilities, all supplies being hauled by wagon from 3 to 5 miles; an average of this hauling cost is 19.6 cents per ton of ore treated.

The sample-room and assaying expenses are equally divided between mine and mill. In the costs of power, the fuel, labor and necessary repairs to the generation of steam are included, the mine and mill being charged equally, which is a very equitable distribution, and the division of the mill power is based on indicator cards taken from the mill engine, the cost of a horse-power day averaged 36.3 cents for the past eleven months.

The costs given in Table VI include every item of expense connected with the operation of the plant, and takes into account also all renewals and changes made, but does not include depreciation of property or amortization fund.

The cleanup cost per ounce of bullion, based on eleven months production of 23,077 fine ounces, was:

	Cents.
Cleaning boxes and acid treatment	2.07
Melting costs	5.87
Marketing the bullion	3.46
Total cost per ounce of bullion	11.40

The men in the mill are advanced from one position to another as occasion arises, which insures a better



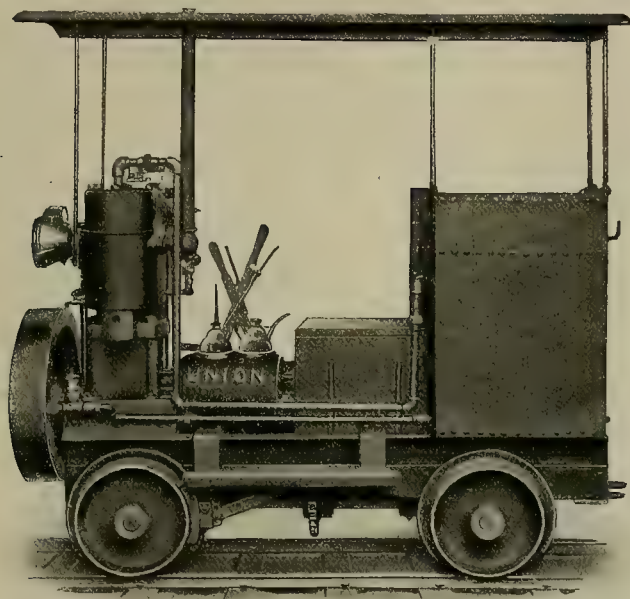
grade of labor, because more interest is taken by the men in their work, and they having a more general knowledge of the work. Moreover, the sudden withdrawal of a man is not so keenly felt. This principle of promotion, which has been in vogue for a year, is productive of excellent results.

LABOR.—The labor employed in the mill was:

	Time.	Cost.
DAY SHIFT—		
Sample room man .....	5 hours	\$1 25
Crusher man .....	12 hours	3 50
Battery man .....	12 hours	4 00
Solution man .....	12 hours	3 50
Precipitation man .....	10 hours	3 00
Helper .....	10 hours	2 50
Engineer .....	12 hours	4 00
Total day shift .....		\$21 75
NIGHT SHIFT—		
Battery man .....	12 hours	4 00
Solution man .....	12 hours	3 50
Engineer .....	12 hours	4 00
Total night shift .....		\$11 50
Total labor in mill .....		\$33 25

### New Locomotive.

The use of gasoline engines for motive power is successfully demonstrated by the mining locomotive, of which views are shown herewith. The engine used is



Mining Car.

a 5 H. P. single-cylinder Union, built by the Union Gas Engine Co. of San Francisco, Cal. The car and transmission were built by the Los Angeles Engineering Co. of Los Angeles, Cal. The locomotive is owned by Robert Beyrle of Los Angeles, Cal.

The engine is of the latest type built by the Union Gas Engine Co., is compact, all the wearing parts being of large dimensions and arranged so as to be easily accessible and always within the control of the engineer. It is fitted with a sensitive governor, which allows fuel to be used only in proportion to the work performed, and has a speed controller by which the speed can be set at any desired rate and maintained without any attention on the part of the engineer. The total weight of the locomotive, in running order, is about 3000 pounds. When tested on the track at Los Angeles it was shown to have a draw-bar pull of 600 pounds. The height over all above the rail is 5 feet 9 inches; length over all, 6 feet; width, not including step, 24 inches.

The height could have been considerably reduced if needed. The oil and water tanks are mounted in the rear. It is also fitted with an acetylene headlight.

This locomotive is now used in the tunnel being built to bring water to the city of Santa Barbara, Cal. This tunnel is to be 19,560 feet long and is now in 450 feet. The locomotive is drawing out the dirt and rock as fast as it can be loosened, taking two tons at a load. It has a greater capacity than this, but at present is not taxed to its working limit.

At the Homestake mine at Lead, South Dakota, are found many original arrangements to aid in promoting the economy of mining. The surface plant is an extensive and very costly one, representing more than \$2,000,000. This is all well protected from destruction by fire by the arrangement of numerous fire plugs which are connected with the reservoir on the hillside, affording a heavy pressure. To fight a possible fire underground, the compressed air-pipe system is connected with the water system, and at a moment's notice the water may be made available for use. The Homestake has never had a serious fire in twenty-eight years.

### Notes on Crushing of Metalliferous Ores in the Stamp Battery in Africa.

Written for the MINING AND SCIENTIFIC PRESS by F. O. ROBERTS.

In reduction of metalliferous ores two objects are desired, viz.: (1) The economical pulverization of the ore to any desired fineness, and (2) the effective liberation of the mineral contained in the ore. In other words, the application of the stamp mill as a means of reducing ores, viewed both in its commercial and metallurgical aspects, may be described as an economical method of making abundantly accessible to amalgamation, or other treatment, the gold or other minerals of commercial importance contained in the ores.

This important branch of the industry has been discussed and critically examined for many years, yet if one gives full cognizance to the important advances made in stamp mill practices during the past decade and, indeed, notices the considerations affecting the crushing of ores, some of which have received only ordinary attention, while the significance of others has but recently been recognized, there would seem to be almost as great a field for metallurgical, as well as mechanical, science in this branch of the industry at the present time as there has been in the past, and it would appear that in the further increase

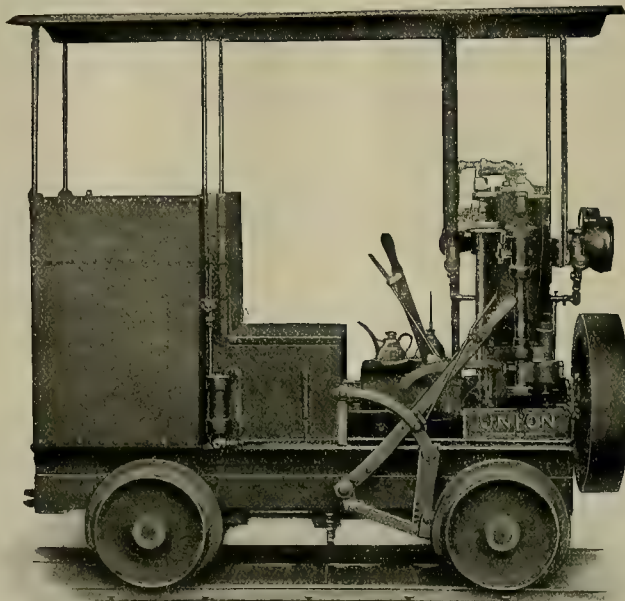
which as much as 55% to 60% of the total gold contents of the ore is accounted for after amalgamation, and while it may be conceded that the extremely fine state of division of the gold particles would, where no variation of amalgamation was shown, largely account for these results, there does not appear to be any mineralogical reason for this, and it is the opinion of the writer that—by giving greater attention to plate area per ton, classification of product, altering the conditions of amalgamation to coincide with the several products produced which are of sufficient value to handle, and observing in general the points affecting amalgamation—a much larger percentage of gold could be retained in the mill.

In Rhodesia, where the auriferous deposits are composed almost wholly of quartz veins, a much greater variety of ores are found and, in consequence, a greater diversity in the character of the ore occurs and a much larger field for variation in amalgamating practices exists.

These fields, however, show no modification of the methods used on the Rand and which have been transmitted to Rhodesia.

It is the very essence of successful metallurgical practice to determine the most effective and economical methods of extracting the mineral contents of individual ores—in other words, to alter the methods to suit the ore being dealt with.

MILL CONSTRUCTION.—In dealing with this subject I will limit myself to giving only a very general out-



Mining Car.

in the crushing capacity of the stamp mill, at least, in so far as this is harmoniously associated with a high, and yet economical, extraction of the gold values, there is a field of sufficient magnitude and promise to warrant the prediction that some very astonishing results will be obtained within the next year or two.

In Africa, generally speaking, the stamp mill is used more as a crushing machine than with any intention of effectively combining the two functions, i. e., crushing and amalgamation—that is to say, the ores are so simple and distinctly amenable to subsequent treatment by cyanide that amalgamation is only considered of importance in arresting the coarser particles of gold, which would otherwise demand longer contact with the cyanide solution before dissolving; hence, more attention is given to the creation of a "large duty per stamp per diem" (within certain limits) than is given to the study of improving the process of amalgamation.

How far amalgamation has been made subservient to crushing capacity can be gathered by the statement that in no instance (at least, in so far as the writer is aware) has any departure been made from the standard 5x12-foot copper plate, arranged directly in front of and in contact with each battery of five stamps. It is, I believe, agreed that the association of gold with the pyrite on the Rand fields is a mechanical one and not a chemical one. In Rhodesia the ores so far dealt with (with one exception) are distinctly free milling, and it would appear that the freely applicable nature of the ores to the cyanide treatment had, to some extent, deflected attention from the importance of crushing and sizing the ores to various degrees of fineness, with the idea of liberating the gold values. It would seem probable that, with more attention directed towards amalgamation and classification of product, some modification of future cyanide plants could be effected, while I dare say in some instances it would be possible to entirely exclude its consideration, without making any sacrifices in the tonnage handled.

Instances on the Rand fields can be recorded in

line of the ideas employed in mill construction, adding that on the Rand fields these methods, from a mechanical point of view, are largely desirable, while no doubt in other countries where the integral parts of the gold mining industry produce a larger degree of speculation many modifications would be called for.

In Johannesburg recognition is given to the economic importance of installing high-class, as well as permanent, plant and the local conditions make it possible to avoid the expensive necessity of constantly increasing the capacity of the plant. Ample provision is also made for auxiliary plant.

The apparently indifferent way in which large sums of money are advanced for surface equipment is to the new comer surprising; but the attention and scrutiny which is later directed towards the "working expenditure" freely sets forth the compensation expected, through this broad and liberal policy.

While a great deal of extravagance is exhibited in Africa, mostly confined to outside districts, on the whole the soundness of boldly tackling the proposition has been the means of establishing an enormous industry in the Transvaal colony.

In Rhodesia the operations are confined wholly to quartz veins; the industry is of a much more speculative nature, and the scale of operations is much smaller. The proximity of the Rand fields, and the magnitude which the term implies, has, in a great measure, adversely affected Rhodesia in the matter of equipment, as well as in other directions.

In the erection of the stamp mill, after the ground contours have been brought to a common level, attention is directed towards the mortar block excavations. In ordinarily hard ground it is usual to build in, anywhere from 2 feet to 3 feet, of concrete at the bottom of the pit for the piles to rest upon, as it is important that a full bearing be obtained, as well as a foundation of unusual hardness. The depth of the excavation is usually 12 feet, but it is not uncommon to find instances where the condition of the ground has rendered it necessary to extend the excavation to a depth of 30 feet to 40 feet.

(TO BE CONTINUED.)



## Forty Mile, Alaska.\*

Written for the MINING AND SCIENTIFIC PRESS by J. S. FRENCH

Since the wonderful gold discoveries in the Klondike in 1896, the territory lying on both sides of the international boundary in "the land of the midnight sun" has been kept prominently before the public by reports made from time to time of new strikes of fabulous richness. Many of these reports have been greatly exaggerated when the actual truth would have been startling enough. What is known as the Forty Mile district of Alaska comprises about 100 square miles. For years before the Klondike diggings on the Canadian side, or Circle City, Rampart and Nome on the American side were discovered, miners were at work on the Forty Mile river.

In those days winter work was virtually unknown, the miners working with their rockers on the river bars during the summer, and spending the greater portion of the winter in their cabins. From their own statements, life did not prove a burden to them during the long winter months. As a rule they had a fair supply of food and drink as well, and should their supply of liquor run short there was always some one in camp who could make "hootch," a drink which it is claimed will make the poorest prospector feel that he is a "bonanza king."

The town of Forty Mile, which is situated on the Yukon river, 52 miles from Dawson, was the base of supplies in those days, the goods being brought up the Yukon by a small steamer from St. Michael. Many thousands of dollars were taken from the river bars during the early days, and the ground then worked is worked now successfully by men with rockers.

Gold has been found in paying quantities on tributaries of the Forty Mile river for about 125 miles from the Yukon, and fair prospects have been found for 25 miles farther, and with the investigations now going on the gold-bearing territory may be considerably added to the coming season.

About 75 miles from Forty Mile the river forks, forming the North and South forks, both of which streams run through a gold-bearing country, but up to the present time the territory drained by the South fork has been proven to be far richer than the North fork. About 30 miles above the forks the South fork divides, forming the Denison and Mosquito forks of the Forty Mile, and here the Mosquito taps the gold belt—the territory drained by the Denison being mostly a granite formation.

The principal gold producing creeks of the Forty Mile are Chicken, Lost Chicken, Jack Wade, Napoleon, Franklin, Walker's Fork and Ingall. Chicken at present is attracting the most attention from the fact that, in addition to having yielded many thousands of dollars of gold the past season, with large dumps being taken out this season, the entire creek has been grouped for the purpose of being worked by hydraulics. This group covers about 4 miles, with an average width for hydraulic working of about 600 feet. As a hydraulic proposition, this will certainly prove a bonanza, a large portion of it having already proved rich drifting ground. Lost Chicken, which lies adjacent to Chicken on the east, is principally bench ground. The first season's working of this ground on a small scale yielded many thousands, and the coming spring will show a good cleanup, as large dumps are being taken out this winter. Jack Wade, which enters Walker's fork about 8 miles from its mouth, has been a heavy producer for several years. The miners are beginning to drop drifting, making use of the open cut instead, and as a result the output for the future will be far heavier, although it has run well up into the thousands during the past couple of years.

Napoleon, which enters the South fork about 16 miles below Chicken, has proved a very rich creek, although little work has been done on it. Discovery claim on this creek has yielded over \$75,000, and but a small space of bedrock has been uncovered. Pay has been shown for 2 miles above Discovery. Franklin, which enters the South fork 6 miles below Napoleon, has for many years proved a very rich creek, many thousands of dollars having been taken from it. This is one of the oldest creeks known in the Forty Mile, and although it has been worked for years, if worked on a large scale could be made to pay handsomely now. Walker's fork, which enters the South fork 2 miles above Napoleon, is proving a paying proposition. The ground is not so rich as on some of the other creeks, but the gold is distributed over a large area, and as the ground is shallow and the water supply good, it will prove a rich producer, when worked on an extensive scale.

Ingall, which enters the Mosquito fork about 7 miles above Chicken, is proving a good producer, and will respond well when worked extensively.

The annual yield from the above mentioned creeks runs into hundreds of thousands of dollars, but with extensive hydraulic plants in operation the output would be a matter of millions. The surface of the ground is covered with a heavy layer of moss, or niggerheads, and below this comes muck, the compo-

sition of which is about 25% decayed vegetation and 75% ice. This muck extends down to the gravel and is easily disposed of in open cut work. After cutting the moss and niggerheads from the surface, plows and scrapers being used for this purpose, thereby exposing the muck to the action of the sun, thawing starts in at once, increasing in volume day by day. Furrows cut in the muck by plows at intervals of several feet greatly facilitate the action of the sun and water in thawing the muck. With the ground in this condition, a fair head of water will run off the muck very rapidly, thus exposing the gravel to the rays of the sun. A big surface of gravel now being exposed, work can be carried on continuously, washing off the gravel as it thaws.

Water begins running in the creeks of the Forty Mile the latter part of April, and active sluicing begins May 1st, continuing until about October 1st. From the latter part of May till August 15th work can be carried on continuously during the twenty-four hours, which fact coupled with the richness of the ground makes the Forty Mile a better proposition for capital than most sections where operations can be carried on during the entire year. The question of how mining work is carried on in Alaska during the winter is apparently a puzzling one to many, yet when once understood is simple enough. Many an old California miner operating in the north has been heard to say that he would rather work in the frozen gravel, thawing as he mined, than in the States where the ground was thawed and where timbering was necessary. In the frozen gravel, shafts and drifts stand without timbering.

The method employed for extracting the gold up to the present has been principally by drifting—in the early days wood fires being used for thawing the frozen gravel and later steam points being introduced. The creeks vary materially as regards formation, some being shallow, with gravel from the surface down to bedrock. Chicken, with a depth of from 12 to 35 feet, has for the most part a soft bedrock. When the depth is 35 feet there are from 20 to 23 feet of muck, but in the shallow ground, say 20 feet to bedrock, there is only 7 or 8 feet of muck, and in ground that only runs 12 or 15 feet to bedrock there is little if any muck. The so-called soft bedrock consists of sand, clay or coal, and the small strip of hard bedrock is a species of iron rock.

When ready for operating the mixer picks his shaft down through the frozen muck until he reaches gravel and then, if thawing with wood, he places dry wood in the bottom of the shaft, blankets it with green wood and then sets fire to it. After the fire has burned out he removes the thawed gravel and repeats the operation. After reaching bedrock he starts his drift in any direction he wishes, piling his wood against the face. This primitive method is a slow way of mining, yet lots of gold has been taken out by it, and there are men in the North who continue to use it, claiming they prefer it.

When thawing with steam the miner uses what are called steam points, which on an average vary in length from 4 to 6 feet. When the points first came into use in the North, rifle barrels were used, as the blacksmiths had bought up large numbers of rifles at their own figures, the majority who had come into the country with the rush finding they had no use for them. Afterwards heavy pipe was used in the manufacture of points. When the miner has reached gravel in his shaft he makes connections with his boiler, extending a pipe down the shaft. For sinking the shaft he will probably use three points. In each of these, about 6 inches from the top, is a nipple, to which is attached a piece of steam hose, the other end of the hose being attached to a header made from a piece of pipe. Each piece of hose is fitted with a valve at its junction with the header, and the header being attached to the pipe by a piece of hose, the connections are now all made and the miner is ready for thawing. The few inches of the point above the nipple is solid and through this a hole has been drilled and a small rod run, which the miner uses to turn the points while driving them. Everything being ready, the engineer turns on steam, the miner places his points and the operations start. At first he only turns a little steam into the points, and as the gravel thaws he continually taps his points, using as a rule a maul and in some instances a sledge, and while driving he turns his points, which aids him in loosening the gravel. After driving the points in for 2 or 3 feet he lets them stand for a while, giving them a fair amount of steam, and then goes back and drives them entirely in, gives them a good head of steam and leaves them.

The time allowed for thawing depends upon the condition of the ground, some gravel being much tighter than others. In sinking a shaft the points, as a rule, would be allowed to steam about eight hours, whereas in drifting they would be steamed for ten hours, or twelve hours. After the points are drawn, the thawing continues for quite a while, consequently the miner aims to keep several thaws ahead when drifting, so as not to have to take out the hot gravel.

These points in drifting will thaw, if properly steamed, a couple of feet beyond the end and about 2 feet on either side of them, so it can be readily seen that with twenty to forty points in use a big body of gravel can be moved by one thaw. As a rule about one horse power is claimed as necessary for a point,

but some miners will only steam twenty points with a 25 or 30 H. P. boiler. Work is carried on during the closed season and about May 1st sluicing begins. After the dumps are sluiced the miner starts with his summer work, which entails far less expense, as he hoists the gravel from his shaft and dumps it into the sluice boxes, doing away with the shoveling in process. Many people imagine that the Forty Mile is an inaccessible region. Such is not the case by any means. The trip from San Francisco to Chicken creek, Alaska, can be made in midwinter without one having to endure any hardship whatever and with but little more inconvenience than would be experienced between San Francisco and New York at the same time of the year. The trip from Skagway to White Horse over the White Pass R. R., though a most picturesque region, is accomplished in a few hours. Here the stage is taken for Dawson, the trip with relays of horses being made in five and one-half days. As there are comfortable accommodations all along the line, the trip proves a novel and pleasant one. From Dawson to Forty Mile, a distance of 52 miles, the trip is made either by stage, cutter or dog team. The trip from Forty Mile up the Forty Mile river to Chicken and intermediate points may be made by cutter or dog team very quickly with good accommodations at all points. The Forty Mile river is a regular boulevard during the winter, four-horse sleds carrying more than a ton to the horse, making the trip from Forty Mile to Chicken, a distance of 110 miles, easily and expeditiously.

The atmosphere is dry, and there is seldom any wind, consequently the cold does not prove so severe, though the temperature may be lower than Chicago or New York. In the early days dog teams were used for freighting, but now horses have taken their places and dogs are only used for passenger traffic, making as much as 50 miles in a day. The writer has run from Napoleon creek to Dawson, about 140 miles, with three dogs in less than three days. A healthier country cannot be found, the miner being able to raise his own garden truck, and he may also gather with but little trouble a supply of wild cranberries, blueberries, currants and raspberries. Game, both large and small, is plentiful. Moose and caribou are fine meat and, although cattle are often driven to the creeks and butchered, the beef fails to take preference over the wild meat. Grouse, ptarmigan and rabbits may always be had in abundance, and last but not least may be mentioned greyling, which is a species of trout which, caught in the fall, may be frozen and stored for winter use.

As regards mining, the Forty Mile possesses many advantages over other sections, among which may be mentioned the plentiful supply of wood and water for operating purposes. The pay lies largely in the gravel, so there is virtually no blank gravel to handle, which greatly enhances the value of the ground for hydraulic work. Another great advantage is that the miner can give title to his ground, which cannot be done on the Canadian side.

For the prospector the Forty Mile offers great opportunities and capital will never find a better mining field for investment.

## Bureau of Forestry Testing Creosote Oil for Preservative Treatment.

The Bureau of Forestry is making exhaustive tests to determine the best grade of creosote oil for use in wood preservative treatment. The supply of the kinds of timber which are naturally most resistant to decay is diminishing so rapidly that substitutes will have to be found within a few years at farthest. Already the railroads are face to face with a tie famine from the exhaustion of the woods hitherto most used, especially white oak. There are plenty of substitutes, but they all decay so fast in their natural state that, though their first cost is low, their use is expensive. In Europe this difficulty was met long ago by devising methods of artificial preservation by which, for example, a beech tie, which if untreated will decay in from four to five years, is made to last thirty years or more. This result is obtained by impregnating it with creosote oil.

Other preservative materials are in experimental use in this country, but none gives more promising results in the increased length of service secured. At present most of the creosote oil for this purpose is being obtained from European sources. Quantities sufficient for our use are produced in this country, but the grades are so many and, for the most part, so inferior that they are but little used.

About 1000 samples of this oil, both native and European, have been tested by the Bureau to determine what grade gives the best results. This involves finding out the grade of oil which both most readily enters the wood and also stays in the longest time. The first will hasten and cheapen the process, the second will insure the greater permanence of the treatment.

The necessity for wood preservative treatment is beyond the theoretical stage. It is a question of recognized and vital importance, especially to the railroads and telegraph and telephone companies, whose bills for constant renewals of ties and poles are enormous. The oil tests the Bureau is making are therefore, of large and immediate practical value.

\*See illustrations on front page.



## Coal in Montana.

Written for the MINING AND SCIENTIFIC PRESS.

The coal fields of the United States are classified under four subdivisions, according to geological age: The Carboniferous, confined to regions east of the 100th meridian; the Triassic, to the Atlantic coast; the Cretaceous, in the Rocky Mountain regions, and the Tertiary, between the 120th meridian and the Pacific coast. These indicate that with advance in geological time, the conditions favorable for the accumulation of coal deposits were within zones successively shifting westward.

Coal fields of Montana are found in the Cretaceous. For 1200 miles southeastward through the United States, from the Canadian boundary, extends a great coal belt whose axis coincides with the main range of the Rocky Mountains. Included in it are portions of Montana, Wyoming, Colorado, Utah and New Mexico. The coal in the plains of this region is mainly lignite, although the lowest beds, which have been subjected to greater pressure, often approach a true coal. Along the flanks of the mountains and in the interior basins, where the inclosing stratum has been folded, the coal is chiefly bituminous, sometimes converted to anthracite in the vicinity of igneous intrusives.

A full description of the various coal fields of the United States appeared in Part III of the twenty-second annual report of the United States Geological Survey. In the fourth annual report of the inspector of mines of Montana, H. F. Walsh has incorporated much of this material that was pertinent to the districts of Montana, bringing it up to date and giving more specific details as to working mines. From this report and other sources, the present description has been compiled to give an idea of Montana's importance as a coal producer. The coal has been found in various districts many of which have been prospected, but often slightly developed. It has been commercially developed in the counties of Carbon, Cascade, Choteau, Custer, Fergus, Gallatin and Park.

In Carbon county the Rocky Fork field has been extensively developed by the Rocky Fork Coal Co., controlled by the Northwestern Improvement Co., a subsidiary company of the Northern Pacific Railroad Co. They operate the largest coal mines in Montana at Red Lodge. H. J. Horn is general manager and Robert Pettigrew is superintendent. During 1903 the output was 541,060 tons. The coal deposits are in a series of massive gray sandstones and shales near the middle of the Laramie formation and within a series of 1000 feet thick. There are seven beds of coal developed, varying in widths from 5 to 14 feet and comprising a total thickness of 54 feet.

The product of these different beds shows some variation in quality, some being preferred as domestic and steam coal, while some are best suited for metallurgical purposes. In addition, thirteen coal horizons are reported to occur below, five of which are said to be of workable character. The coal measures outcrop along the east bluff of Rocky Fork, with a southerly dip of 17° at the Red Lodge mine, but this dip rapidly decreases to the southeast and south. The property is developed by two main slopes 1800 and 2500 feet long. The greatest development has been done in vein No. 4. The roof of this vein is sandstone with a floor of fire clay 1½ to 4 feet thick on sandstone. From slope No. 4 five levels have been driven to the east and four levels to the west. The third and fourth east levels in No. 4 have been driven 9000 feet from the slope. The second level west has been driven 1 mile from No. 4 slope, the workings being ½ mile wide on the pitch of the vein by 3 miles long on the strike of the vein.

A 600-ton washer was completed in 1903. Previous to its completion the slack coal was dumped into the waters of Rock creek until prohibited by law. Such small coal is now washed, making a commercial product, and the overflow water from the washer, carrying the very fine coal and dirt in suspension, is settled alternately in two reservoirs, which prevents any appreciable pollution of the waters of the creek. A regular inspection is daily made for gas which, however, is seldom found in dangerous quantities. The condition of haulage and airways is good.

Other outside improvements consist of new warehouse, blacksmith shop, machine shop, carpenter shop, a large addition to the electric light building, in which another engine, with an alternating generator for lighting the city and an additional direct current generator, has been installed. During the past four years two 250 H. P. water tube boilers, small hoist to haul coal from No. 4 to No. 2 steel tippie, a set of railroad track scales, a new box car loader and three additional fans have been installed, a 20-foot fan at No. 2 (steam), a 5-foot fan at No. 6 (electric) and a 3-foot fan at No. 1½ (electric).

The coal is similar to that of the Canyon City field of Colorado. It does not coke in burning, but produces a bright flame and leaves a small amount of light ash. It is a transitional type, between bituminous coal and lignite. It gives a theoretical calorific

power of 10,500 B. T. U. per pound, and in a stationary boiler test, an actual evaporation of 5.8 pounds of water at working temperature and pressure and a relative efficiency of 94%.

Three miles east of the Rocky Fork field the Clark Fork field is worked at Bridger, the terminus of the Clark Fork branch of the Northern Pacific, by the Bridger Coal Co. The vein pitches 12°, is 4½ feet thick and is developed by a slope 3000 feet long. George Hough is manager and W. R. Dickson, superintendent. S. H. Glidden represents the owners. The main work has been done to the south of the slope, but at the face of the south entries the coal became so thin, owing to a portion of the vein being displaced by a parting of rock, that these entries were stopped. What coal there is makes an excellent steam and domestic coal. The output for the past two years has been about 50,000 tons per year.

This field was made available by the Bighorn mountain uplift which brought the Laramie rocks to the surface along its western side. It crosses the Yellowstone river 22 miles west of Billings and extends thence north to the Musselshell river. The northward extension of this field is not known to contain coal beds of value. About 8 miles south of the Yellowstone river the beds have a workable thickness, which is maintained southward to the Bighorn Basin field of Wyoming. The coal occupies the bottom of the Laramie formation, the "basal sandstone" being exposed but 10 feet below the lowest bed, while the bed now worked is 50 feet above. The inclination of the bed averages about 5° toward the west. The bed which is mined varies in thickness from 5 feet at the northern end of the workable area to 3 feet, about 6 miles north of this point, and again increases to nearly 5 feet within the next 15 miles. There are two other beds at this point, one immediately above the bottom of the Laramie the other about 500 feet higher. Neither of these beds has developed a workable thickness at any of the points where they have been opened. The coal is lignitic, but has a peculiar structure. Bands of bright coal alternate with bands having a dead appearance and closely resembling "bony" coal. The proportion of the latter gradually increases toward the north, where they become shale lenses, so that the product is of little value. Toward the south the coal is very bright and firm.

At Gebo the same field is worked by the Clark Fork Mining Co., where a large modern electric plant has been installed by the Link Belt Machinery Co. of Chicago. The coal is hauled 1 mile from the slope to the tippie, which is of steel, equipped with shaking screens. The vein developed is 6 feet thick. A slope 2000 feet in length has been driven, the pitch of the vein averaging 6°. The coal is lignite, having a peculiar structure. It is much banded—bands of bright coal alternating with bands of a dead luster—and throughout the seam is disseminated considerable "bony" coal, which necessitates much sorting in the mine. The vein has a few inches of fire clay for a floor, and between the top of the coal and the overlying massive sandstones there is several feet of shaly rock which requires considerable timbering to maintain. The manager is H. H. Griffith and the superintendent, J. E. McLaughlin. In 1903, 2000 tons were mined, but the management estimates the output for the year 1904 will approximate 25,000 tons. The Carbon Coal Co., J. C. McCarthy owner and manager, is likewise working the vein.

The Belt field in Cascade county lies along the northern base of the Little Belt mountains. The strata are exposed only along the canyon walls, as the country is deeply covered by glacial drift. The only coal bed of workable thickness is near the center of the field, the thickest point being near the mines at Sand Coulee, where it is 7½ feet thick, with three small shale partings. The extension of the field west of the Missouri river has not been thoroughly prospected, except in the vicinity of Judith basin.

Cascade county has been the biggest producer of coal in the State, reaching its maximum output in 1900 of 1,146,534 tons. During the past four years it has maintained an output of 800,000 tons.

The Cottonwood Coal Co. mines are at Stockett, the terminus of a branch of the Montana Central Railway Co. Lewis Stockett is manager and James Pierson is superintendent. There are five mines opened here, three of which have been worked out, one of which has opened up all available coal and a new mine known as "No. 5," which has been developed during the past two years. The coal is mined from a vein of the Kootenai group of the lower Cretaceous, having a total thickness of 9 feet 3 inches. The vein is nearly horizontal and consists of five coal veins of different quality, separated by sandstone and slate. There are no partings between the different benches of coal, slate and "bone," the vein being very hard and a solid mass from top to bottom, which, with a liberal number of pyrite nodules, scattered promiscuously throughout the vein, make the coal a difficult one to clean. The cleaning was formerly done with indifferent results by the miner at the face, and the nut coal was washed in a jig. Scarcity of water prevented the erection of a plant to wash the whole product and at times necessitated the shutting down of the nut coal washer. After a series of experiments, a scheme of treatment supple-

mentary to the cleaning by the miner was determined upon. It consists of an extensive plant depending upon hand picking and difference of specific gravity for separation of the different products. The machinery started August 10, 1904, and has since been in continuous operation every week day with gratifying results. The output for the past two years has averaged about 400,000 tons. Two additional boilers have been added to the old plant. Two air shafts have been completed in the No. 5 mine and two fans erected. Thirty-four mining machines and twelve air drills are in use on this property.

The Anaconda Copper Co. mines are at Belt, a station on the Neihart branch of the Montana Central Railway, F. W. C. Whyte, manager, and J. J. Kinney, superintendent. The mines at Belt, in Cascade county, are very extensive, having miles of rope haulage and airways. There is one main tail-rope system, about 1 mile long, running through the main entry to the tippie. As the vein of coal has many rolls, there are several independent rope systems which handle the cars from the partings nearest the working faces to the main parting. During the past year 560 men have been employed. Twenty-two Ingersoll-Sergeant punchers are used. The output of the company in coal and coke for the year 1903 was 177,704 tons and the estimated total tonnage for the year 1904 is 142,733 tons.

Rock Springs Coal Co. mines are at Sand Coulee. The vein is the same as opened at Belt and Stockett, but at Sand Coulee is somewhat thicker than at other points in the field, there being about 7½ feet of coal. E. Gerber is manager and superintendent. The output for the 1903 was 104,800 tons and the estimated output for the year 1904 is 75,000 tons.

Nelson Coal Co. mines at Sand Coulee are owned and managed by Nelson Bros. In 1903 the output was 53,000 tons and for the year 1904 this amount has been increased over 100%. The plant of this company has been added to by new boilers and a compressor. A change from pick to machine mining took place Nov. 1, 1904.

In Choteau, Cascade, Fergus, Gallatin and Park counties the Yellowstone River field and its extensions is the main source of supply. The outcrop of the coal-bearing formations can be followed 150 miles from the eastern end of the Boulder river through the Boulder, Livingston-Bozeman and Sixteen Mile and Shields river basins, thence circling around the northern and eastern end of the Crazy mountains and connecting with the western end of the plains field. The Boulder district comprises the area of Laramie along the drainage of the West Boulder, extending thence west as far as the Yellowstone river at Livingston. The area covered by the coal measures is 30 miles in length east and west and from 5 to 18 miles in breadth. The northern border of the field is formed by the edge of the overlying Livingston formation. The strata dip north, away from the Boulder mountains, from 12° to 45°. One coal bed has been discovered in this field which has a maximum thickness of 4 feet at the eastern end on the West Boulder river. The coal cokes, and although it has never been tested on a large scale, laboratory tests indicate that it is a high-grade fuel. The Livingston-Bozeman district consists of the continuation of the Boulder district from the Yellowstone westward. The coal-bearing formations outcrop along the northern base of the mountains westward to the Gallatin range, and their outcrops swings northward along the eastern base of the Gallatin and Bridger ranges. This district contains the maximum thickness of coal in the entire field and is the only portion in which actual mining is now going on. The strike of the bed follows very closely parallel to the neighboring mountains, the dip being everywhere away from them. Numerous minor fault planes occur where the strike of the beds makes an abrupt change in direction, and the dislocation of the strata has been further increased by the subsequent intrusion of igneous rock. Four coal beds have been discovered in this field, one of which never attains workable thickness. As a rule, only one bed is productive at any one point, the others having thinned out beyond the limits of profitable mining. The beds are composed of alternating bands of coal, "bony" coal, "bone" and shale, in varying proportions and the change from one to another is very abrupt. They vary from 4 to 16 feet in width, where mined, the dip varying from 25° to 90°. The only practicable method of mining is by taking out the entire bed and passing it through a washer, the resulting product being a high grade of steam and coking coal. A large proportion of the output is consumed for locomotive fuel on the Northern Pacific Railway, the main line of which crosses the western end of this district. The Sixteen-Mile and Shields River districts extend northward 40 miles from the line of the Northern Pacific Railway to the northern end of the Crazy mountains. From this point they extend westward 45 miles, around the northern end of the Bridger range. Along the many miles of Laramie outcrop exposed the coal has been prospected by a series of open cuts which have failed to show any thickening sufficient to warrant the opening of mines and the extension of the railroad. The Cascade formation is present over a small portion of the western part of this area, and one coal bed has been found a short distance above the measures, but not of workable thickness.

(TO BE CONTINUED.)



## Mining and Metallurgical Patents.

PATENTS ISSUED DECEMBER 13, 1904.

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE CONCENTRATOR BELT.—No. 776,744; J. Kane Passaic, N. J.



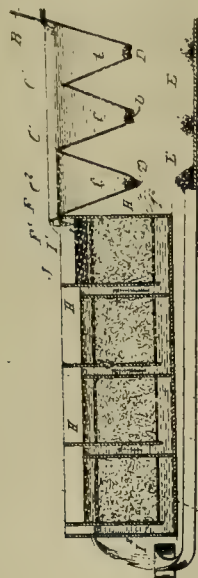
Belt for ore concentrators having continuous side flanges of vulcanized rubber surmounted by integral transverse upwardly extending edge projections.

CONCENTRATOR.—No. 776,647; F. M. Dillon and W. G. Wilson, Denver, Colo.



Transversely inclined concentrating table having longitudinal vibration whose tendency is to cause material to travel thereon from head toward tail of table, table having longitudinal riffles arranged in groups of varying height, highest group being located upon upper portion of transversely inclined surface, lowest group being centrally located on surface, and third group on lowest portion of table.

APPARATUS FOR RECOVERING PRECIOUS METALS.—No. 777,159; V. Tunbridge, Newark, N. J.



Apparatus comprising a supply channel having backwardly inclined screen at discharge end, separator arranged to receive material from supply channel, and provided with series of sediment collecting hoppers having sediment discharges and separated by ridges which are progressively higher toward outlet, forwardly inclined screen located at outlet of separator and provided with means for holding soap, filtering tank connected with outlet of separator and provided with upright and depending partitions forming series of upward and downward passages, filtering material located in the downward passages, and channel adapted to receive overflow from filter and to direct the overflow against the sediment withdrawn from separator.

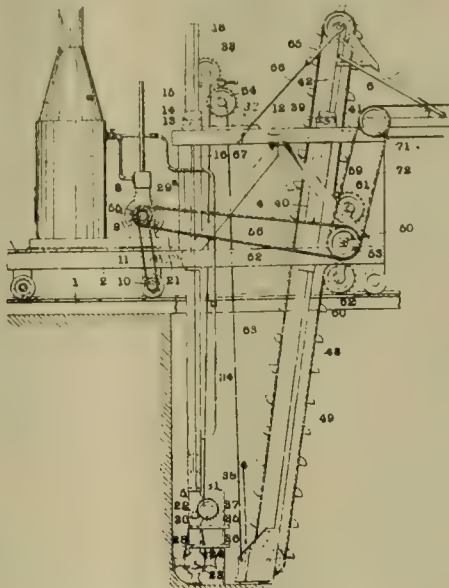
SAND CONCENTRATOR.—No. 777,176; E. S. Bennett, New York, N. Y.



Combination with conduit for tailings having discharge opening in its lower side, a deflector projecting into conduit to direct ore particles to discharge opening and grating or guard associated with deflector, both deflector and the grating being adjust-

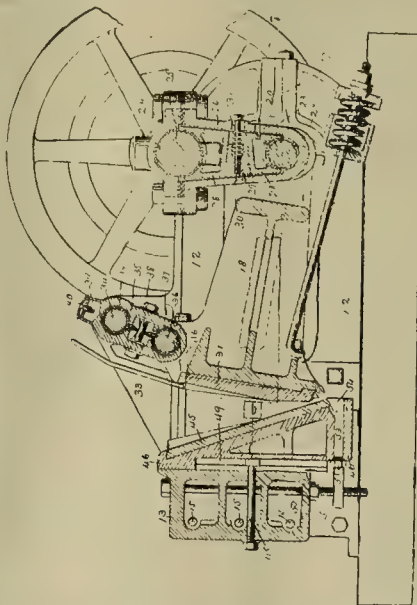
able and grating being arranged to guard opening between deflector and bottom of conduit.

EXCAVATING MACHINE.—No. 777,204; J. Helm, St. Louis, Mo.



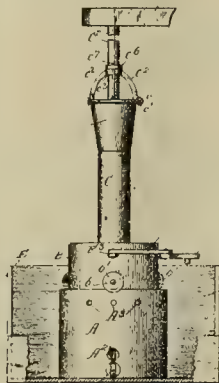
Excavating machine comprising frame, dislodging mechanism pivotally and reciprocatingly mounted in frame, means to automatically reciprocate dislodging mechanism when dislodging mechanism is actuated, and means to yieldingly hold dislodging mechanism to its work.

CRUSHING MACHINE.—No. 777,227; T. L. Sturtevant, Quincy, and T. J. Sturtevant, Newton Center, Mass.



In rocking-jaw crushing machine, combination with U-shaped machine-frame open at its rear end and having side parts provided with projections to form buttresses for toggles, of fixed or normally stationary jaw mounted in frame, co-operating rocking-jaw, rocking-jaw frame also mounted in machine-frame and carrying rocking-jaw, toggles interposed between rear parts of rocking-jaw frame and buttresses of machine-frame, and means for operating rocking-jaw frame.

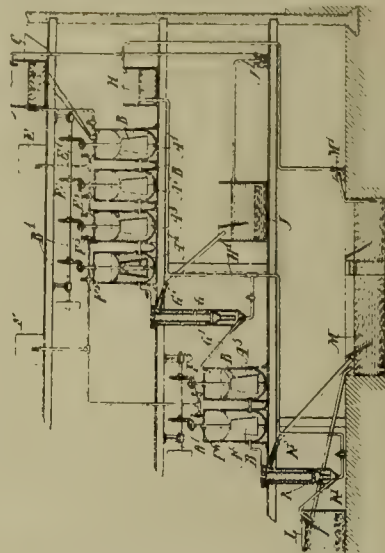
AMALGAMATOR.—No. 777,233; E. P. Wilkins, Baltimore, Md.



In amalgamator combination with receptacle of

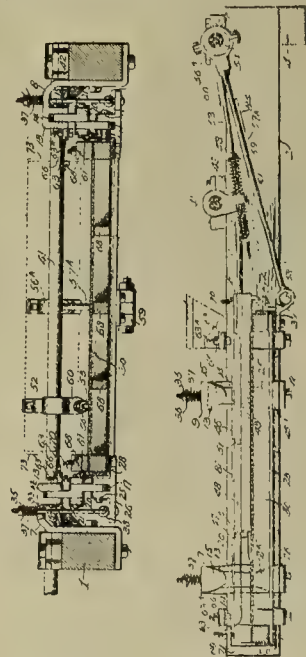
cylinder adapted to rotate therein, stand-pipe rigidly engaged in and projecting below bottom of cylinder, worm conveyor in stand-pipe projecting below bottom thereof, inwardly-directed beaters on bottom and sides of receptacle and outwardly-directed beaters on bottom and sides of cylinder arranged staggering therewith.

SEPARATION OF THE METALLIC CONSTITUENTS OF ORES FROM GANGUE.—No. 777,273; A. E. Cattermole, London, Eng.



Process of separating metalliferous matter from gangue by mixing pulp with an amount of oil equaling only fraction of metalliferous constituents, agitating mass until oil-coated metalliferous matter is agglomerated into granules and subjecting mixture to classification to remove small non-coated particles from granules.

SHAKING ORE SCREEN.—No. 777,317; J. A. Traylor, Denver, Colo.



In shaking screen, combination with supporting frame, brackets and links, casing comprising bed plates pivotally secured to links, angle irons secured to bed plate, and screen and sash supported by casing, of strips adapted to rest on side edges of screen, brackets secured to one of angle irons at discharge end of screen, arranged to project over adjacent ends of side strips, adjustable clamp screws threaded to arms to bear on adjacent end of clamping strips, slot in opposite end of each of clamping strips, eyes secured to end angle irons at opposite end of screen, eye bolts pivotally secured to eyes, having nuts threaded to ends and arranged to swing into slots in ends of clamping strip and to clamp with nuts clamping strips to screen.

CONCENTRATION OF MINERALS FROM ORES.—No. 777,274; A. E. Cattermole, H. L. Sulman and H. F. Kirkpatrick-Picard, London, Eng.

Process concentrating ore by mixing ore-pulp with soap solution and mineral acid which liberates organic acid from soap, agitating mixture so as to agglomerate coated mineral particles into granules, separating granules from non-coated gangue and adding alkali to granules to produce soluble soap.



# Mining Summary.

SPECIALY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

The Standard Oil Co. is completing the last section of the great pipe line for carrying oil from Red Fork, Indian Territory, across Kansas and Missouri, under the Mississippi river, through Indiana, Ohio and Pennsylvania to their refineries at Bayonne, N. J., and Newton Creek, New York City.

## ALASKA.

The Eagle River M. Co. has thirteen claims on Eagle river, 7 miles from salt water. B. L. Thane is in charge at Eagle. A tram has been built for 3½ miles from the beach and the remaining 3½ miles is reached by wagon road. A 20-stamp mill is in operation. Ore is brought 260 feet from the mine to the mill by a cable tram. Work has been done in thirteen stopes. The ground is loose and requires careful timbering.

The Alaska-Mexican G. M. Co., on Douglas Island, reports for month of October that the 120-stamp mill ran 29 days; crushed 18,210 tons ore; value of bullion, \$27,665. Saved 445 tons sulphurets of value of \$30,571. Working expenses, \$32,326.—The Alaska-Treadwell G. M. Co. for October reports that the 240-stamp mill ran 28 days; 300-stamp mill ran 28 days; crushed 78,746 tons ore; value of bullion, \$89,357; saved 1850 tons sulphurets of value of \$97,000. Working expenses for month, \$83,918.—The Alaska-United G. M. Co. reports the Ready Bullion claim, 120-stamp mill, ran 29½ days; crushed 18,410 tons ore; value of bullion, \$19,257; saved 390 tons sulphurets of value of \$13,233. Working expenses, \$28,521.

At Windham bay the California-Alaska M. Co. has let contract for 100 feet extension to tunnel on the Doctor claim. J. F. Stewart has charge.—At the Yellow Jacket M. Co. claims on south side of Windham bay, the electric plant has been finished and the mines will be worked during winter with machine drills.—J. P. Bartels and E. H. Patten are driving a tunnel on the Dark Horse, ½ mile south of the basin.

## ARIZONA.

### Cochise County.

In the California mining district, near Paradise, \$70,000 has been paid for seven and one-half claims by W. E. Rise of Houghton, Mich., for Michigan parties.

Three of the old furnaces of the Copper Queen smelter have been transferred to the plant in Douglas, and the smelter shed is to be enlarged to accommodate three new furnaces of the same size as those now in use and also two converter stands.

The new power house of the Calumet & Arizona smelter has been completed and two new furnaces have been ordered.

### Graham County.

The Copper Plate & Arizona Co. has been formed at Duluth, Minn., to develop the Copper Plate claims on the west side of Coronado mountain and the Rattlesnake group, north of Chase creek. The president, J. A. McKinley, is at Clifton arranging for development. He will build a road from Pinkard's gulch to the Plate group, put in air drills and erect buildings.

The Arizona C. Co. has put in another Hancock jig. A. Morrison, concentrator superintendent, reports that the two machines are handling 600 tons per day. The machine installed six months ago was the first to be put up in the United States.

J. C. Erman, superintendent of the Tribulation S. & D. Co. at Safford, will put in a concentrating plant.

### Mohave County.

The Gold Hill R. Co. has bought the Arizona & Utah Railroad and is repairing it.

R. C. Walker, superintendent of the Vanderbilt mine, worked by the Cerbat Mountain M. Co., near Kingman, reports completion of a 100-foot shaft. The mine is making water rapidly and a pumping engine will have to be put in.

Huntington mills have been put in by the Gold Road Co. at Acme.

The Savannah mines, 75 miles southeast of St. George, Utah, in Mohave county, Arizona, have resumed work after being closed for two years.

A 10-stamp mill is being put up for the Blue Ridge M. Co. at Acme.

Thos. Ewing of San Francisco, Cal., is developing the Spear's group, Virgin and Victor, near Acme.

### Yavapai County.

A. V. Miller is working the Brooklyn mine and 10-stamp mill, near Dewey station, with ten men.

The Monarch M. & M. Co., operating

the Ryland, 9 miles east of Wickenburg, is building roads to haul machinery, including a 40 H. P. engine and hoist. C. H. Pratt is superintendent and H. A. Suttle, manager.—The ore bins for the Treadwell S. Co. at Mayer will hold 2500 tons.—E. E. Greenwood has sixty-two men at work on the Mt. Union, 12 miles southeast of Prescott. A Huntington mill and concentrating tables are being placed.—J. M. Radcliffe and J. W. Switzer of Prescott have bonded the Gold Standard mines, 3 miles from Skull valley, to the El Dorado M. Co., of which T. Wilkinson of Burlington, Ia., is president and J. J. Hawkins, Prescott, is vice-president. Switzer and Radcliffe will put in necessary machinery to sink 200 feet on the Enterprise, 12 miles from Prescott.—R. McNary has bonded to the El Dorado Co. claims 1½ miles southeast of the Gold Standard.—A 6-stamp mill is being put up by the Pick & Drill M. Co., on the Agua Fria.

Superintendent A. F. Anderson is sinking the shaft with ten men at the Levathan, near Martinez.—J. H. Hise is developing the Monte Carlo, near Hillside.

J. F. Neff, president of the Goddard M. Co., in the Black Rock mining district, 3 miles from Wickenburg, says that they have sunk 150 feet and are planning to put in a gasoline hoist.

### Yuma County.

The 120-stamp mill to be erected 7 miles southwest of Quartzsite is to be started January 15th. The value is found in a cement, 10 to 40 feet thick, and carrying values from \$2.50 to \$15 per ton. Quartzsite is 20 miles east of La Paz, on the east side of the summit of the River range.

The Arizona Quartz King M. Co., owning claims on the Colorado river, 7 miles above Parker, is putting up a 100-stamp mill and propose to put in 1200 stamps.

## CALIFORNIA.

F. D. Ryan, Commissioner of Public Works, has returned from Sioux City, where he attended the session of the Engineering Commission appointed to formulate plans for the improvement of the Sacramento river and the proper drainage of the Sacramento valley, and says that the report of the Engineering Commission will advise the confinement of the river to its course by strong levees, compelling it to carry all its own flood waters, and thus scouring out and deepening its channel. There will be no cut through Sherman island. Strong recommendations against allowing the detritus from the mining streams will be made. The filling of the Sacramento and the consequent floods will be traced to the slickens from mining operations which filled the tributaries and the main streams.

### Amador County.

The 10-stamp mill at Jose gulch, near Butte Basin, southeast of Jackson, is running, employing six men in mine and mill. W. E. Stewart has charge.

At the Rhetta mine, near Plymouth, the mill is running. W. W. Worthing is superintendent.

The Central Eureka for December has declared a dividend of 7 cents per share, amounting to \$28,000.

There is talk of reopening the Empire and Pacific, near Plymouth.

### Calaveras County.

(Special Correspondence).—The 100-stamp mill of the Sticks mine is crushing ore. The new Laidlaw-Dunn-Gordon 20-drill air compressor is working satisfactorily. It is run by a 400 H. P. electric motor.

Angels, Dec. 20.

### El Dorado County.

A 4-stamp mill for prospecting is being put on the Scherrer mine, east of Georgetown. A. P. Frechette has charge.

G. W. Seybold, of the B. S. mine, near Pleasant Valley, reports that a hydraulic plant has been put in. N. H. Berger of Placerville is superintendent.

### Fresno County.

In Coalinga there are forty-three drilling rigs operating and fifteen new ones that will be operating by the first of the year. Nearly 500 of the 1200 inhabitants of Coalinga and vicinity are engaged in the production of oil.

### Mariposa County.

Congress has passed the bill transferring from the Yosemite National Park to Sierra Forest Reserve a large tract in Mariposa county within which are private holdings of mineral lands. This releases the mineral lands from the restrictions of the National Park and will admit of the building of roads, developing electric power from the streams and the operation of the mines at a reduced expense.

### Mono County.

Surveys for the power line of the proposed electric plant on Bishop creek to transmit power 90 miles to Goldfield, Nev., have been made and the work of construction on the plant has been begun.

Interested in the company are L. Oddie, C. F. Potter, R. Curtis of Denver, G. S. Wood, C. Hobbs and F. J. Campbell. Hobbs is at Bishop superintending the work, having secured water rights on Bishop creek capable of furnishing from 3000 to 5000 H. P.

### Nevada County.

A. M. McDonald, inspector of hydraulics for the California Debris Commission, says that the barrier dam below the Omega mine, built by W. M. Wilson of Maybert, is the best in the State.

The Ironclad mine at Rough and Ready is planning to put in electric pumps.

The Champion Mines have sued the Home G. M. Co. of Nevada City for \$300,000, alleging that the Home Co. has taken ore out of the plaintiff's mines during the last two years. The Home mining property adjoins the Champion mines and the defendant's tunnels have been run into the plaintiff's property, it is alleged. A temporary injunction to prevent further extraction of ore by the Home Co. has been granted. Case will be heard in San Francisco Jan. 6, 1905.

### Sacramento County.

A gold dredger is to be built on the Ingleside fruit farm, near Fair Oaks bridge, by El Dorado Gold Dredging Co., headed by H. E. Pickett of Placerville.

### San Bernardino County.

The Big Lode M. Co., 15 miles from Hesperia, J. C. Button, superintendent, is considering putting up a mill.

### Shasta County.

A. C. Brokaw will light the Golden Eagle quartz mine at Indian creek with electricity from the Siskiyou Electric Light & Power Co.

An electric power plant will be put in at the Midas mine, at Harrison Gulch, A. J. Oswald, superintendent. Four thousand inches of water will be taken from Bee Gum creek, in northwestern Tehama county.—C. Webb, leasing the Washington mine, in French gulch, is considering putting in machinery for deeper work.

### Sierra County.

The Swansea mine, near Alleghany, has resumed operations for the winter under the supervision of J. Brock. N. Johnson is foreman.—F. B. Kloff, superintendent of the Deep Blue gravel mine, has returned from the East.

### Siskiyou County.

G. L. Carr, of Carrville, superintendent of the Yellow Rose M. Co., operating claims on the headwaters of Salmon and Union creek, in Coffee Creek mining district, says that the company is driving a 1200-foot tunnel from the Siskiyou county side to tap the ore vein running parallel with the Dorleska mine, now being operated on the Trinity side. They intend to put in an electric power plant from the headwaters of Salmon river.

### Sonoma County.

The Socrates mine, at Pineflat, is shipping 200 flasks of quicksilver a month. C. Bell is superintendent.

### Trinity County.

Eastern men, represented by F. Grotefend of Redding, have options on dredging placer ground along the Trinity river, above Junction City, and are prospecting with a Keystone drill.

The Dorleska, at Dorleska, will work 100 men in the spring, and are preparing to put in machinery for crushing with a larger milling plant. H. Z. Osborne of Los Angeles, Cal., is president and manager.

The Globe mine, near Dedrick, has closed for the winter. Henry Randohr is superintendent.

The 5-stamp mill on the Lappin mine is crushing. Manager Beacham will soon put in an air compressor and power drill.

### Tuolumne County.

At the Woodside mine, near Sonora, owned by the Ranch M. Co., the shaft is being enlarged from top to bottom by three shifts.—A Gates canvas plant has been put in at the Black Oak mine at Soulsbyville and it is proposed to do away with the cyanide process, as the new plant will save the values.

W. T. Beveredge and B. Harter have bonded to H. G. Comstock & Co. of San Francisco the Roberts placer claim, containing 139 acres, near Montezuma.

C. W. Ayers of San Francisco has bonded to Chicago parties the Omega and Joe Hooker quartz mines near Rawhide.—B. Bacon and C. Dorsey of Columbia are working the Mexican and Bauman veins on Bald mountain, the property of J. F. Rooney.—The Horseshoe Bend mine is putting in a new mill. E. Goss of Sonora is superintendent.—The mill on the Experimental Gulch mine will soon be completed.—Hawsett & Anderson of Columbia are working the dump of the Over mine on Bald mountain.

A deposit of talc 4500 feet in length and over 100 feet in width has been discovered by H. Shaw in Hunter canyon, southeast of Tuolumne.

## COLORADO.

### Clear Creek County.

A 300 H. P. Rand Imperial, type 10, air compressor has been set up by the Dives-Pelican Seven-Thirty M. Co. at Silver Plume. It will have a capacity of 1700 cubic feet. A mill is under construction. Manager J. H. Eaton is making arrangements for boilers and other machinery for the new mill. O. O. McReynolds is engineer.

### Fremont County.

The United Oil Co., at Florence, has struck oil on the Walters ranch at 2900 feet. The well has been equipped with pumping apparatus producing 200 barrels a day.

The Junction Oil Co. has completed its derrick and is drilling.—The Florence field is producing 3500 barrels paraffine base crude oil that will refine 60% illuminating.

### Gilpin County.

A 2000-foot hoisting plant is being put up by the Pewabic Con. G. M. Co. at Central City. J. C. Feschhut is manager.—The McClelland tunnel will underlay the mine 1500 feet, obviating trouble with water.

The Hall mine in Russell district, operated by the Electric Spark G. M. Co., is shipping milling ores to Black Hawk. G. N. Rogers is manager.

### Gunnison County.

I. J. Johnson, manager of the East Gold Hill M. & M. Co., operating near Quartz station, has started a 1200-foot tunnel to develop the Gold Cup from Middle Willow gulch. He is putting machinery on the Sylvan Dell.

The Continental Fuel Co. at Mt. Carbon has a payroll of 120. Jos. Watson is superintendent at the Alpine mine, where the main shaft is down 150 feet, main entry 1800 feet and two cross entries 1200 to 2000 feet. The coal vein is 7½ feet thick. A day shift produces 500 tons of coal. This mine is equipped with an electric hoist, two Sullivan coal cutting machines, a Jeffrey cutter, and an Ottumwa box car loader.

### Hinsdale County.

The Hidden Treasure mine and mill, operated by L. Kafka of Lake City, will increase the force to eighty men.—The Hanna G. M. & M. Co., operating the Moro mines at Capital City, will resume operations about January 1. The mill will be overhauled.

### San Juan County.

The Keystone, Del Mino and Boycotter groups in Prospect gulch, near Silverton, belonging to Frank Wetzel, have been sold to the Galt Boy Co. for \$20,000.

The 4000-foot aerial tramway from the Old Hundred property down to Howardsville will be completed in January, 1905. The angle of the line is 45°, rendering the construction slow, the towers having to be ironed and bolted to the rocky sides of the mountain.

### San Miguel County.

Wagner Bros., working the Seventy-six claim of the Smuggler-Union at Telluride, and the dumps of the Sheridan, have found the Crane automatic ore dresser and sorting apparatus to be satisfactory. The ore is first screened and washed, the fine ore and screenings being run into a bin or conveyor belt, and the larger lumps discharged automatically into a large drum, inside of which a spiral screw agitates the mass, worming the ore through a hot water bath, melting any snow or ice and cleansing the rock. From this drum the slimes settle into a tank below and the coarse ore falls upon the picking belt. As the ore on this belt is washed clean of dirt and slimes, it is rapidly sorted by hand with greater efficiency than when covered with dirt, which hides the mineral. One machine handles 250 tons per day, using two barrels of water to 100 tons.

They will add twenty more stamps to the Cimarron mill in the spring.

### Sammit County.

The Providence-Colorado E. & D. Co., under management of H. S. Whitehead, at Breckenridge, will probably put in a concentration milling plant.—M. G. Evans, manager of the French Creek G. M. Co., is figuring to drive a crosscut tunnel 1000 feet into Mount Baldy near Breckenridge.

### Teller County.

The operators on the Jack G. of the Doctor-Jack Pot at Cripple Creek will put in machinery to increase ore tonnage.

## IDAHO.

### Boise County.

At the Gold Eagle M. & M. Co., at Neal, a Chilean mill, a 1000-foot steam hoist, an 80 H. P. boiler, five Willey tables and amalgamating plates are being put up. A cyanide plant will be put in by the Gold Eagle M. & D. Co.

### Idaho County.

The Bradley Engineering Co. have sold the 400-ton cyanide plant of the Republic



Power & Cyaniding Co. to W. Hogan, president of the Crooked River M. & M. Co. of Orogrande, Elk City district.

The Gold Coin M. Co., working at Black Lake, near Grangeville, has a 100-ton cyanide plant in operation and has rebuilt the mill burned last year. — The Iron Springs Co., in the Rapid River district, near Grangeville, will probably put in a 100-ton cyanide plant next season. C. A. Sutherland has succeeded C. F. Macey as superintendent.

The 7200-foot aerial tramway, connecting the Sunnyside mine with its 40-stamp mill on Marble creek, at Belleco, is in operation.

#### Shoshone County.

(Special Correspondence).—The output of the Cour d'Alene will be about \$13,000,000 for 1904.—The production of the larger mining companies lately has been restricted because of water shortage. The tailings accumulations have diverted the streams so as to damage property below.—The Monarch M. Co., near Murray, is putting in a 50-ton concentrator for lead-silver ore, and will ship to the smelters by January 1. E. P. Spaulding is manager.—The Bear Top M. Co. is moving the Black Bear mill on Canyon creek to their mine, 5 miles east of Murray. The manager is C. C. Groesbeck.—The Tamarack & Chesapeake M. Co. at Custer Peak has found cerussite and galena at 500-foot level. F. E. Culbertson, formerly manager for the Tiger-Poorman mine at Burke, is interested.

The Iron Spar M. Co. has closed down till spring. The ore is chalcopryite in quartz gangue in a bedded greenish slate, probably Cambrian. J. J. Curran is manager.

Wallace, Dec. 19.

In conjunction with the Big Divide M. Co., the Headlight company is installing a compressor to drive a joint tunnel, giving a depth of 1800 feet upon the Headlight and 1400 feet upon the Big Divide. A. McCullom at Wallace is interested.

#### NEVADA.

##### Humboldt County.

The Glasgow & Western M. Co. will extend the narrow-gauge railway, between Golconda and Adelaide, 50 miles to Kennedy.

##### Lincoln County.

M. McKee has charge of the New Era mill at Searchlight. J. A. Jester is superintendent.

#### NEW MEXICO.

##### Eddy County.

On the west slope of the Guadalupe mountains, 20 miles northwest of Carlsbad, T. F. Teegarden is prospecting for oil. He has one standard rig at work, another on the sidetrack at Carlsbad, and four more in transit, and claims to have a high-grade oil with paraffine base. C. F. Ricksecker of Roswell is interested.

##### Lincoln County.

The five Huntington mills on the Vera Cruz mine, south of White Oaks, are crushing.

##### Rio Arriba County.

It is reported that the deposits of mica 15 miles from Tres Piedras, in the Cribbenville district, are to be operated. The district is divided into six groups known as the Sandoval, Lincoln, Petaca, Webster, Cribbenville and Superior groups. The mica is found in a vein of feldspar and quartz in schist. The Sandoval, Cribbenville and Petaca are owned by M. Leichte and R. W. Tandy of Tres Piedras, the Webster by T. J. Stout of Edinburg, Indiana, and the Lincoln by J. C. Lincoln of Cleveland, Ohio. These have all been developed, but are awaiting better prices from an independent market.

L. E. Shale of Tres Piedras is developing the Owl claim, Bromide district.

The Pennsylvania M. & M. Co., operating 10 miles west of Tres Piedras in Bromide district, expects to place machinery on the Elliott consisting of an 80 H. P. boiler and a 1000-foot hoist. F. A. Elliott is working the property.

##### Socorro County.

The zinc mines of the Magdalena and Kelly districts are shipping high-grade ore. The Tri-Bullion M. & S. Co. of Chicago, Ill., owns the Kelly. The Little Juanita, owned by E. W. Eaton, H. M. Dougherty of Socorro, is being worked under supervision of C. T. Brown. The Graphic group is owned by the Williams-Sherwin Paint Co. of Cleveland, O. The town of Magdalena is the shipping and business point of the district.

#### OREGON.

##### Douglas County.

The Umpqua Coal Co. is opening up two coal veins at Elkton and propose a gravity tram line 1½ mile from the mine to the Umpqua river. R. W. Fenn is secretary.

##### Grant County.

The Mountain View mine, belonging to J. Chambers of John Day, is being worked

by O. Peone, E. Chambers and L. George of John Day.

The Red Boy mine near Granite is being developed by Superintendent W. H. Reeves.

#### Josephine County.

Dr. Ray of Gold Ray plans to put a dredger on the McDonough placer, near Tolo, which T. Kahler is working. Pumps and pipe line will be needed to force water 2 miles. Electric power will be used.

Power drills are to be put in at the Blue Ledge copper mine, on the divide between Elliott and Joe creeks. Surveys have been made for an electric transmission line and for a 27-mile railroad from Joes Bar to Jacksonville. C. W. Gedder is superintendent.

At Waldo the Waldo S. & M. Co. is prospecting its copper claims with a power drill under the management of M. Draper.—C. W. Thompson and Wm. Breevoort of Greenback will place a 10-stamp mill on the Scenic mine, on Coyote divide. The wagon road from Wolf creek to Greenback has been completed over the Coyote Divide.—The Golden Drift M. Co. at Dry Diggings has put in four turbines, generating 3000 H. P., and will operate four giants on its placers, water being carried 1 mile by a new pipe line from its power dam on Rogue river.—F. W. Lillegram is managing the Eagle mine, near Gold Hill.—A. C. Hofer, manager of the Mount Pitt Hydraulic & Quartz M. Co., operating at Jump-Off-Joe, near Grants Pass, intends to put in a 10-stamp mill.

#### SOUTH DAKOTA.

##### Lawrence County.

The Puritan G. M. & M. Co., C. F. Hutchins, Jr., of Deadwood, secretary, has authorized the manager to add ten stamps to the mill, put in slime tables and other machinery.—The Hidden Treasure shaft is 160 feet deep. P. T. Baird is superintendent at the mine, below Texana station.—The cyanide mill of the Gilt Edge-Maid G. M. Co. near Deadwood is operating at full capacity. Work is supervised by J. Terry.

The Queen of the Hills Co. has appropriated \$40,000 to erect a 10-stamp mill, combining amalgamation and cyanidation, crushing in water. E. P. Farnham of Deadwood is superintendent. A. Varney of Deadwood will be the millwright.

#### UTAH.

##### Salt Lake County.

The Deseret Evening News states that Bingham Canyon is annually handling 1,000,000 tons of ore in its mills and smelters and gives the following as the daily output in tons: Utah Consolidated 750, Utah Copper 700, Bingham Consolidated 400, United States 400, Boston Consolidated 250, Yampa 200, Ohio Copper 125, Bingham-New Haven 60, Utah-Apex 50, other producers 150, with a total of 3085.—The Utah Copper Co. will probably construct an addition to its present \$200,000 plant to handle 3000 tons per day. The Ohio Copper Co. will build a 500-ton plant, an increase of 375 tons a day. The Yampa is preparing to double its output.

The Wahsatch M. Co., in Wahsatch canyon, on the west side of the Wahsatch range, 4 miles south of Bingham, has done 5500 feet of development and proposes to sink a shaft. The ores are low-grade galena, containing gold and silver. The equipment is a 150-ton concentrator, an aerial tramway connecting the mine with the mill, and a blower plant.

##### Summit County.

M. Ferry of Park City is fitting the Ferry-Hancock property with a 500 cubic foot straight line compressor, one 100 H. P. high pressure steam boiler, one 100 H. P. steam heater and two air receivers, also a double-action 10x14 geared hoisting engine, including cable.

#### WASHINGTON.

##### Ferry County.

R. L. Boyd, president of the Keller & Indiana Con. S. Co., has purchased a 150-ton smelter, a sampling plant, a turbine water wheel and an electric plant for mines at Keller.

##### Lincoln County.

The trial run of the furnaces of the Turk smelter in Cedar canyon, near Davenport, made by Superintendent W. B. Van Osdell, was satisfactory. A few minor changes will be made in the arrangement of the machinery. The feed doors of the furnaces will be altered and it is expected to blow the furnaces for a permanent run the first of the year.

##### Okanogan County.

The International M. & S. Co. has been organized at Cheshaw by W. C. Peay, J. P. Blaine and H. Thompson to work three claims on Copper mountain, near the international boundary. The claims were purchased outright, and work will be started immediately with a large force of men.

#### Snohomish County.

The mining engineering class at the Washington University will spend their Christmas vacation at the copper mines near Index and gain practical knowledge of mining by actually operating the property, as it is idle.

#### Stevens County.

D. J. Zent and Superintendent J. Keough of the Frisco-Standard mine, 8 miles east of Boundary, have the road completed and are shipping concentrates to the Everett smelter.

## FOREIGN.

### BRITISH COLUMBIA.

#### Boundary District.

The November output in tons was: Granby mines, Phoenix camp, 45,089; Mother Lode, Deadwood camp, 15,376; Brooklyn-Stemwinder, Phoenix camp, 7650; Emma, Summit camp, 2650; Athelstan-Jackpot, Wellington camp, 720; Senator, Summit camp, 415; Mountain Rose, Summit camp, 132; Oro Denoro, Summit camp, 99; miscellaneous, 175, or a total of 72,306 tons. Most of this ore was treated at Boundary Falls, Greenwood or Grand Forks.

Manager Kellor of the British Columbia C. Co., Ltd., operating the Mother Lode mine and smelter at Deadwood and Greenwood, will put in new furnaces to double the output of the smelter. For three weeks the average number of men employed at the Mother Lode mine, including miners, muckers, engineers, carpenters, bosses and all others, was sixty-four; the output shipped per week averaged 3253 tons, giving an average per week per man of fifty-one tons of ore.

M. F. Madden of Chicago, president of the Providence M. Co., has bought the Gold Finch, at Greenwood.

There are three smelters running and ten furnaces in blast, including the second furnace of the Boundary Falls smelter. The Granby mines are shipping the ore needed for six furnaces at Grand Forks—about 1800 tons daily. The company will add to its furnace capacity next year, it being the intention to spend \$125,000 on two furnaces and to increase the daily output to 2700 tons. The British Columbia Copper Co., operating the Mother Lode smelter, will also add two more smelters at once, thus doubling the capacity of its plant. The Great Northern Railway expects to have its trains running into Phoenix by Jan. 1.

#### Cassiar District.

J. Haskins of the Rosella Hydraulic M. Co. announces that it is proposed to build a railway, to be known as the British Columbia Northern & Mackenzie Valley line, forming a junction with the Grand Trunk Pacific near Dease river. The ocean port will be on Nasoga gulf and the line will be carried to Dawson. The trunk line will have a length of 1500 miles, and twin branches of the same length will give 3000 miles in all. One of the chief objects of the line is to open the rich gold-bearing gravels district of Cassiar.

#### Roseland District.

Because of increase in price of copper and silver the Spitzee mine at Trail creek was started this week, expecting to output 1000 tons per month from the ore reserves in the mine. During 1903, 483 tons were shipped, employing fifteen men; 120 feet of shafting, 160 feet of driving, 80 feet of raising and 130 feet of crosscutting were done. Additions to plant amounted to \$8000.

The tonnage of ore shipped from and crushed at the Roseland mines for the week ending December 17th and for the year to date was as follows:

Mine.	Week.	Year.
Le Roi	2,727	138,841
Center Star	1,440	70,549
Center Star (milled)	440	14,460
War Eagle	1,260	54,826
War Eagle (milled)	350	3,960
Le Roi No. 2	350	23,231
Le Roi No. 2 (Elmore)	350	10,900
Spitzee	350	900
Kootenay	350	5,084
Jumbo	132	12,679
CHF	30	1,340
Velvet-Portland (milled)	30	2,635
I. X. L.	30	986
White Bear (milled)	30	2,000
White Bear	135	135
Iron Mask	30	70
Roseland View	30	80
Totals	6,404	332,976

J. J. Warren, managing director of the White Bear at Trail, has been running the mine and mill since Nov. 23d. Two of the four units of the oil plant are in operation, and the concentrates being turned out carry 8% copper, giving five tons per day. Superintendent Demuth has resumed charge.

At the next session of the British Columbia Legislature the Kettle Valley Railway Co. will apply for a subsidy to build a railway from Grand Forks up the North Fork through Franklin camp to Fire valley, along Fire Valley river through the Monashee mountains to Vernon, following the Government wagon road. From Ver-

non it will connect with the Sicamous branch and will be continued to the Nicola coal fields.

M. R. Galusba, the manager of the Jumbo, reports striking a good ore body in 450 feet in the intermediate level. R. H. Clarke of Spokane, Wash., is making a survey for the aerial tramway to connect the Jumbo mine with the Red Mountain Railway for the Bradley Engineering Works.—Increased ore shipments from Roseland caused an additional gold-copper furnace to be blown in at the Trail smelter.

#### Slocan District.

P. J. Hickey, Jr., superintendent of the Ivanhoe mine, owned by the Minnesota Silver Co. at Sandon, B. C., says that the Ivanhoe is working 90 men. The mill is actively at work and is producing lead concentrates, which go to Trail, B. C., and zinc concentrates, which are sold to Batchelder Bros. of Spokane. They have a contract for 500 tons, which they are shipping to Europe. The zinc concentrates run about 45% in the base metal and 30 ounces in silver. The total output of lead and zinc for the year will run about 2000 tons. The feed is low grade and the concentration is about 20 into 1. The Payne mine is being worked solely by lessees. Manager M. Gintzberger of the Monitor mine, near Three Forks, is interested in the custom zinc mill, with magnetic separator and jigs, which is being built at Rosebery. The buildings for it are up.

#### West Kootenay District.

B. White of Nelson has bonded the Morning group at Poplar.—Minneapolis men are driving a 1½ mile tunnel to tap the Silver Cup and Nettie L. leads as found in the Union Jack. — The Horse-shoe, near Trout Lake City, is being operated.—The Triune, in the upper Lardeau, is being operated by the Metropolitan M. Co. under management of R. H. Batty of Ferguson.—D. Morgan is working the Surprise on the North Fork of the Lardeau with six men.

#### MEXICO.

##### Guerrero.

E. D. Elson, manager of La Dihca M. & S. Co. of La Dicha, says their 200-ton smelting plant will be operating by Feb. 1st. Their mines are 60 miles from Acapulco, on the Pacific.

##### Oaxaca.

The Ures Con. M. Co. at Santa Fe has contracted with the Vega M. Co., operating the San Jose mine, to treat the ores from that mine, while the Ures Con. Co. is sinking its shaft from 340 feet to 450 feet and drifting to develop the ore body. The reason for this contract is that men will not work in the bottom of the shaft or slope with the hoist running, on account of the danger of pieces of ore continually falling from the cars. The contract made with the Vega company is for three months, on a basis of \$10 each ton of ore milled.

##### Sonora.

The Lucky Tiger Combination G. M. Co. mines are in the Tiera mountains, 32 miles east of Yzable station, on the Nacozari railroad, the station being 40 miles south of Douglas, Ariz. The two principal veins are opened through adits and crosscuts. It is stated that shipments of selected lots at regular intervals for the first six months of this year averaged \$200 per ton in silver and gold. A recent shipment of 500 tons ran \$200 per ton. The milling ore will, it is said, run \$35 per ton. These ores consist of iron-lead sulphide, carrying gold and silver. A mill is under construction, intended mainly for concentration, although amalgamating plates will be put in. The Lucky Tiger is controlled by Bisbee and Douglas, Ariz., and Kansas City, Mo., men, with B. F. Graham of Douglas manager.

O. Riechenbach, president of the Tarasca M. Co., operating near Torres, reports the mines producing steadily and development progressing. Ore shipments are regularly made to San Francisco by water, and returns are satisfactory.

##### Vera Cruz.

P. N. Furber, president of the Oil Fields of Mexico Co., says that the Mexican National intends to build a branch line to connect with the company's oil fields at Cugua, Veracruz. Well No. 1, having a depth of 1269 feet, is now overflowing naturally. The oil is of good quality and comes from the well at 65° F. Well No. 2 is down 500 feet, and the oil is steadily increasing. Well No. 3 has been located, and the erection of the derrick is being pushed as quickly as possible. Earthen tanks are being constructed for the storage of oil, 250,000 barrels capacity having to be provided. A tram line is being constructed from the property to the Tecoluta river, a distance of fifteen kilometers. All machinery is brought to the mouth of the river on the Gulf coast, and barged up to the point, where the tram line will have its terminal.



## NORWAY.

The production of copper in Norway during 1903 amounted to 1340 metric tons, not including the copper in ores exported. At the Sulitjelma mine 1300 men are employed, the output amounting to 60,434 tons. The smelter produced 640 tons of Bessemer copper. The company has installed a new concentrator at the Alten mine. The Roros mine produced 740 tons of copper and 13,808 tons of pyrite. The mines of Kjolli, near Roros, are being worked by an English company.

## Personal.

THE address of C. M. Neyman is wanted.

W. L. COBB is examining mines west of Shingle, Cal.

C. ANDERSON is manager of the Keystone M. Co. at Sandy, Nev.

W. T. BEANE is manager of the Golden Empire M. Co. at Lead, S. D.

J. S. FREE is superintendent of the E. & F. Co. mines at Pioche, Nev.

F. E. WILSON is manager at the Sinker Tunnel, near Silver City, Idaho.

E. B. EASTWOOD is superintendent of the Hathaway mine, Ophir, Cal.

B. F. RICHMOND is superintendent at the Jupiter mine, at Nespillem, Wash.

D. M. SMITH is superintendent of the Golden Eagle mine, New Central, Nev.

P. J. MCENRY is general manager of Beamer M. Co., of Quartzsite, Arizona.

CLYDE JACKSON is now superintendent of the Ida Mitchell mine, Placerville, Cal.

C. W. PLATT is superintendent of the Ryland mine, 9 miles east of Wickenburg, Arizona.

J. QUALEY is superintendent of the Porcionera mine at Santa Eulalia, Chihuahua, Mexico.

R. J. LAYNG is superintendent of the Zada mine, 14 miles from Caliente, Kern county, Cal.

JOHN BEATHAM is general manager of the Lappin mine at Deadwood, Trinity county, Cal.

H. WM. STEVENS has returned from an Eastern visit to Prescott, Ariz., 1-2 Lawlor Bldg.

H. C. ROLFE is superintendent of the Santa Margarita M. Co., near Soyopa, Sonora, Mexico.

MANAGER ROBINS, of the Last Chance mine at Coloma, Cal., is at Gold Hill, Or., for the holidays.

P. L. YOUNG, M. E., has returned to California from Mexico, where he had been investigating mining properties.

A. E. STAHLER is general manager and Frederick Aude superintendent of the Banker M. & T. Co., Winfield, Colo.

A. HOWLAND is superintendent of the Cook & Howland placer mine on Jump-off Joe, near Grants Pass, Or.

C. S. VERRILL is superintendent of the Mountain Boy mine, at Park City, near Republic, Ferry county, Wash.

W. B. CLOETE, managing director of the Grand Central M. Co., is at La Colomada, Sonora, Mexico, from London, England.

R. L. KEELY has been appointed professor of mechanical engineering in the University of South Dakota, Vermillion, S. D.

C. R. TROXEL of Chihuahua, Mexico, is at Ojinaga, in the eastern part of Chihuahua, investigating niter and oil possibilities.

L. HUNDESHAGEN, a mining engineer of Loeboe Sikaping, Padang, Sumatra, is investigating mining conditions in California.

A. S. ROSECRANS, superintendent of the Standard mines at Metcalf, 6 miles from Clifton, Ariz., is visiting Guadalajara, Mex.

ERNEST JOHNSTON has been appointed receiver of the American Con. C. Co., owning mines in the Lordsburg district, Grant county, N. M.

A. MOOREHEAD has resigned as superintendent of the Nevada Chief mine, of Rockland, and Superintendent Anderson, his successor, is at the mine.

H. R. KLAUSER AND H. GERBER of Toledo, Ohio, have been visiting the smelter of the Yaqui River S. & R. Co. at Toledo, Sahuaripa district, Mexico.

C. D. GALVIN is in Redding, Cal., as consulting engineer for a Boston syndi-

cate exploring on the Sugar Loaf group, north of Iron Mountain.

C. P. B. BARTLETT, manager of the Fearnot M. & M. Co., Victorville, Cal., is in Chicago on business connected with his company. They expect to put in a 100-ton concentrator plant.

JESSE SCOBEE, formerly manager for the Pride of the West M. Co., at Washington Camp, Arizona, is at Chiplona, Sonora, Mexico, superintending the erection of reverberatory furnace for the Cieneguita Copper Co.

M. D. STACKPOLE, M. E., of The Gold & Silver Extraction Co. of America, Ltd., has returned to Denver, Colo., from a professional trip to the States of Chihuahua and San Luis Potosi, Mexico, and leaves shortly to examine properties in Montana and Oregon.

C. W. WHITNEY has resigned his position with the McGraw Publishing Co., New York, and is now with the Abner Doble Co., San Francisco, Cal., engineers and manufacturers of tangential water wheels and needle regulating nozzles, in charge of their publicity department.

EDMUND B. KIRBY has resigned the management of the War Eagle, Center Star and Roseland Power Companies, Roseland, B. C., to attend to private affairs and business elsewhere. Mr. Kirby expects to leave Roseland Jan. 15. He went to Roseland in August, 1899, as the successor of J. B. Hastings in the general management of the Center Star and War Eagle mines, and accomplished much for those interests, conceiving and successfully introducing many economies and improvements, especially in the cost of mining.

## Commercial Paragraphs.

THE Stevens-Adams Manufacturing Co., of Aurora, Ill., are doubling the capacity of their machine shop, to take care of their increased business. F. G. Adams, of this company, has just returned from a trip covering England and Scotland.

THE city of Alameda, Cal., awarded a contract for furnishing a new engine for a municipal electric plant to the Charles C. Moore Co., 63 First street, San Francisco, Cal., for \$7719. The same establishment has a contract for providing the plant with a generator, to cost \$4888.

THE United States Consul in France reports that French quarries desire information as to cost and utility of American stone breakers, particularly those producing a minimum of dust. Manufacturers interested may address Thomas Sankey, 51 rue Hippolyte de Tocqueville, Cherbourg, France.

THE Union Gas Engine Company of San Francisco, Cal., is shipping to the Pfau Gold Mining & Reduction Co., Arizona, two double-cylinder, vertical, stationary gas engines, fitted to run on low-grade distillates or crude oil; one engine is 100 H. P. and the other 30 H. P. They are intended to drive air compressors, pumps and other machinery.

THE World's Fair exhibit of the Weber Gas & Gasoline Engine Co., Kansas City, has been sold to the E. Hertlein Co., New York. The plant consists of 150 H. P. Weber engine and 150 H. P. Weber suction gas producer, direct connected to a 75 K. western electric generator. This, they state, is the first producer gas power plant to be located in New York.

O. A. STRANAHAN has been appointed manager of the power department of the Allis-Chalmers Co. and will have charge of the sales of reciprocating engines, gas engines and steam turbines. Mr. Stranahan has been in charge of the engine business of the British Westinghouse Electric & Manufacturing Co. and has given much attention to gas engine developments, particularly with regard to producer and blast furnace gas—developments which are farther advanced in Europe than in the United States.

W. ORR is now general manager of the Gold & Silver Extraction Co. of America, Ltd. This company introduced the MacArthur-Forrest cyanide process in the United States, and has exerted a great influence in the improvement of the methods of ore treatment throughout the West. Under Mr. Orr's management the company will make a specialty of the examination of mines, and the determining of methods of treatment, retaining for this purpose a staff of specially qualified engineers.

COLORADO IRON WORKS CO., of Denver, Colo., report the following orders: One 42x120 copper matting furnace and complete sampling plant for the National Metallurgical Co., Mexico; one 200-ton silver-lead furnace for Laurium, Greece;

two C. I. W. impact screens for the Braden Copper Co., in Chile, S. A.; two double three compartment jigs for the El Cobre mines in Cuba; sampling machinery for the Con. Mercur Co., in Utah; two C. I. W. impact screens for the Puzzler M. & L. Co., also in Colorado; one C. I. W. impact screen for the San Juan R. Co., also in Colorado.

A MERGER of the S. S. Machinery Co., the Machinery Supply & Implement Co., the Thomas Crow Machinery Co. and the Colorado Iron Metal Yards Co. has been made at Denver, Colo. The new concern, which is capitalized at \$150,000, will be known as the Second Hand Machinery Co. They have leased the premises at 1626 Blake street, and the stocks of the different concerns entering into the merger will be moved to that building. The company will buy and sell mining machinery and supplies and will keep on hand stock for immediate shipment. Some of the companies in this combination have been in the machinery business in Denver for twenty-five years. The officers are: H. Stewart, president and treasurer; Thomas Crow, vice-president and superintendent; Morris Block, secretary; D. C. McNerny, general manager. The new company will start business January 1, 1905.

A MEMORABLE incident of the morning following the close of the St. Louis Exposition was the formal shut-down and inspection of the 600 H. P. Westinghouse steam turbine generating unit in the palace of machinery after a continuous run of 3962 hours. The machine was started on its long run at 9:20 A. M., June 20, and was stopped at 11:32 o'clock A. M., December 2. During the five and a half months that the unit was in operation, it supplied current for light and power throughout the Westinghouse exhibits in the palaces of machinery, electricity and transportation. C. F. Foster, chief operating engineer of the exposition; H. M. Holman, supervising engineer of the Government exposition gas engines tests, formerly president of the St. Louis board of public works, and a number of Westinghouse representatives, including W. Franklin of Detroit, C. C. Chappelle of Chicago, and W. K. Dunlap, managing director of the Westinghouse exhibits, were present when the engine was stopped. It was found to be in excellent condition, giving little sign of wear, the bearings still retaining the tool marks as they had come from the shops. There have been at least two instances on record in America in which piston engines have been run continuously for about the same length of time as that of the record run of the Westinghouse turbine. A remarkable feature of the turbine run was the maintenance under load of a speed of 3600 revolutions a minute for such a long period. From 8:30 o'clock in the morning to 10:30 o'clock in the evening, the load carried throughout the exposition varied from 25% under load to 25% over load. The total number of revolutions was 855,792,000.

## Books Received.

"The Fourth Annual Report of the Inspector of Coal Mines of the State of Montana," by H. W. Welsh, gives a description of the present condition of coal mining in Montana.

Under title of "Mineral Resources of the United States for 1903," the United States Geological Survey has issued "The Production of Coal," "Statistics of the American Iron Trade" and the "Production of Gas, Coke, Tar and Ammonia at Gas Works and in Retort Coke Ovens."

Bulletin No. 9 of the University of Texas Mineral Survey is a "Report of a Reconnaissance in Trans-Pecos Texas," by G. B. Richardson. It gives a detailed description of the geology and mineral resources of the region, with special reference to the occurrence of underground water.

The Bisbee Folio, No. 112, is the latest addition to the geologic atlas of the United States published by the United States Geological Survey. It contains a descriptive text, topographic maps, areal geology maps, economic geology maps, structure section sheets, fault diagram, columnar section sheet and illustration sheets. Price is 25 cents.

## Obituary.

JACKSON MCCracken died December 17 near Wright's Station, Cal., at the age of 82 years. He was the locator of the silver mines bearing his name in Mohave county, Arizona, and was prominent in mining and politics.

## Latest Market Reports.

SAN FRANCISCO, December 23, 1904.

## METALS.

SILVER.—Per oz., Troy: London, 28½d (standard ounce, 925 fine); New York, bar silver, 61½c, refined (1000 fine); San Francisco, 61½c; Mexican dollars, 52c San Francisco, 48½c New York.

COPPER.—New York: Standard, \$14.87½; Lake, 1 to 3 casks, \$14.87½@15.12½; Electrolytic, 1 to 3 casks, \$15.12½; Casting, 1 to 3 casks, \$14.75; San Francisco: \$16.00. Mill copper plates, \$17.00; bars, 18@24c. London: £66 spot per ton.

Copper stands steadily at, or just above, the 15-cent mark, despite the rapid and large fluctuations in leading copper stocks. Further comment on the causes which have led to the present anomalous situation seems unnecessary, in view of the widespread publicity given the matter in the daily press of the country. Copper is in good demand, fully up to the production, and the price of the metal will in all likelihood remain at about the present figures for a time.

Following are the figures of the German consumption of foreign copper for the months January-October, 1904, compared with the same period of time for 1903 and 1902:

	1904.	1903.	1902.
	Tons.	Tons.	Tons.
Imports.....	65,797	70,958	68,815
Exports.....	7,399	8,477	7,516

Consumption ..... 88,488 62,481 61,299

Out of the above, 80,693 tons were imported from the United States.

LEAD.—New York, \$4.70; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, \$4.85. London: £12 10s ½ long ton.

SPELTER.—New York, \$5.87½; St. Louis, \$5.00; London, £24 12s 6d ½ ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, \$29.00 @ 29.25; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, 32½c @ 35c. London, £132 5s spot.

PLATINUM.—San Francisco, crude, \$18.50 ½ oz.; New York, ingot, \$19.00 ½ Troy oz. Platinum ware, 75 @ 82c ½ gram.

QUICKSILVER.—New York, \$40.00 @ 41.00, large lots; London, £7 15s San Francisco, local, \$39.00 ½ flask of 75 lbs.; Denver, \$45.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 19.50c; San Francisco, Plumbers', 100 lb. lots, 16.25c.

ZINC.—Metallic, chemically pure, ½ lb., 50c; dust, ½ lb., 10c; sulphate, ½ lb., .04c.

NICKEL.—New York, 40@47c ½ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

## STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$16.35 @16.60; gray forge, \$15.85; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$21.00; open hearth billets, \$21.00; San Francisco, bar, 7c to 12c ½ lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½ c ½ lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, ½ c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city ½ bbl.

CEMENT.—Imported, \$2.15@2.65 ½ bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 ½ bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

## GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*,



## New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING DECEMBER 13, 1904.

777,365.—RAIL JOINT SHOE—J. B. Anderson, Portland, Or.  
777,060.—RAILWAY SIGNAL—R. Avery, Sausalito, Cal.  
777,591.—CRUSHING MILL—M. P. Boss, S. F.  
777,193.—DOOR OPENER—W. A. Fagan, S. F.  
777,411.—PUTTING KNIFE—J. O. Hall, Phoenix, Ariz.  
777,305.—PUZZLE—C. Henry, S. F.  
777,514.—HOOF PAD—Jennings & Tuttle, San Mateo, Cal.  
777,346.—CHALK HOLDER—Kraus & Links, S. F.  
777,381.—KINETOSCOPE—W. W. Ladd, Seattle, Wash.  
777,590.—STEPPER FOR AUTOS—H. M. Landes, Sacramento, Cal.  
777,522.—CHALK HOLDER—Links & Kraus, S. F.  
777,427.—BAG TURNER—S. T. Lockwood, Portland, Or.  
777,262.—TYPEWRITER—W. A. Lyman, S. F.  
777,530.—ELEVATOR—T. J. McCarthy, S. F.  
777,389.—WRENCH—J. N. Noyer, Gould City, Wash.  
777,532.—DRAWING APPARATUS—V. Pfaff, S. F.  
777,309.—DERRICK—W. G. Read, Davisville, Cal.  
777,392.—TIME CHECK—G. Stockton, S. F.  
777,507.—PRUNING SHEARS—Taylor & Boeck, Medford, Or.  
777,318.—POWER SET WORKS—Tullock & Barnes, Seattle, Wash.  
777,329.—POWER TRANSMITTING—C. C. Vaughn, S. F.  
777,269.—TOOL SHARPENER—F. Watkins, Burton, Wash.  
777,357.—GARMENT HANGER—E. M. Webster, Los Angeles, Cal.

## Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

COMBINED CHALK HOLDER AND SHARPENER.—No. 777,346. Dec. 13, 1904. B. Kraus and A. Links, San Francisco, Cal. The object of this invention is to provide a simple, handy and practical device which will combine a chalk holder and a means for sharpening the chalk and retaining the shavings or chalk powder, so that the latter will not get upon the hands or be scattered over the cloth and table.

RAILWAY SIGNALING DEVICE.—No. 777,060. Dec. 13, 1904. R. Avery of Sausalito, Cal. Giacinto Corsini Avery, executrix of R. Avery, deceased. This invention relates to an apparatus which is especially designed for signaling the presence of trains upon the line of track over which other trains are liable to approach and to give warning to the approaching train of such other train in time to prevent collisions. It consists of a series of torpedoes or equivalent devices and means by which they are temporarily placed above the rails in line of the approaching train, so that the officials of such train will be given an audible warning of the presence of another train upon the track in front.

STEPPER ATTACHMENT FOR AUTOMOBILES.—No. 777,260. Dec. 13, 1904. H. M. Landes, Sacramento, Cal. This invention relates to improvements in auxiliary propeller devices for motor vehicles. Its object is to provide a suitable adjunct to the ordinary engine of self-propelling vehicles to enable the vehicle to get over a particularly heavy or hilly piece of road that otherwise it would not be able to traverse. It consists in various combinations of mechanism and parts adapted to bring about the desired result.

PORTABLE DERRICK.—No. 777,307. Dec. 13, 1904. W. G. Read, Davisville, Cal. The object of this invention is to provide a rigid, compact, economically constructed device, which can be compactly crated in a knockdown form for shipment and can be quickly set up and made ready for use, and when thus set up can be easily moved from place to place contiguous to the point of use. It consists, in part, of a compound truss support for derrick masts and the like, comprising a step for the bottom of the mast, a guide sleeve for the mast located in line above the step, a base, converging timbers extending from the base and supporting the sleeve, tension rods between the sleeve and the step, and other rods between the step and base frame.

CHALK HOLDER.—No. 777,346. Dec. 13, 1904. A. Links and B. Kraus, San Francisco, Cal. The object of this invention is to provide a simple, cheap and practical holder and protector for the chalk or marking substance, such as is used by tailors and the like. It consists in the combination with a chalk holder having jaws engaging the opposite sides of the chalk, of a removable cap or protector adapted to enclose the protruding end of the chalk and embrace the jaws; and other details of construction by which a useful device is obtained.

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## Trade Treatises.

Catalogue No. 30 from the Jeffrey Mfg. Co., Columbus, Ohio, treats more particularly of their pulverizing machinery of various types and uses, together with other labor-saving machinery.

The 100-page booklet of the Smooth-On Manufacturing Co., Jersey City, N. J., shows in illustrated detail how Smooth-On repairs are made. The booklet will be sent on request to any address.

Bulletin No. 351 of the National Electric Co., Milwaukee, Wis., is devoted to motor-driven air compressors. S. I. Wailes, 519 Mission street, San Francisco, Cal., is their Pacific coast representative.

Crawford & McCrimmon Co., Brazil, Ind., manufacturers of hoisting and hauling engines, ventilating fans and acid proof pumps, send an attractive catalogue giving full details of their line. A unique device attached to their engine is the safety stop, an automatic device which immediately stops the engine when the least overwinding occurs. This is said to be the only engine on which such a device occurs. The catalogue is worth the perusal of any mine superintendent or manager, and will be sent upon request.

## ASSESSMENT NOTICES.

**EUREKA CONSOLIDATED DRIFT MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on Friday, the 16th day of December, 1904, an assessment (No. 41) of one-half (1/2) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 3, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of January, 1905, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 13th day of February, 1905, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors,  
CHAS. W. DIXON, Secretary.  
Office—Room 3, No. 214 Pine street, San Francisco, California.

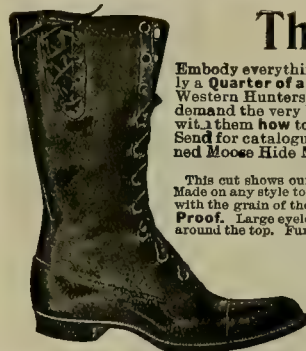
**MARINA MARSICANO GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of December, 1904, an assessment (No. 41) of five (5) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 207 Battery street, Room 15, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of January, 1905, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 6th day of February, 1905, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors,  
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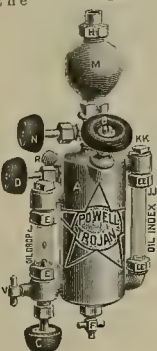
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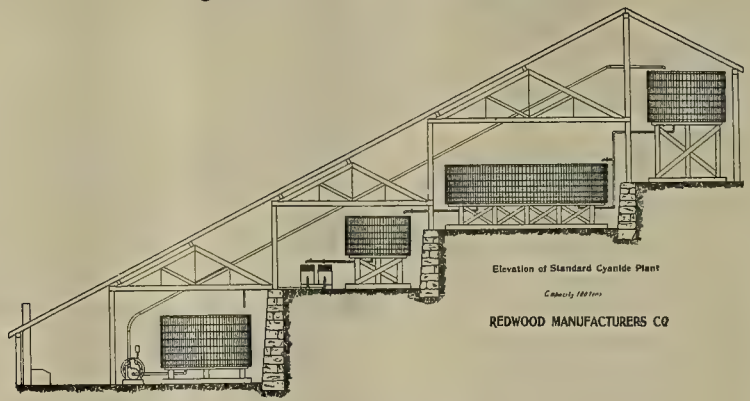
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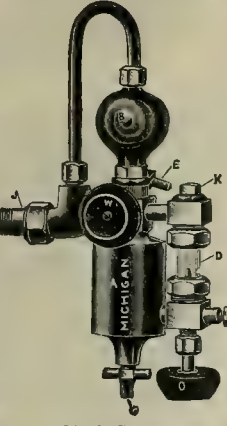
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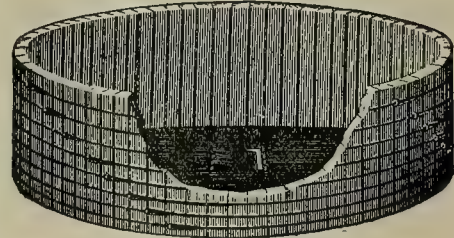
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Whole No. 2319.—VOLUME LXXXIX.  
Number 27.

SAN FRANCISCO, CAL., SATURDAY, DECEMBER 31, 1904.

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## Engineering in Alaska.

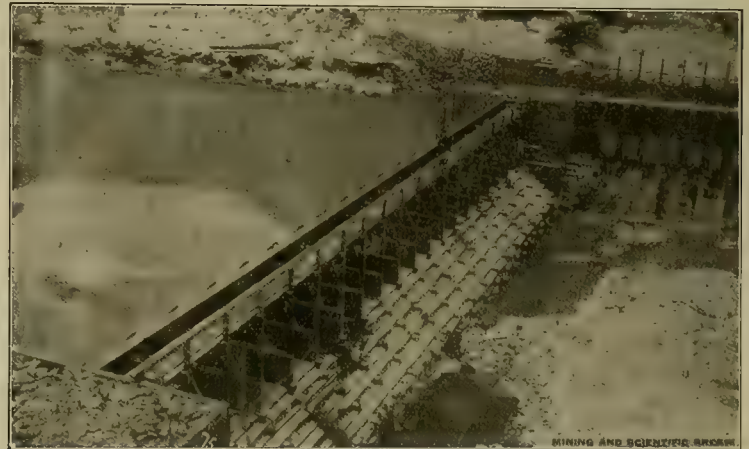
The engravings on this page illustrate one phase of mining in Alaska, where some of the greatest mining undertakings in the world are in successful operation, and is merely indicative of what may be accomplished by the employment of engineering skill and money in overcoming the difficulties which nature has placed in the way. The attempts to drain this basin have been numerous but previously futile, while it now appears that the difficult feat has been at last accomplished and the various obstacles successfully overcome. It is seldom that flumes for mining purposes are built of such large size, but the necessities of the case demanded that the conduit should be capable of carrying off all of the flood waters of the stream running through the canyon draining the basin, and this required the building of such an artificial channel as is here illustrated. The engineers seem to have taken some risk in basing a portion of the dam on gravel instead of on bedrock, but they have probably satisfied themselves that there is no grave danger of the water undercutting the structure, rendering it temporarily useless, and have taken steps to prevent it. Should this actually occur, it is safe to say that the dam will be reconstructed in a more substantial manner made possible by the cutting out of the gravel.



Interior of Flume at Basin, Alaska, Capacity 240,000 Cubic Feet Per Minute.  
(See Page 436.)



Head and Side Gates of Flume at Basin, Alaska. (See Page 436.)



View of the Dam at Basin, Alaska, Completed. (See Page 436.)



General View of Basin, Alaska, Showing Completed Flume and Dam. (See Page 436.)



# MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....Publisher

SAN FRANCISCO, DECEMBER 31, 1904.

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THE United States mints, having coined all the silver bullion on hand, are now unable to turn out more fractional coinage, which is much needed in merchandising throughout the country. Silver has advanced slightly in price the past few weeks, but whether directly due to the shortage of silver bullion in the mints or not it is difficult to say, as the Secretary of the Treasury has no authority to purchase silver bullion for subsidiary coinage. The higher price of silver, however, is gratefully viewed by the producers of silver. Indeed, miners at present have cause to feel unusually thankful, as not only is silver somewhat higher, but copper, zinc, tin and lead are also up; and in view of the present peaceful state of affairs between the mine operators and organized labor unions, the outlook for a prosperous year during 1905 is most auspicious.

RECENT attempts have been made to introduce Japanese laborers into Mexico and also into the northern portion of British Columbia. In the former instance many of the Japanese quit and refused to go on with the work for which they were imported. In British Columbia the strenuous opposition of white miners resulted in the attempt not being carried to a conclusion. In California there are a large number of Chinese engaged in mining, but the greater number of these are working individually for themselves or for Chinese companies owning the mines, mostly placer. To this little objection is made by the white miners, for the reason that in most instances the Chinese work over placer ground usually believed to be too poor to pay the white men for their labor. Although the introduction of Chinese labor into the mines of the Rand has been successfully accomplished, owing to the peculiar conditions at present obtaining there, it is safe to say that any attempt to similarly employ Asiatic labor in the mines of Western America will be vigorously resisted.

## Retrospective.

With this issue is closed the 89th volume of the MINING AND SCIENTIFIC PRESS. Within its life history there have been issued 2319 numbers of this paper which has always been the faithful exponent of the mining industry. As time passed on it has taken up and exploited the manifold branches of mining, metallurgy and engineering, and it has been its constant aim, while being enthusiastic in the cause and endeavoring to put forward all that was good in the lines it represents, to be at the same time, dignified and conservative and above all else to be correct. While errors occasionally creep in, yet it is gratifying to know that they have been neither numerous nor serious.

A review of the work of the past year gives a good idea of the province and aim of the MINING AND SCIENTIFIC PRESS. Within this period has been published herein all that was latest and best relating to mining and metallurgy and their kindred topics. Many of the articles have been written by men who stand high in their profession and some have been furnished by the regular staff of this paper. They embrace a very wide range of subjects and treat of the present condition of the mining industry in every part of the world.

Among the practical subjects treated may be mentioned articles on mine development and operation (among which are the Homestake methods); mine drainage; costs in mining; various types of mill construction; equipment of mines; automatic ore sampling; the cyanide process, and its varied applications to the treatment of gold ores; copper smelting; gold milling; concentration; the mining law, and a large number of articles on other miscellaneous subjects. In geology, the occurrences of veins and ore deposits in every portion of the world have been discussed, with more particular attention to the most important sections.

The "Concentrate" page has continued to supply the information demanded by an army of inquirers in as prompt and accurate a manner as possible. In this department there has been much of mining law, and those who desire information in the legal branch of the mining industry will find in "Concentrates" an epitome of mining decisions on the most important questions. It is also a source of valuable technical, engineering and metallurgical information, which has taken up almost every phase of these varied topics.

"The Prospector" is a new department introduced within the year, in order to respond to the numerous requests for information as to the character of rocks and minerals which came under the observation of the prospector in the pursuit of his investigations, and which he is often at a loss to understand or fails to recognize.

The illustrative features of the paper have been kept up to the standard, and within the year have appeared illustrations of mining methods in almost every country of the world where mining is an important industry. There have been engravings of scenes on the verge of the Arctic circle; from the heart of Africa, from South America, from the interior of China and Japan, from Australia, and from many other more easily accessible parts of the world.

In the advertising section the mine manager and metallurgist have long learned to look weekly in search of the innovations and improvements constantly being made in mechanical appliances, realizing that the advertising pages of a journal such as the MINING AND SCIENTIFIC PRESS possess educational features that cannot be neglected if they desire to keep abreast of the times, when changes are so frequent and so radical as at this period.

While much has been accomplished in the past, still it is with the feeling and belief that much still remains to be done, and that the coming year will see many more changes and new departures from old methods and practice, and these it shall be the privilege of the MINING AND SCIENTIFIC PRESS to give to the world as heretofore, as promptly as they make their appearance, or can be anticipated.

IN discussing the labor situation on the Rand, in South Africa, Lord Milner is reported as saying, at Johannesburg, that the importation of 7000 Chinese coolies to labor in the mines of the Transvaal has resulted in giving employment to 1000 additional white men, and every 1000 white men employed in

the mines involves an additional population of at least equal number, and probably more, in subsidiary industries, as artisans, traders, etc. Of these latter a larger proportion are married, with families, than the miners, and altogether it is probable that from 8000 to 10,000 white people have found employment and means of livelihood as the direct outcome of the importation of 7000 Chinese. The importation of laborers from China continues, and since the time referred to by Lord Milner a large number of additional Chinamen have been received at Johannesburg for distribution to the mines. A statement by the Chamber of Mines is to the effect that, up to Nov. 26, there had arrived 17,078 Chinese, since which date over 2000 more had reached Johannesburg, so there are at present in Johannesburg nearly 20,000 Chinese. If Lord Milner's estimate holds good, this will mean an increase in the white population of not less than 25,000.

## Mine Valuation.

There appear to be a great many people who do not understand that the value of a mine can not be ascertained by merely visiting it and looking at it. Mine valuation is a science which requires a broad technical knowledge and wide practical experience. An engineer, with technical training and knowledge of the methods of ore sampling, may go through the workings of a mine, and carefully take a large number of samples, which, when assayed, will give, together with the measurements of exposed ore bodies at the places sampled, an approximate idea of the gross value of the ore available in the mine. If the engineer does not have the experience necessary to make proper estimates on the cost of mining and reducing this ore, his report will possess little of practical value, but when it embodies the amount of ore in sight and its value, together with the costs of the varied operations necessary to recover this value, it becomes a tangible proposition, which can be utilized to advantage, either as a basis of investment or as a substantial deterrent to further expense in connection with the property. If mines could be placed in the market on the showing of gross value in sight, the introduction of new mining projects would be easy of accomplishment. Some years since, an elaborate report stated that a certain ore deposit showed several millions of dollars of value in sight. An engineer, who was sent to see if the statement was true, in his report verified all that had been said as to the value in sight, but also submitted the opinion that it would cost two to three millions more than were there to get it out.

The engineer who accepts a commission to examine a mining property for possible purchasers undertakes a responsible task, and he should be guided by the facts both as to values and as to costs. A noted mine was sold on the report of well-known engineers some twenty years ago. The mine was equipped and work was prosecuted for a time, but at a loss, and the property was abandoned. This mine is now in operation and paying, not because the ore is more valuable than formerly, for it is a gold mine, but for the reason that the engineers who made the former report were inexperienced in the district where the mine was situated—a remote one—and underestimated the cost of operating in that region. The conditions existing at that time have been changed by the building of a railroad, and the cost of operation has been decreased by improved mining methods, and also by making available a better class of labor, while the possible saving of values has been greatly increased by the introduction of the cyanide process.

Instances of this kind are more numerous than is generally supposed. It is quite as important the writer of a mining report should be capable of judging the cost of operating a property under the existing conditions as that he should know how to take mine samples, and mathematically compute his averages and gross values.

THE contents of this journal for the six months ending to-day will be found suitably indexed in this issue for convenient reference. This index shows the varied and valuable character of what appears herein. It is recommended that this index be bound with the volume for ease in referring to any desired topic. This is the 89th index so prepared for our readers and is at least equal in value to any of its 88 predecessors.



## CONCENTRATES.

CYANIDE OF POTASSIUM is employed in some charges in the assay office, particularly in assaying tin ores. It is a powerful reducing and desulphurizing agent.

THE owner of land through which a stream of water flows may appropriate the water and divert it from the stream for use elsewhere, provided he in no way conflicts with the established rights of others in so doing.

THE electric wires should be carried down the manway compartment of the shaft, and placed in a corner away from the compressed air, ventilating and water pipes, to lessen danger of the electric current being communicated to the pipes.

WHERE a flume is built on a curve, the outside of the curve should be raised slightly above the inner edge to prevent the water splashing over the top of the flume and to keep the depth of water in the cross-section of the flume as nearly equal as possible.

THE advantages of heating boiler feed water can scarcely be overstated. By employing the heat from the engine exhaust in a suitable heater the feed water can be brought nearly to boiling point. It will save from 40% to 60% of the fuel bill, whether it be coal, wood, oil or gas.

IT is said that nine out of ten mining claims are defective in the location work, and where valuable mines are discovered the title is often successfully attacked, due to the careless manner of locating claims. Every mine locator should familiarize himself with the law and follow it to the letter.

GRAPHITE can be employed as a lubricator in many places where oil is undesirable for some reason. To make it adhere, a little oil may be mixed with it. Pure graphite only can be safely used as a lubricator, as that containing earthy or gritty impurities is likely to be worse than the oil or grease for which graphite has been substituted.

THE splicing of a running rope, such as is used in rope transmission, should be entrusted to none but those who thoroughly understand the art of splicing. A poor splice is worthless and is not cheap, as it must soon be done over again, with a probability of the necessity of having to cut out the strands previously spliced by an inexperienced hand.

A CAVED SHAFT can best be recovered by throwing heavy stringers across the caved hole and hanging the timber sets from these reachers as the work of excavation proceeds downward. It is well to make the upper sets of liberal dimensions to allow some lee way in making connection with timbers that may be found in place lower down.

IN the event of a contract having been made to sink on a vein and in sinking the vein disappears, the contractor is not obliged to sink in the barren country. (Woodworth vs. McLean 11 S. W. 43.) If the contract makes provision for this contingency then the contractor is required to complete the job in compliance with the terms of the contract.

THE fact that an ex-employee made a location adjoining a working mine, basing his location upon the knowledge that the workings of the mine had extended into adjoining and unclaimed ground, which knowledge was gained while he was in the employ of the owners of the mine, will not void his right and title to the claim taken under such circumstances.

CHAINS, when properly made, have links as short as is consistent with the free working and play of the chain, as long links are more liable to become kinked than short ones. The weight of a chain of close links is usually about three times the weight of the bar iron from which it is made for equal length. A chain has about 25% more strength than the bar from which it is made.

WHEN, owing to the position of the pulleys, it is inconvenient to ascertain the length of belt required by passing a tape line around the pulleys, the information may be gained by adding the diameter of the two pulleys together, dividing by 2, and multiplying this by 3.14, to which add twice the distance between the centers of the shafts. This gives the length of belt required.

DIAMONDS have been reported found in Mexico, in the State of Guerrero, in the district of La Union. Between the Pueblo La Union and the Hacienda Coahuayutla is a conical peak called Cero del Diamantes, "Hill of the Diamonds," where the diamonds are supposed to have originated, but no scientific exploration has been undertaken in the district, as far as known, for many years.

ALL unpatented mining claims upon which the assessment work has not been done within the past year, if the same was located prior to Jan. 1, 1904, are subject to relocation at midnight to-night, Dec. 31, 1904, except in

such instances as where the claim holder is at work on the annual assessment, but has not yet completed the same; but to make this of avail the work must be continued to its completion.

THE topographical situation at a mine is a matter of secondary consideration. The first requisite is to find a promising vein or ore deposit, then if the surface topography is unsuitable it must be made so by such means as seem necessary, such as grading, building concrete or masonry walls, or by cribs of timber filled with waste rock. The prospector who looked for a good place for a dump is still abroad and is heard from occasionally.

THERE are few minerals which have a more uniform distribution than manganese. It occurs in nearly all rocks. Some rocks which in themselves show no trace of manganese are found to have in the planes of fracture and jointing, detritic infiltrations, called "forest rock," picture rock, etc. It is found associated with iron oxides in rocks and in veins, and is a widely distributed mineral, though workable deposits are comparatively scarce.

A PATENT issued for a placer mine will not carry with it known lodes, unless these lodes be specifically mentioned and claimed in the application. The area of mining ground which may be consolidated for the purposes of patent is unlimited. Where placer claims are on surveyed lands and conform to the legal subdivisions of the Government survey, no further survey or plat is required. Where the lands have not been surveyed, a mineral survey must be made.

A FLUX is a substance which if added to another substance, which is itself infusible, or fusible with great difficulty, will cause it to fuse. Quartz is very difficultly fusible, but if sodium carbonate (a basic flux) be added to the quartz, which is acid, it will fuse readily on application of comparatively low heat, and any metallic substance contained in the quartz sinks through the molten mass, which is a silicate of soda, and may be recovered. Briefly, this is the chemistry of the fire assay and of smelting.

EXPERIENCED AMALGAMATORS contend that the best work is done with the battery water at a moderate and even temperature. From 50° to 55° is known to give good satisfaction. If the battery water is pumped back for reuse and it is found to contain oil it would be improved by passing through a filter bed composed of various sizes of screened gravel and sand, or the water could be pumped to a reservoir or tank, which should be kept full. The oil will rise to the top and the water may be drawn from the bottom of the tank free from oil.

WHERE ore must be shot down from a higher to a lower level on the surface by means of a chute, the force of the descending stream of rock may be broken by arranging several heavy poles inside the chute, which will necessitate the ore passing beneath them. This can only be done with comparatively dry rock, and is only required where the slope angle of the chute is equal to or exceeds 35°. If the slope angle is much greater than 35°, the chute must be covered and the chute allowed to fill from top to bottom, when it may be drawn off as required by means of a gate or chute door at the bottom of the chute.

WHEN a tunnel is driven through "rim rock" to tap a gravel channel it is of first importance to know that the tunnel is located low enough to strike as low as the bedrock of the gravel channel, if not below it. A great many tunnels have been run for this purpose whose location was largely a matter of guess work, and, failing to strike bedrock, being started too high, were useless. If the depth from the surface to bedrock in the channel of the stream is unknown, an effort should be made to ascertain what it is by means of drilling a series of holes. A single hole is insufficient, as it is misleading, for this one hole may be on the rim instead of in the channel.

BLASTING CAPS are charged with mercury fulminate, and the caps are marked with the letter X to denote the amount of fulminate used. X caps contain 3 grains of mercury fulminate; XX, 6 grains; XXX, 9 grains; XXXX, 12 grains, etc. This varies somewhat with the different makes of this class of explosives. These caps explode easily and should be handled with care, as a slight blow will cause them to go off, and as low a temperature as 367° F. will also cause an explosion. The mercury fulminate absorbs water readily, and the presence of moisture will prevent or lessen the likelihood of explosion, for which reason caps should be stored in a dry place.

THE costs on application for patent for a placer claim in California are approximately as follows: Payment, twenty acres, \$50; surveyor-general deposit, \$40; publication of notice, \$25; affidavits, etc., \$5; surveyor, deputy, \$40; land office fee, \$10; total, \$170. In addition to which comes the items of attorney's fees and of incidentals. This estimate is based upon the assumption that no adverse claim is filed, but that all things go regularly, without exceptional features. It is impracticable to state with any considerable accuracy what the maximum will be. If the claim is upon land over which the governmental surveys have been extended, the item for surveyors' charges may be unnecessary.

THE method of operating pumps in mines by means of rods actuated by machinery situated on the surface is known as the Cornish system of pumping. In order to overcome the danger of settling of the machinery about the shaft, and also to make room for hoisting and other machinery, the pumping machinery is placed opposite the end of the shaft, instead of directly in front or behind it. Many of the large pumping engines of the Cornish system on the Comstock lode were thus arranged. There are usually three hoisting engines, two to handle cages or skips and a third to lower and raise the pump when it was necessary to place it in a new position.

THE casting of fly wheels "extra heavy" will not have a tendency to reduce the likelihood of "exploding" if run at too high speed. Recent tests have shown that the cast iron fly wheel which will not burst at 400 feet rim speed per second is the rare exception. The safe speed is between 5000 and 6000 per minute. Any balance weight attached to a fly wheel increases its tendency to burst, as at a high velocity the outward pressure of this mass of metal, due to centrifugal force, becomes an important factor. Some fly wheels which are required to be run at dangerously high speed are wound with wire, and otherwise reinforced to render them safe.

A MILL SITE may be taken and held in conjunction with a lode claim whether a mill be built on the site or not. Five acres are allowed for a mill site. It must be non-mineral land—that is, no lode must be known to exist in the site. The site must be occupied or used by the claim owner for mining or milling purposes. If mine timbers and houses for supplies are located on the land it is sufficient use. A mill site may also be taken up which has no connection with any lode claim. In this case a mill or reduction works must be built on the tract. A plant located on the site to furnish power to neighboring mines not owned by the owner of the mill site is not sufficient use in this case. Where \$500 has been expended on a lode claim and it is desired to obtain a patent, this expenditure on the lode claim is sufficient to carry the mill site with it if the latter has been actually and properly occupied.

IF a suitable site for building the headframe is not naturally available at the shaft, the frame may be anchored with timbers or steel cables, heavily weighted, to resist the pull. This arrangement will take the place of the back braces usually built in headframes to take the strain. On level or nearly level ground headframes are sometimes built in sections, lying on the ground or inclined slightly toward the foot on "horses." The members of the frame opposite each other in the same set are joined by the permanent ties and braces, and this is raised into position by means of blocks and tackle and gin pole. If the section is very high it is well to have extra ropes at center and top to sustain the weight and keep the frame from bending too much. When raised to the proper place and secured by guy ropes, the second section may be raised in the same manner, and the two sections then tied to each other permanently. This method is superior to raising each corner separately, though it requires more power to raise the heavier section.

A CLEAN-UP BARREL may be well suited for treating auriferous black iron sands of rivers, but has not been employed for this purpose as far as is known to "Concentrates." There would appear to be no mechanical difficulty in the way of its success, and the gold should be more readily subject to amalgamation by the attrition of the particles in the barrel. It is a question how long each charge would have to be kept in the barrel before amalgamation would be complete. Ordinarily, gold is concentrated on various fabrics, in washing machines of several patterns, including sluices, beach washers, etc., but the separation of gold from the sands is incomplete, owing to the high gravity of the iron sands. The best way to get information as to the adaptability of the barrel to this work is by trying it. The test should be made by one familiar with the clean-up barrel. How quickly and completely amalgamation would take place can only be determined by trial. The recovery of the amalgam should offer no insurmountable difficulty, though not so easily effected as where the sands are of quartz in place of iron.

HANGING BOLTS for shaft timbers must be heavy enough to sustain the weight and strain which they will be called upon to withstand, and the hooks must be so formed that they will not straighten out when the strain comes upon them. Bars of  $\frac{3}{4}$ -inch iron are heavy enough for 8x8-inch timbers;  $\frac{1}{2}$ -inch for 10x12, and 1 inch for most heavier timbers used in this class of work. There should be on hand at least forty hooks, making twenty full sets of two each. Generally the hooks are left in position until four sets of timbers are in place, when the hooks from the upper set of the last four may be removed for use on the next set below. This will require thirty-two hooks, the remaining eight hooks being for immediate substitution for a defective hook, or for one which may be seriously damaged by blasting. If the ground is very heavy it is sometimes an advantage to leave the hanging bolts in position permanently. In this case it is less expensive to employ straight rods of iron, with the usual nuts and large-sized washers. No hanging bolts are required for the end plates if the shaft timbers have been properly framed.



## Notes on Crushing of Metalliferous Ores in the Stamp Battery in Africa.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by  
F. C. ROBERTS.

Masonry is largely employed in Africa and the piles are usually surrounded by walls 2 feet to 2 feet 6 inches in width, leaving a space 6 inches in width between the piles and the masonry, which is subsequently filled and tamped with clean sand. In cases where the piles have been "grouted in," a good deal of trouble has arisen through shrinkage of the cement, and this has resulted in general dissatisfaction. These masonry walls are built up to a level 6 feet below the bottom of the mudsills as a vertical wall. From this point they are extended 5 feet 6 inches toward the front of the mill and 8 feet toward the back of the mill, in order to give support to the central mudsills.

The arrangement is shown in the accompanying sketch.

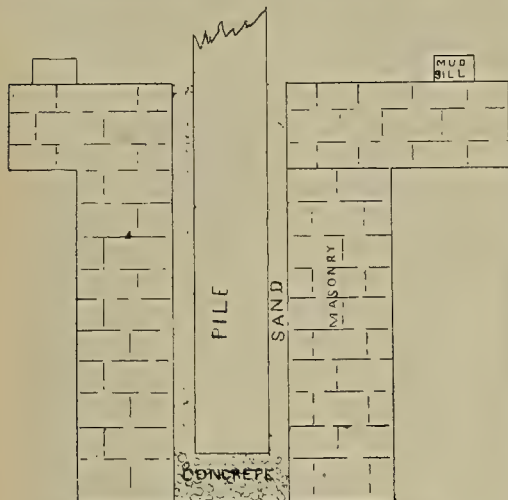


Fig. 1.—Mortar Block in Masonry Foundation.

Beyond this the only heavy masonry used is that below the back bin posts. The mudsills are usually anchored to masonry with 12x4-inch round iron bolts. The masonry walls carrying the mill building are usually 18 inches wide, of any desired depth, and pointed on the weather side with cement mortar.

The amount of masonry used in Africa (this class of work costs from \$10 to \$12 per cubic yard) is largely in excess of that employed in America, and it is a question open to discussion whether it is necessary to build up an artificial foundation on ordinarily good ground, particularly where such an extensive base is offered, as that given in a mill of more than ten stamps.

In one or more instances on the Rand fields masonry pillars have been substituted for "pitch pine" mortar blocks, but this practice has not been looked upon with favor, and it is thought to give less satisfaction than timber. Probably in a climate where "dry rot" was prevalent, or from other causes the life of timber was very limited, the masonry pillar would prove the more economical method of support; but, speaking generally, the idea has not appealed to mining men out here, and, theoretically, the practice does not appear to be a good one.

It appears to the writer that if the cubical contents of the pitch pine blocks, used as a support for the mortar boxes, be increased to such an extent (the superficial area always remaining the same, i. e., 7.5 square feet) that the force of the blow produced by the falling stamp and the resulting vibration be compensated for in the inherent properties of the timber, not only is effective work to be expected, but the wear and tear generally should be largely decreased.

In one instance the writer has had an opportunity of putting this theory into practical use, in which case each battery of five stamps was supported by ten pieces of 12x15-inch pine 26 feet in length, bolted together in the usual manner. The resulting vibration, not only to the mortar boxes, but to the whole of the driving arrangements, was observed to be very slight, and the experiment has resulted in general satisfaction.

Between the top of the piles and the bottom of the bed plate of mortar box a rubber slab of  $\frac{1}{4}$  inch in thickness is inserted. The common support for each battery of five stamps is ten 12x15-inch pitch pine timbers 13 feet in length. These are bolted together and tarred before being placed in the pit.

The ideas embodied in mill construction in Johannesburg show a wide range of variety, while in Rhodesia so much cannot be said.

The dimensions of the heavier timbers and the distances between centers may also be said to be "constants;" indeed, so similar are these factors in Rhodesian practice that the manufacturers carry "standard drawings," which are furnished with a mill

order. This method of operation no doubt saves a large amount of time to the engineer which otherwise would be taken up in calculations of breaking and crushing strains, estimation of quantities, etc., but it is doubtful if the best results accrue when the variety of local conditions met with are made to fit the one design.

The mudsills used are of 14x14-inch pitch pine, and the streak sills, which directly support the battery and bin posts, line shafting etc., are of 12x18-inch, usually 32 feet in length, in one piece. The battery posts are framed of 12x24-inch timbers, 22 feet in length; but where three posts are used for every two batteries of five stamps, the dimensions of the central post are extended to 20 inches by 24 inches by 22 feet in length. Where four battery posts can be economically employed for every two batteries of five stamps, this arrangement is preferable, as greater rigidity is obtained, the interior of the mill is made more roomy and convenient and the ore bins are largely increased in capacity without adding height to the structure. The battery posts are tied together with 6x8-inch binders, or "tie pieces," one across the full length of the span at the top, and just above the streak-sill level individual binders for each ten stamps are used, both back and front.

This whole framework is then securely tied to the mill bins, 7 feet above the cam floor level and immediately below the same, with 8x8-inch timbers.

The bin posts and cap pieces are of 12x12-inch timbers, while the bracing and top cap pieces are framed of 10x12-inch timber. The only variation shown in bin construction is in the method of bracing. Probably the most satisfactory and certainly the most economical method of bracing the lower bents is in employing single braces, which are cut short of the span, and the remaining space taken up with wedges, which can easily be made to compensate for any shrinkage in the timbers.

The bins are lined with 3x9-inch deals, and the interior areas which are subjected to violent contact with the moving rock, are protected with  $\frac{1}{4}$ -inch steel plates. The bin capacity usually arranged for is at the rate of ten tons per stamp.

There are two classes of ore bins used, as shown in the accompanying sketches.

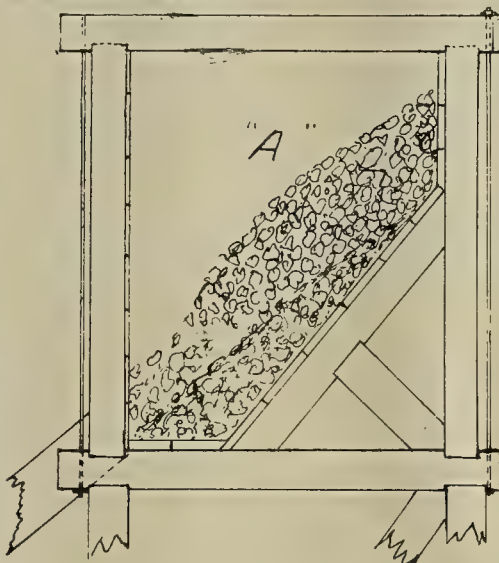


Fig. 2.—Ore Bin.

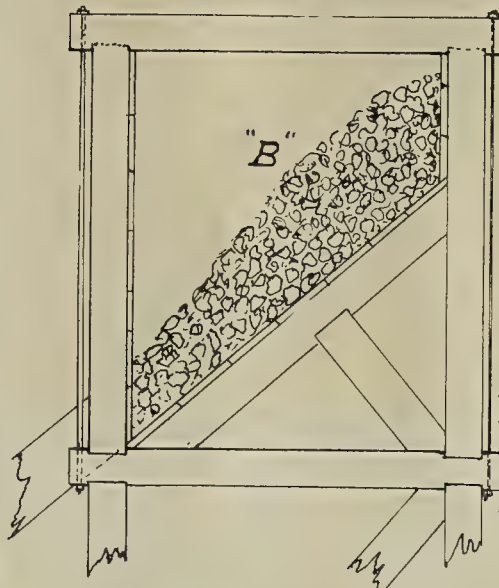


Fig. 3.—Ore Bin.

The advantage claimed for (a) bin, which contains an offset at the bottom, is that larger capacity is

gained without making any sacrifice in the height or width, but the free delivery of the ore is greatly impeded, by reason of its movement being on ore, and the constant bridging of the rock, especially when moisture is present, makes this arrangement less satisfactory than the older type (b), in which interior work is entirely avoided.

On small properties it is not uncommon to find the grizzlies, sorting arrangements and rock breakers erected immediately above the mill ore bins. This results in a good concentration of plant and the gravitation of the rock minimizes handling, but the extreme height required necessitates a proportional increase not only in the timbers directly affected, but in the whole of the superstructure, as well as the building. In the larger plants arrangements are made for sizing, sorting and crushing, either at the head gears or in independent stations, where automatism is practiced to such an extent as to almost entirely avoid handling.

In all of the more recent larger mills the batteries are being placed back to back, in which case the bins resemble an inverted V, the dumping arrangements being such as to provide for an equal distribution of the ore to either bin. The mortar boxes, however, retain the same relative position to the bins as in case of the single row of batteries.

The power is transmitted either direct to the line shaft, in which case the shaft is coupled to the crank shaft of the engine, or transmission is made either by rope or belt drive. Of the latter, the rope drive no doubt gives the most economical and more satisfactory results. In direct coupling a distinct advantage is gained in the decrease in floor space required. In the smaller plants erected by the writer direct transmission has been employed. The more common type of mill engine used is the horizontal tandem, compound, Corliss, while in many instances the twin-compound engine is used. The vertical type engine is rarely met with. The horizontal tandem engine offers a very economical means of dealing with an increase in power, in case it were found possible at any time to increase the capacity of the plant originally erected. If the engine in the first instance is so designed that the high pressure cylinder may be erected alone, it is possible at any time to couple the low pressure cylinder and thus double the capacity of the engine with practically no loss of time.

In the single mill all power is transmitted from the line shaft, which is extended through the entire length of the mill, the bearings resting on the streak sills at a point 4 feet 3 inches back from the center line of piles. The length of drive and the relative position of the line shaft to the cam shafts is such as to require the use of belt tighteners. The position of the line shaft might be largely improved, if not to such an extent as to avoid the use of belt tighteners, certainly so that the dust and fine rock would not come in contact with and have such an injurious effect upon the belts. The arrangement—sometimes practiced in America—of carrying the line shaft through at the back of the bins and at the cam floor level is a more economical method, in so far as the cost of belting is concerned. The difficulty of obtaining a friction clutch suitable for this purpose has deterred many from using this arrangement.

**CORRECTION.**—In the issue of Dec. 24, in the fifth line from the bottom of the third column, page 425, in reference to mortar block foundations, it should have read "a foundation of uniform hardness," not "unusual" hardness.

(TO BE CONTINUED.)

## An Alaska Dam and Flume.\*

Written for the MINING AND SCIENTIFIC PRESS.

The dam and flume of the Jualpa Co., in Last Chance basin, within 1 mile of Juneau, Alaska, has been designed and built to intercept and divert the water, at all stages of Gold creek, for the purpose of draining the basin, and controlling the water so that hydraulic operations can be started and carried on with safety. The dam is built at the upper end of the basin diverting the water into the flume which is constructed along the south side of the basin and returns the water to the creek channel at the lower end of the basin. All the drainage water on the south side is picked up in small side flumes and dumped into the large flume. The drainage from the north side is handled in another way. The dam and flume were put into successful operation on November 27, 1904, in the presence of 300 residents of Juneau with appropriate ceremonies. The dam is a solid, rock-filled crib resting on bedrock and gravel, 24 feet wide and 12 feet deep, with piers and abutments rising 13 feet higher and also rock filled. Upon this foundation, between the piers and abutments, are placed the intake of the flume, 42 feet wide, and the superstructure 12 feet high, in twenty sections of 6 feet each, any one of which can be removed and accumulations of gravel and debris sluiced out over the dam. The dam is not intended to have water overflow its crest. The entrance to the flume is 42 feet wide and 12 feet deep and reduces by curves in the distance of 76 feet to the headgates in the flume 10 feet in the clear. The

\*See illustrations on front page.



water is controlled by two gates 10 feet 6 inches by 12 feet 8 inches, weighing over 2000 pounds each and moved by a train of gears by which two men can operate the gates at any stage of the water. There are also twelve gates in the side of the headpiece 4x4 feet operated by special gearing, which have a greater combined discharge than the carrying capacity of the flume, in case such an emergency is required. Out of these gates such water will be discharged as will be required for bywash in the operation of the mine, the water for piping being obtained from a high line flume on the north side of the basin. (See engraving first page and accompanying illustrations.) The face of the dam is two thicknesses of 2-inch plank, laid to break joints, and is carried down below the foundation crib as much as 8 feet to tight gravel, and puddled with clay. A hydraulic jet pump was used in sinking the facing. The structure is 196 feet over all.

The flume is 4250 feet in length and 20x9 feet in cross-section on a grade of 1.66 feet per 100 feet, except at the head where there is an increased grade for the first 400 feet to rapidly bring the water up to its velocity. The sills are 6x8 inches and the posts and caps are 6x6 inches; the sides and bottom are of 2-inch plank battened and the bottom has a false bottom of 1 inch, making a total thickness of 3 inches. The projecting ends of the caps and sills are swayed to the posts top and bottom to overcome the wind strains. The trestle work is 24 feet wide with bents 12 feet, centers of hewed mud sills, 8x8-inch posts and caps carrying six stringers of 6x12-inch timbers. There is about 2250 feet of trestle, the highest of which is 14 feet. There is about 2000 feet of grading through earth and rock 26 feet wide. The flume has a capacity of about 240,000 cubic feet of water per minute, and is designed to carry all the flood waters of Gold creek. In the construction of the flume and dam 1,200,000 feet of lumber has been used, over 6000 linear feet of hewed timber, and about twenty tons of nails and drift bolts. Work was commenced June 15 and the structure completed November 20, 1904, after being subjected to numerous delays through shortage of material.

A tunnel 2000 feet long taps the gravel in the basin 90 feet below the surface and is being extended 400 feet farther, 8x8 feet in the clear, when an upraise will be made to the surface and hydraulicking commenced next season.

This operation was commenced after a favorable report and careful examination by W. H. Hile of Philadelphia, with Eastern capital. The work of constructing the large flume was successfully completed by William H. Hampton, manager.

### Air Compressor Plant Homestake M. Co.

Herewith is illustrated what its makers say is the largest air compressor in the world. It is located at

drills. The steam pressure is about 130 pounds. The exhaust steam is received by a Wheeler surface condenser in connection with a cooling tower. The total weight is about 300 tons.

This machine is used exclusively for operating machine drills in the underground workings, assisted by two smaller machines built by the same maker and both of Corliss type, with piston inlet valve. One of these machines, at the Old Abe shaft, is a duplex machine, steam cylinders 24 inches diameter, air cylinders 26½ inches, stroke 60 inches. Its capacity in free air is about 4400 cubic feet per minute. The other compressor is at the Highland shaft and is of the same type—stroke, 42 inches; air cylinders, 22½ inches; steam cylinders, 20 inches diameter. At rated speed its free air capacity is about 2600 cubic feet per minute. These two compressors, together with the one at the Ellison shaft, are operating over 200 Ingersoll-Sergeant rock drills in the mine workings.

### The Extralateral Right Law.

The law of the extralateral right is always one of interest. It has been the law of the West ever since mines were first discovered there, and even if a new law be passed by Congress by which the existing law is replaced by one providing for vertical side lines, the law of the extralateral right will still be with us, for a new law cannot be made to apply to claims located prior to the passage of the law. There still exists a divergence of opinion on this matter, and following are the views of two mining men, each of whom offers substantial reasons in support of his contention:

TO THE EDITOR:—In the course of every few years it has become fashionable for some ambitious mining lawyer or engineer to make the grand discovery, as did E. A. Belcher recently, that "the extralateral right should be utterly abolished. It is a thing of evil. Within my reading no one statutory provision has been so productive of endless and costly litigation as this," etc., as reported in your issue of the 10th inst. Has Mr. Belcher never heard of the statute of old institution and use, which is short and to the point, "Thou shalt not steal?" For under it there have been endless litigation and lawsuits, and prosecution—far more than under all other laws combined. It is the breaking of this law, "thou shalt not steal" ore from your neighbor's claim, and not the just provision of the extralateral right, that is at fault, as we find that when the mining property or claim boundary is a vertical side line, as it is the case under the square location, the unlawful act of stealing ore goes on just as easily and often as under the law of the apex or extralateral right, when miners desire to be dishonest. The proof of that is in the fact that the theft of ore, under the laws where vertical side

is prevented or good mining ground is tied up or reserved from operation. Hence it is that where the square location exists little prospecting and mining are done. It, therefore, stops industry in mining, and as industry is the secret of happiness among civilized people, it is not a law or condition which is in the best interest of the miners of the State. The first provision of the United States mining law is discovery and full freedom to prospect or explore. After discovery work is required to retain title, hence industry is encouraged and made compulsory, which after a time develops economic value. The pursuit of obtaining values in depth underground is the business of mining, but as almost all mineral deposits depart from the vertical line in taking depth, the miner is forced by the peculiar geological conditions under which his vein or deposit dips from the vertical to follow it. Consequently the most just miner's boundary is that which is parallel to the apex or dip and strike of his vein or deposit as developed by actual mining work underground, as is the case in the Western United States.

The square location or vertical side line is a good surface condition or a good farmer's boundary, and says, "This far and no farther." Hence it is not a law or condition in the favor or benefit of both labor and capital invested in work underground, except in coal mining or flat deposits.

In countries where it is in force great injustice and legalized fraud has been done to capital that has been invested in deep metallic mining, and through its operation the mineral wealth of the country has been given to others who chanced to own the adjoining land, or the minerals have been locked up, and the mining industry retarded by it. If proof is demanded, that can be given. Under the extralateral rights industry and deep mining are made possible and labor and capital get their just reward. Mining disputes are carried into courts of law, where the fight is often continued for years, whereas it would be different if all mining disputes regarding the boundary lines of a claim, or trespass on a neighbor, were settled "on the ground at the mine" by arbitration of mining men who have examined and understand the local conditions at the mine. Those who desire a change in the law, as at present, have good intentions, but they base their argument on wrong premises, and have not had experience under the same conditions that they seek to impose on the Western United States, and to go from the present condition to a worse state of affairs. An experience of about forty years in mining in Europe, Canada and the Eastern and Western United States enables me to give facts on this important question for protecting the best interests of capital and labor invested in mining.

JOHN STEUART.

Los Angeles, Dec. 15.

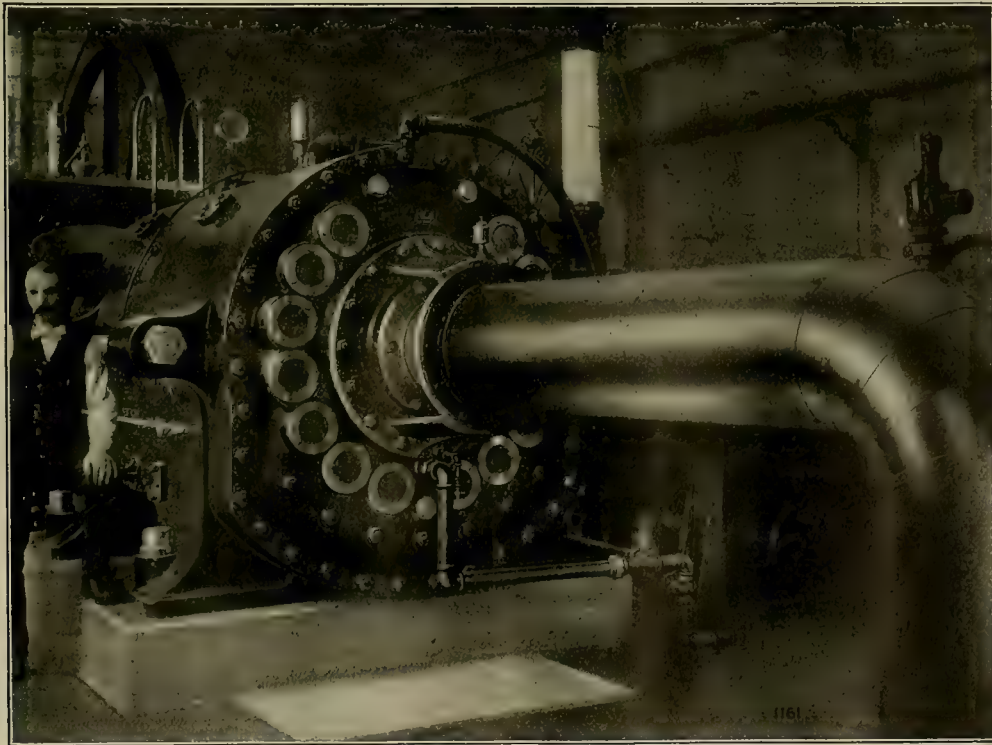
TO THE EDITOR:—The defenders of the extralateral law claim that it benefits the prospector most of all, and that it encourages and protects him.

Any one who gives the question a little thought and studies the records of the past, will, I am sure, be convinced of the doubtful benefits derived by the prospector from this law. Long before the shadow of extralateral complications dims the horizon, the original locator has "folded his tent" and hies himself to new prospecting fields; for we all know that the prospector rarely, if ever, goes so deep that he can not hop out of the hole-in-the-ground when he so desires. If by chance he should retain possession of his property and he appeals to the law for protection, what is the usual result? He may be arrayed against a wealthy corporation and he has not the means to fight it. The services of mining lawyers and geological engineers come high, and by the time he secures final judgment, if he does not find himself in debt he is fortunate, indeed.

If final judgment would be rendered within a reasonable time, it would not be so discouraging, but in the United States, where the history of such cases is one of continuous appeals and vexatious delays, the outlook for the prospector of small means is gloomy, in the extreme. To support this fact, the writer will cite one instance, of many that have come under my observation. In this case the original locator is now surrounded by powerful mining corporations. When he found he was being robbed he appealed to the courts. This was six years ago, and during that time he has secured judgments in four different courts for a sum well up in six figures, and the end is not yet. In fact, the president of the opposing corporation on being approached by a reporter when the case was last decided against him, said: "Why we have just begun to fight this case; Mr. — can leave it as a legacy for his children and grandchildren."

There is no doubt in my mind but that it will be so.

This law, no doubt, was intended to benefit the prospector at its inception, but that was at a time when lode mining in the United States was in its infancy and the apex was supposed to be an ideal condition. That these ideal conditions rarely exist is now conceded by all, and this law, which was intended to benefit, is now an obstacle to legitimate mining. It has been proven in countries where the change was made that no serious hardship was imposed either on the prospector or investor. It seems to me that where claims are 1500 feet wide and the vertical plane extension a law, that a



Air Compressor Homestake Mining Co., Lead, S. D.

the Ellison shaft of the Homestake Mining Co., Lead, S. D., and is a cross compound condensing two-stage Corliss machine, built by the Ingersoll-Sergeant Drill Co. of New York. The high and low-pressure steam cylinders have a diameter of 32 and 60 inches, respectively, the air cylinders are 52½ by 32½ inches in diameter, the stroke is 72 inches. At rated speed of 50 R. P. M. the free-air capacity is 9000 cubic feet per minute, this volume being sufficient, under average conditions of mine work, to operate 125 rock

lines are the boundaries of mining claims, is as common as where the extralateral right prevails, and there is as much litigation and stealing of ore as there is in the Western United States. If proof is demanded, that can be given. The square location is also undesirable on account of its covering more leads or deposits than the vein or deposit which is the subject of location. The parallel vein may or may not be the same class of mineral as the vein or deposit which is operated, and as a consequence prospecting



prospector has all the ground he needs. If there were any obstacles to prevent him from locating a side claim, there might be some cause for complaint.

The laws of location should be so simple that any locator, no matter how ignorant he may be regarding the location laws, may reasonably expect to hold his discovery. The ordinary prospector is, as a rule, ignorant of the extralateral law. He may have a vague idea that such a thing exists, but if the subject is broached to him he is very liable to regard you with open-mouthed astonishment. What he sees on the surface, or near it, he is very liable to locate properly; but when he has to locate with regard to the probable distribution of ore under ground, his task becomes a most hopeless enigma. Here is where the simplicity of the vertical side lines appeals to the ordinary prospector. One of the most prominent mining lawyers in the United States, whom I approached on this subject, said that nine out of ten mining locations could be successfully contested before patent was issued, for not complying with some legal condition imposed. And these are the laws for which the American mining fraternity should be grateful.

What prospector considers the existence of this law, as with feverish haste he hoists his outfit on the hurricane deck of a cayuse and wanders forth on mountain steep, or desert waste, to delve in the bosom of Mother Earth for the treasure that may lie there concealed? A. R. MACDONALD.

Rosslund, B. C., Dec. 24.

## The Genesis of the Copper Deposits of Clifton-Morenci, Arizona.\*

Written by WALDEMAR LINDGREN.

The Clifton mines, always important, are at present the largest in the Territory, the output in 1902 having reached 50,000,000 pounds of copper, chiefly divided between the two principal producers, the Arizona and the Detroit Copper Cos. The Shannon Copper Co. also contributed to this figure, and its output has greatly increased since then. The total output of the district to the end of the year 1903 is estimated at a value of about \$49,000,000.

**TOPOGRAPHY AND GEOLOGY.**—Clifton is situated on the San Francisco river, a few miles above its confluence with the Gila river, in the southeastern part of the Territory, and not many miles from the New Mexican boundary. An irregular mountain region, without well-defined ranges, lies here north of the broad, detritus-filled valley of the Gila river, which has an elevation of about 3000 feet. The highest elevations in the mountains scarcely attain 8000 feet.

Between the San Francisco river and Eagle creek, both tributaries to the Gila river from the north, a

porphyry, which extends in a northeasterly direction between the foothills near Eagle creek across to the Copper King granite ridge overlooking San Francisco river. The main stock, which is about 8 miles long and up to 1½ mile wide, breaks up, at the southwest end, into a network of irregular dikes and sheets, and at the northeast into a system of northeasterly trending dikes cutting through the granite. Laccolithic masses of porphyry occur in the Cretaceous shales and sandstones. The rock of the main stock ranges from a granite-porphry to a quartz-monozonite porphyry. The sills and laccoliths are usually composed of diorite-porphry, but the different types of rock are clearly facies of the same magma, connected by transitions and forming a single geological unit. Dikes of diabase occur in a few places.

The intrusion of porphyry took place during the latest Cretaceous or the earlier Tertiary, and was accompanied by great disturbances in the immediately adjoining rocks, particularly well noticeable in the Paleozoic sediments; but these disturbances of the strata did not extend far from the contacts.

The intrusion of the porphyry was followed by important structural movements. The surface of the granite, together with the whole covering sedimentary series, was buckled into dome-shaped folds and then extensively fractured, the blocks sinking successively deeper towards the valley and settling unequally around the two great buttresses, or "horsts"—the Coronado and Copper King mountains—the maximum throw of the normal faults being 3000 feet.

An epoch of erosion followed, but floods of Tertiary lavas soon surrounded and largely covered the old rocks, which have only lately emerged by the energetic action of a second epoch of erosion. The effects of the large faulting movements, which preceded the lavas, are still visible in the greater topographic features of the region, especially in the bold escarpment of the Copper King ridge.

**OCCURRENCE AND GENERAL FEATURES OF THE ORE DEPOSITS.**—The geographical distribution of the copper deposits is practically coextensive with the great porphyry stock and its dike systems. The deposits occur either in the porphyry or close to its contacts, or along dikes of porphyry in some other rock. Areas in which no intrusions have taken place are practically barren. This intimate connection with the porphyry is certainly a most important fact. There is only one small division of deposits, namely, that connected with the diabase dikes, which deviates from this rule.

Practically all types of deposits contain copper as the most valuable metal. Gold and silver occur, as a rule, only in minute quantities, except in some of the outlying districts, where they become of more importance. The two most important mining centers, Morenci and Metcalf, which are 3 miles apart,

kaolin, willemite, calamine, diopside, chrysocolla, copper pitch ore, morencite (a new mineral, chiefly ferric silicate), calcite, dolomite, zinc carbonate, malachite, azurite, libethenite (copper phosphate, not previously found in the United States), brochantite, alunite, gypsum, spangolite (basic chloro-sulphate of copper and aluminum), chalcantinite, goslarite, epsomite and gerhardtite (basic copper nitrate forms green crusts on weathered surfaces of porphyry and is, in these, associated with a copper chloride, possibly atacamite).

The deposits with payable copper ore take many widely differing forms, as follows:

**Deposits in limestone and shale, not connected with fissure vein—**

Irregular bodies near contacts of main stock or dikes. Tabular bodies near contacts of main stock or dikes following stratification.

Tabular bodies, following contacts of porphyry dike (all of these carrying oxidized ores, almost exclusively; rarely chalcocite).

**Fissure veins—**

Normal veins in porphyry or in any of the other rocks near porphyry contacts. Include central veins and surrounding partly replaced porphyry forming together a lode. Carry chalcocite as the important ore; in upper levels also sometimes oxidized ores.

Normal veins, following porphyry dikes in granite. Chalcocite and oxidized copper ores.

Normal veins following diabase dikes. Chalcocite and oxidized copper ores.

**Stock-works—**

Irregular disseminations in porphyry, quartzite and other rocks. Contain chalcocite and oxidized copper ores.

The above classification is based on the occurrence and form.

Native copper, all of the oxy-salts of copper, and chalcocite are wholly secondary minerals produced by direct or indirect oxidation from primary pyritic ores. In all of the divisions given above, this primary ore consists of pyrite and chalcopyrite, with some zinc blende and molybdenite. The scant gangue of veins consists of quartz, while the deposits in the first division are usually accompanied by garnet, epidote, magnetite, diopside, tremolite, or their products of oxidation.

**METAMORPHIC PROCESSES.**—The region is practically unaffected by regional or dynamic metamorphism, and even the ordinary hydro-metamorphism has affected the rocks but little, producing some slight changes in granite and porphyry and introducing cherts into the limestones. Epidote, chlorite, and a little pyrite are apt to develop in the hornblende phases of the porphyry.

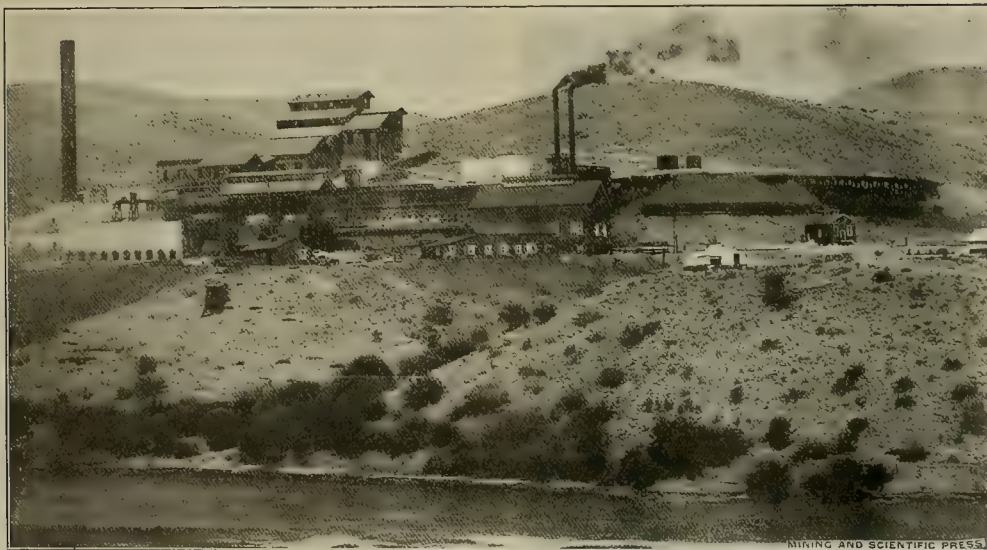
**CONTACT METAMORPHISM.**—The contacts of the porphyry with sedimentary rocks often show typical instances of this class. The granite porphyry and the quartz-monzonite porphyry show themselves most effective in this direction, while there is usually but little metamorphic action at the contacts of the diorite-porphry. The effect seems in direct proportion to the amount of quartz contained in the porphyry. Granite and quartzite are unaltered; the shales and sandstones of the Cretaceous series are hardened and baked.

The Paleozoic limestone series comes in contact with the main stock in two places—at Morenci and at Metcalf. In both places extensive copper deposits are encountered. Dikes also occur at both places and along some of these radiating out into the unaltered areas the metamorphic process may be studied to best advantage.

Along dikes it is found that the metamorphism varies greatly in the different strata and even in apparently similar limestone layers there may be great difference in the degree of alteration. A well-defined dike, 50 feet wide, on Modoc mountain was studied with special care, as it cut through all the formations present. Where contained in the Longfellow limestone the metamorphism extends at most 20 feet outward into the limestone and generally only a few feet. Garnet, epidote, diopside, specularite and magnetite are the minerals which form abundantly by metasomatic replacement along the contacts, and intergrown with them are chalcopyrite, pyrite, and zinc blende, unquestionably of contemporaneous formation. The contact metamorphic limestone has certainly a very different composition from the unaltered rock, and it is apparent that much silica, iron, copper and zinc at least have been added. Epidote often forms in considerable quantities close to the contacts, while a little farther away garnet prevails. The Morenci shales overlying the Longfellow limestone are hardened and baked, but not materially altered in composition. Finally, when the dike enters the pure limestone of the Modoc formation, garnet forms in enormous quantities from the latter; the metamorphism exerted by the dike here merges in that affecting the whole block of limestone, due to the contact of the main stock of porphyry.

The principal metamorphic area at Morenci is about 2 miles long; its width is from 1000 to 1500 feet. The Modoc formation, however, has been affected to an extraordinary degree and extends as a stratum of garnet and magnetite 2000 feet away from the contact between almost unaltered Devonian and Cretaceous sediments.

(TO BE CONTINUED.)



The Shannon Copper Co.'s Concentrator and Shops, Near Clifton, Arizona.

core of older rocks of about 70 square miles is exposed, consisting of pre-Cambrian granites, Cambrian quartzites, Paleozoic limestones and a capping formation of Cretaceous beds—all intruded by post-Cretaceous granitic porphyries. This older core, which seems to represent the broken-down edge of the great plateau province, is completely surrounded and largely covered by volcanic flows of Tertiary age, including basalts, andesites and rhyolites, which have been extensively eroded; hence the lack of regularity so plainly apparent in the mountain complex.

The copper deposits are all contained in the older rocks and distinctly antedate the Tertiary lavas.

The sedimentary rocks rest on a basement of red, coarse granite, forming two great buttresses, the Coronado and the Copper King mountains, both rising over 3000 feet above the San Francisco river.

All of the rocks are intruded by a great stock of

are both situated at the main contact of the porphyry stock and the series of Paleozoic limestones. Elsewhere the intrusive rock generally adjoins granite or Cretaceous sediments.

The ores consist of chalcocite, chalcopyrite, malachite, azurite, chrysocolla, brochantite, cuprite, and native copper. Covellite and bornite are practically absent. Brochantite, the basic copper sulphate, is very commonly present, especially in the oxidized veins in porphyry, and, in fact, constitutes in places an important ore. On account of its similarity to, and intimate intergrowth with, malachite it has usually been overlooked.

The following named minerals have been found: Native copper, native gold, quartz, chalcedony, rutile, magnetite, hematite, limonite, pyrolusite, coronadite (a new mineral, chiefly PbO and MnO<sub>2</sub>), cuprite, pyrite, chalcopyrite, zinc blende, galena, molybdenite, chalcocite, diopside, tremolite, garnet, epidote, muscovite, chlorite, serpentine, asbestos,

\* Abstract Trans. Am. Inst. Min. Engs



## Water Rights in California.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by  
SAMUEL C. WIEL.

In the preceding number it was said that no appropriation can be made on or interfering with private or occupied lands because an appropriation cannot be initiated by a trespass and cannot interfere with established riparian rights. It must be understood by this that adverse occupancy is meant. The rights of one claiming solely as an appropriator were under discussion. If one claims also under the consent of an occupant, the occupancy to that extent ceases to be an objection. Likewise if the occupant himself seeks to make an appropriation on his own land his occupancy ceases to be a factor. An occupant may make an appropriation on his own land so long as the rights of other occupants or appropriators are not interfered with, as in the case of any appropriation.

"The fact that plaintiff or his grantor was a riparian owner does not warrant the conclusion that he could not be an appropriator—there is, as is said in a play, 'no consonancy in the sequel.' The notion seems to be that becoming a riparian owner estops one, in some sort of way, from being an appropriator of water, although there be no one in existence in whose favor the estoppel can be evoked. \*\*\*\*\* Counsel for respondents seems to think that because plaintiff's grantor, as a riparian owner, could have prevented subsequent appropriators from diverting the water above his land and away from it, therefore he could not divert the water himself; but that is a confusion of the distinction between meum and tuum. Counsel complain that this view gives great advantage to the first possessor and appropriator of the water of a stream. This is no doubt true, but it is the advantage which the law gives, and which necessarily follows prior occupancy and appropriation." 97 Cal. 464.

**HOW AN APPROPRIATION IS MADE.**—Having found that water can be appropriated and a proper place to appropriate it, the right to the water is not complete until the water is actually taken into one's possession, or, rather, until all construction work preparatory to the actual use of the water is completed, since that is the equivalent of taking possession (6 Cal. 548). As between the Government and the appropriator there are only two requisites for this—the preparatory work must be actually completed and there must be an intention to apply the water to a beneficial use. If there are no rival claimants of any kind, up to such actual completion, that is enough to satisfy the Government, who is then alone concerned, and the right is complete against later attack on this ground. (Wells vs. Mantes, 99 Cal. 583.) The head note to that case sums up the decision as follows: "The scope and purpose of the provisions of the Civil Code upon water rights was merely to establish a procedure for the claimants of the right to the use of the water whereby a certain definite time might be established as the date at which their title should accrue by relation; and a failure to comply with the rules there laid down does not deprive an appropriator by actual diversion, of the right to the use of the water, as against a subsequent claimant who complies therewith."

But as against rival claimants who appear before completion, to guard himself against them, four requisites in all must be complied with: First, a notice must be posted at the start; second, there must be an intention to apply the water to a useful purpose; third, the work must be prosecuted with diligence; fourth, it must be actually completed.

1. Notice must be posted. In the Civil Code, Sec. 1415, 1421, it is provided that a notice must be posted at the point of intended diversion, stating the amount and purpose and place and means of use, and be recorded within ten days.\*

This serves to warn others. It does not actually withdraw the water then and there from use by others entirely, as a notice of discovery withdraws mining ground, but it warns others that later on, when you have completed your works, you will have the right to so much water. It has been held that in the meantime anyone can come in temporarily and

\*—1415. NOTICE OF APPROPRIATION.—A person desiring to appropriate water must post a notice, in writing, in a conspicuous place at the point of intended diversion, stating therein:

1. That he claims the water there flowing to the extent of (giving the number) inches measured under a 4-inch pressure.

2. The purposes for which he claims it and the place of intended use.

3. The means by which he intends to divert it, and the size of the flume, ditch, pipe or aqueduct in which he intends to divert it. A copy of this notice must, within ten days after it is posted, be recorded in the office of the recorder of the county in which it is posted.

After filing such copy for record, the place of intended diversion or the place of intended use or the means by which it is intended to divert the water, may be changed by the person posting said notice or his assigns if others are not injured by such change. This provision applies to notices already filed as well as to notices hereafter filed.

En. March 21, 1872. Am'd. 1903., 361.

use the water, and you will have no action against him unless he interferes with your construction work or continues to use the water after you have actually completed your works. Until that time you will have no action for his diverting the water. In Nevada Water Co. vs. Kidd, 37 Cal. 282, the Court says:

"In view of this principle, suppose by way of illustration that the plaintiff has located its site for a dam and canal and claimed the waters of the South Yuba river, and commenced the construction of the dam and canal, but in consequence of the magnitude of the work, was unable for several years to divert or use the water, and in the meantime the defendants, being men of greater pecuniary ability, should subsequently locate another claim above or near the plaintiff's, and a canal running parallel with the plaintiff's, and be in a condition to divert and use the water in half the time; their acts, provided there was no interference with plaintiff's site and location, or obstruction to the prosecution of its work, would be no injury to plaintiff or cause of action in its favor. The plaintiff in such case has, as yet, no right to the water so far perfected that a diversion or use by other parties is any interference or injury. But if the plaintiff's work should be prosecuted with diligence and completed, so as to entitle it to divert and use the waters, its right to the waters thenceforth would date by relation from the commencement of the work, and, should defendants thereafter continue to divert the waters and deprive the plaintiffs of their use, an injury to their water rights then vested and perfected would result, and a right of action for the injury to such a right accrue." The case so held.

For all purposes except to make such temporary use of the water actionable, however, the right to the water on completion relates back to the time of posting notice if the work has been prosecuted diligently, and dates from the posting of the notice as against those who come later (C.C. 1418; 99 Cal. 583).

Failure to post a notice constitutes a waiver of all advantages that such a warning gives. As seen above, it is not fatal if the work is nevertheless completed before others intervene. But it is fatal as against intervenors who comply with the code (C.C. 1419). As between rival claimants neither of whom has posted a notice, they are on the same footing as though the code were never enacted, since those provisions were enacted for their own benefit and they refused to take advantage of them (117 Cal. 106). Their rights are the same as before the code (when no notice was needed, 80 Cal. 397-406) giving the better right to the man who began work first, or if he fails in diligence, to the one who first prosecuted it to completion with diligence (7 Cal. 261).

As to underground water, it seems that the code provisions, and the rules just stated, apply, if it is in a definite stream, or subflow of a definite surface stream; the code governs all cases of definite streams, and a notice must, it seems, be posted on the surface (126 Cal. 486). But it is said, in Katz vs. Walkinshaw, 141 Cal. 116, that the code does not apply to mere diffused percolating water; and that the appropriation of this must be governed by the same principles as those which established the law of appropriation in the early days, before the code was enacted. It will probably be found that the code, however, merely enacted the law as it existed before, without materially changing it, except to require posting of notice, and that the requisites for the appropriation of percolating water will be otherwise substantially the same as those for water in streams; viz., intention to apply it to a beneficial purpose, diligence, and actual completion, leaving out only the details as to notice, length of time, etc., fixed by the code. In Katz vs. Walkinshaw, 141 Cal. 116, the Court says:

"The principles which, before the adoption of the civil code, were applied to protect appropriators and possessory rights in visible streams will, in general, be found applicable to such appropriators of percolating waters, either for public or private use, on distant lands, and will suffice for their protection as against other appropriators. Such rights are usufructuary only, and the first taker who, with diligence, puts the water in use, will have the better right."

How far an appropriator is bound by the declaration in his notice as to amount, purpose, means or place of use will be a matter for consideration later. It may be said here that the appropriator is not bound by his notice to a preliminary base line for ditches or flumes, but may later, in the course of construction, within a reasonable time, change his surveyed line, as necessity points out, without having to start and post a notice all over again (C.C. 1415, 6 Cal. 548).

2. There must be an intention to use the water for a beneficial purpose (C.C. 1411). What constitutes a beneficial purpose will best be seen from examples. A ditch for mere drainage does not fulfill this requirement; another may hence go up stream and cut off the water (7 Cal. 261). Irrigation is a useful purpose, and water may hence be appropriated for irrigation (23 Cal. 453). An appropriation for sale of the water is good (60 Am. St. Rep. 804 note, and Cal. Constitution, Art. XIV, Sec. 1), but mere speculation is not allowed; e. g., a reservoir built to hold

water indefinitely without any definite use in mind (15 Cal. 271).

"Water is diverted to propel machinery in flour mills and sawmills, and to irrigate land for cultivation, as well as to enable miners to work their mining claims; and in all such cases the right of the first appropriator, exercised within reasonable limits, is respected and enforced" (Basey vs. Gallagher, 87 U. S. 670).

Malice and ill will toward another do not enter into the question (42 Cal. 339; 46 Cal. 218; 137 Cal. 39). It is usually said that an act otherwise lawful does not become unlawful merely through a malicious motive to injure another, though this wide statement is open to question.

The intent alone, by itself, is not enough; the other requisites we are considering must also be complied with (13 Cal. 33). A design two years before to appropriate a certain creek as a connecting link in a long canal was held, in 6 Cal. 105, not to prevent another man from coming in the meantime and building a dam. In extensive operations of this kind, involving several streams, each, it appears, must be separately appropriated.

How is the intention shown? First, of course, from the notice; but it may be drawn, also, from the appropriators' acts, the manner in which they work, the general size of the ditch, etc. (8 Cal. 443). They aid in interpreting the notice.

3. There must be diligence in prosecuting the construction work (C.C. 1416). The code has specified certain requirements for diligence. The work must commence within 60 days after posting the notice. It must continue thence uninterruptedly unless prevented by rain or snow (C.C. 1416). Interruptions, even by sickness or lack of money, are not allowed (37 Cal. 282 at 314; 12 Cal. 27).

What constitutes diligence must be determined on the facts of each case. In Kimball vs. Gerhart, 12 Cal. 27, the court says that the following statements, among others, are an accurate statement of the law:

"In appropriating unclaimed water on public lands only such acts are necessary, and only such indications and evidences of appropriation are required as the nature of the case and the face of the country will admit of and are under the circumstances and at the time practicable; and surveys, notices, stakes and blazing trees, followed by work and actual labor without any abandonment, will in every case where the work is completed give title over subsequent claimants." \* \* \* "In determining the question of the plaintiffs' diligence in the construction of their ditch, the jury have a right to take into consideration the circumstances surrounding them at the date of their alleged appropriation, such as the nature and climate of the country traversed by said ditch, together with all the difficulties of procuring labor and materials necessary in such cases."

Perhaps the mere fact that another began later than you and finished sooner would be evidence of lack of diligence on your part (37 Cal. 282), but it would hardly be conclusive. (80 Cal. 397.)

The failure to use diligence in the construction work is like the failure to post notice already discussed. If there are no rival claimants before completion, the right is complete as against attack thereafter (cases cited supra). But as against intervenors who are diligent it is fatal (37 Cal. 282, C. C. 1419). It seems, however, that a revival of diligence, after inactivity, will constitute a good new start as against those coming later, although no new notice was posted; or, as it is said, the right on completion will probably relate back to the last diligence. (60 Am. St. Rep. 801, note).

4. The construction work must be actually completed. (C.C. 1416.) "By completion is meant conducting the waters to the place of intended use." (C. C. 1417). It is sometimes said that there must be an actual diversion of the waters; but this is too narrow a term, since, in peculiar cases, the appropriation may be accomplished without any diversion at all. Thus, straightening out a bed of a stream by dykes or dams constitutes an appropriation, though there is no diversion at all. (6 Cal. 105, 7 Cal. 46, 142 Cal. 350.) So, simply putting a large water wheel in the stream itself would doubtless be an appropriation of enough water to run it. In general, however, there will be no completion without diversion.

(TO BE CONTINUED.)

The total imports of pig iron for the calendar year will fall below 85,000 tons as against 599,574 tons last year and 619,354 in 1902, says the American Manufacturer. The total cost of the pig iron imported this year will not exceed \$1,600,000 as compared with nearly \$11,000,000 last year and \$7,500,000 in 1902. The imports of pig iron for October were 8074 tons, for the ten months ending October there were 69,294 tons. This compares with 566,090 tons in the first ten months of last year and 400,581 in 1902.

The recent outbreak of a racial war between Kaffirs and Chinamen on the Rand, in which several of each race were killed, points to the probability that the mines of the Transvaal must be worked by all Kaffirs or all Chinese. At all events, it is evident both can no longer be safely employed in the same mine.



### The Free-Milling Process.

A few years ago the process best known to miners was the free-milling process. Ores which could not be satisfactorily treated by this "process" were called "base," "rebellious," "refractory," etc., and if rich enough were sent to the smelter for reduction. From the earliest days of quartz mining in California the amalgamating stamp mill was the most important factor, and is still in that State. The California stamp mill and the free-milling process was introduced into Colorado, Montana, Idaho and other Western States, and in time throughout the world. In some instances the process extracted more than 90% of the gold values from ores, but the miner usually believed that he had done the best that could be done if he could secure 70%. He was not contented with this, however, and constantly experimented with a view to increasing this saving, and various were the expedients he tried. It was soon learned that when the sulphide zone was reached that the values were often associated with the sulphurets, and the values in free gold obtainable sank from 70% to sometimes 40%, or even less. The early millman soon came to understand that concentration after amalgamation was a necessity, so he devised various ways to separate the sulphides from the gangue, and then, after he got them, they were of little value, for he did not know how to extract the gold from the base combinations of sulphur with iron, lead, zinc and copper. Still he saved them in many cases in the hope that some day a way would be found to extract this gold from sulphurets at a profit.

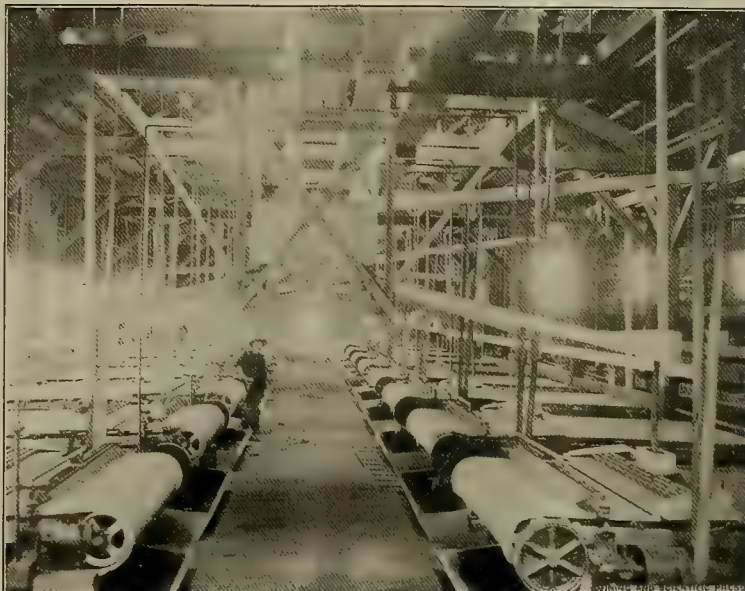
To accomplish this concentration he reverted to the practice of the Cornish tin miner and put in inclined tables or sluices in which he placed skins with the hair side up, or coarse blankets, burlap or some other fabric which would entangle and hold the par-

ticles of sulphide, which, owing to their greater specific gravity, would settle and find a resting place in the inequalities of the surface of the table.

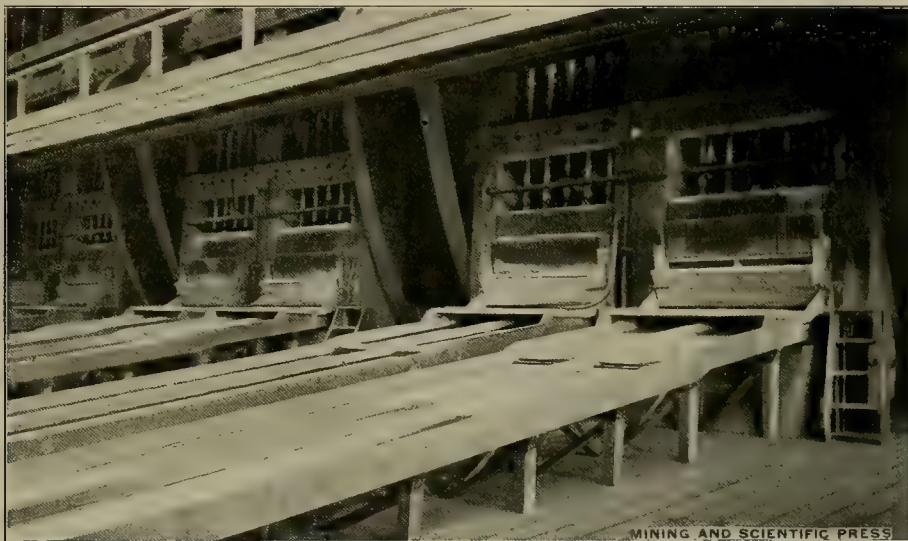
It was found that the sulphurets could be treated by smelting when rich enough to pay for the cost of transportation and metallurgical treatment. At one time a standing offer of \$5000 was made by the MINING AND SCIENTIFIC PRESS for a method which

would successfully treat these concentrates.

The value of sulphurets having been demonstrated, the inventive genius of the country was stimulated to produce a mechanical device which would effect a separation of the sulphides from the pulp of the stamp mill. As a result, scores of concentrators were invented, some of which were good and many were bad and impracticable. But these devices of



Concentrator Room of a Modern Mill.



The Plate Floor of a Gold Mill.

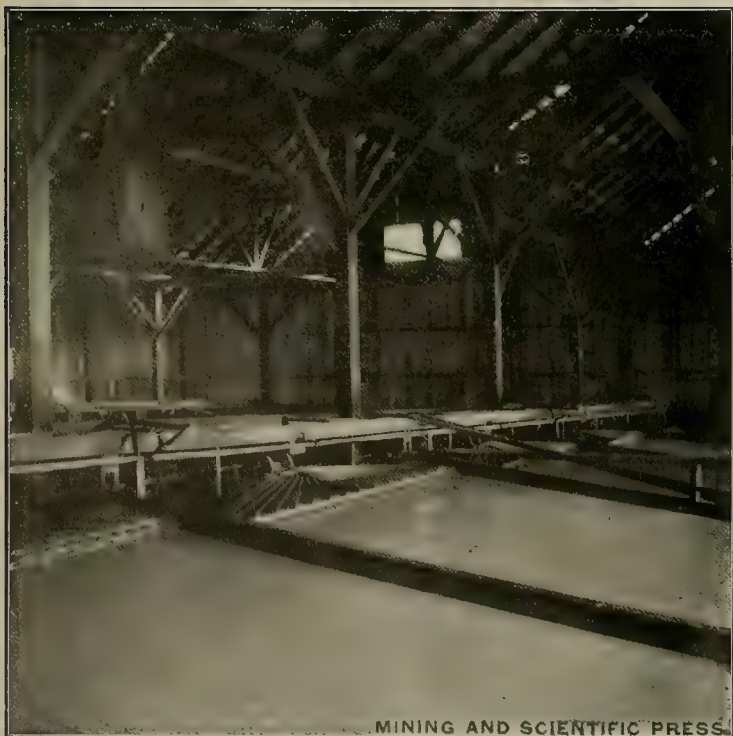
the early days cannot be compared with the finely built and efficient concentrators of to-day.

The early stamp mill was as inefficient as the early concentrator. Both have been improved as new and greater demands were made of them until they have reached a highly satisfactory stage.

Beside the stamp mill there may have been seen, in the early days, the Chile mill, the arrastra, the ball or tube mill, rolls, and various other forms and types of machinery for reducing ores from coarse lumps of fine sand.

For years it was the practice to feed stamp batteries by hand with a shovel, notwithstanding the fact that more than 50 years ago there were mills equipped with automatic feeders, actuated by a blow from the falling tappet, in much the same manner as now. Although these feeders were automatic, the ore was shoveled into them from a pile lying on the floor at the back of the battery.

In the modern "free-process" mill, built after the most approved design and with a view to the greatest economy compatible with the largest output, the ore arrives at the top of the mill, having passed through one or more breakers which have reduced the rock to a size suitable to introduce to the stamps—this should not be larger than will pass a 1½-inch ring, and even a smaller size is advisable. It is desirable to have the ore enter the mill at the end, rather than at the back, as by this arrangement it may be



Distribution of Pulp on Slimes Table.



A Double Row of Canvas Tables in a Slimes Plant.



dumped into the bins where it may be needed, and thus keep the distribution of rock in the bins even. It also obviates dumping all the coarse rock at one part of the bin and the fines at another, as is often the case with a mill having the rock breakers and grizzlies in the mill above the bin.

Ore bins should be of liberal size and should have inclined bottoms—not less than 35°. Some believe flat bottoms to be an advantage, as by their means greater storage capacity is secured. This advantage is more than offset by the increased cost of shoveling the ore into the chutes leading to the feeders in case the ore supply from the mine fails to keep the bins full. The excess ore—that is, the ore lying on the floor of the flat bin and sloping back at an angle of 40°—picks so tight with most ores as to make it necessary to pick down every bit of it, and when about half shoveled to the feeders, in a good-sized bin, the remainder must be handled twice by the shoveler. The cost of shoveling this ore will reach, if not exceed, 15 cents per ton where wages for this class of labor is \$2 per day. If bin capacity be required by reason of the erratic production of the mine—not an uncommon feature where the milling plant exceeds the capacity of the mine—let it be provided in bins beneath the breaker or in the mine itself.

From the ore bins the ore should pass by gravity through inclined chutes to automatic feeders—preferably of the suspended type, as they allow more light and permit the feeder floor being kept clean at little expense of time. The mortar should be suited, as to inside dimensions, to the ore. An ore readily amalgamated can be satisfactorily crushed and amalgamated in a narrow rapid-discharge mortar, but an ore slow and difficult to amalgamate will do better in a wider mortar with a higher discharge. All mortars should be lined, and the height of discharge regulated by chuck blocks of differing height. This can be partly accomplished by having the screen frames made with a greater width on one side than the other. Then by reversing the screen the height of discharge can be changed in a few minutes at any time that it may be deemed necessary.

Inside amalgamating plates must be provided or rejected, as the character of the ore suggests. The mesh and kind of screen employed must rest with the mill man, who will know by experience what is best adapted to the ore.

Silver-plated copper plates, if not indispensable, are, at least, to be preferred to raw copper plates, as they require less care usually, though care of the plates is one of the first essentials of good results in amalgamation.

From the apron plates the pulp passes to concentrators. These are various in design and in method of operation. It has been the practice of the "free-milling" foreman to cut a stream of pulp from a 5-stamp battery into two equal parts, each of which is sent to a separate concentrating machine. That this is the best practice there is every reason to doubt.

Modern practice has proven that if the pulp from the apron plates is sent to a hydraulic classifier for the purpose of making a separation of fine and coarse material, and the pulp thus sized sent to separate concentrating machines, far better results are obtainable than by the old method.

As an outcome of this old time practice, and the one still largely in use, fine sulphides escape when a clean separation of the coarser material is being made, or if the machine be so adjusted that both coarse and fine sulphides are saved, much sand is saved with them. In some mills this is the practice—saving both coarse and fine sulphides and some sand, and the releaning of the dirty concentrates. By employing a hydraulic sizer and treating the sands and slimes separately, cleaner concentrates result, and no necessity for releaning remains.

It has been previously stated that concentration without classifying is the more common practice, and the result, being unsatisfactory, has led to the re-introduction of inclined tables covered with canvas as a substitute for the old-time bullock's skin, or gunny sack. By means of the inclined canvas tables, extremely fine slimes, high-grade in gold, may be separated from the tailings by concentrating machines. The canvas, or slimes plants, as they are called, differ considerably in construction, and to some extent in method of operation, depending somewhat upon the character of the ore, and to some degree upon the ideas of the operator. However, the canvas plant has proven a valuable adjunct in the economy of the free-milling process, where hydraulic classifiers are not in use between the battery and the concentrating machines.

The concentrates, which are the results of all of this careful and painstaking manipulation, are treated by chlorination or cyanidation, or are sent to the smelters. These latter processes are entirely beyond the range of undertaking of the free-gold amalgamation mill man, who has had concentration forced upon him, but who usually turns the operation of cyanide and chlorination plants over to another department, and gives all of his attention to the matters more directly connected with his specialty.

The accompanying illustrations show a portion of the battery of a large modern stamp mill; the concentrating floor of the same, and two views of a broad, short canvas table with the method of dis-

tributing the pulp evenly over the inclined surface; also the launders which carry concentrated sulphides and the tailings away. By the use of the long, hinged aprons, situated at the foot of each table, the stream can be turned into either the sulphide launder or to the waste way.

## Coal in Montana.

NUMBER II.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS.

In Choteau county there are several small operations where lignite is mined for local use. The largest of these are located near Havre and supply Havre and vicinity. The total production of this field is estimated to be about 7000 tons a year.

In Fergus county there are no records of the production of coal prior to 1899, when the output was 3000 tons. This output was increased to 10,000 tons in 1900, and has gradually increased to the maximum production in 1903 of 32,000 tons. The completion of the Montana railroad, which connects with the Northern Pacific at Lombard, from Harlowtown to Lewistown, opens up a new country. The best developed mine in this section is operated by the Spring Creek Coal Co., located 3 miles from Lewistown, the principal market for its output. John Borgh is manager.

In Gallatin county the Chestnut coal mine is owned by the Northern Pacific Railway Co., which has also acquired the property of the Mountinside Coal Co. adjoining. There are several beds of coal in this district, but only one is worked. The vein which has been developed varies from 5 to 20 feet in width and the dip varies from 25° to 90°. The vein is very dirty, being composed of alternating bands of coal, bony coal, bone and shale, the proportions of which vary greatly and abruptly. H. J. Horn is manager and T. J. Evans is local superintendent. The output for 1903 was 43,224 tons and the estimated output for 1904 is 50% greater. During 1903, the plant was increased by additional boilers and a compressor and air replaced steam as a motive power for the hoisting engine, located inside of the mine. The large washing plant which was destroyed October, 1904, by fire has been rebuilt. The tunnel and shaft at Chestnut is 3000 feet from the Mountinside workings. The vein, which is nearly perpendicular at Chestnut, inclines from 90° going toward the Mountinside, until half way between the workings, where it is again perpendicular. From this point it again inclines from the perpendicular, the pitch of the vein varying much in the Mountinside workings. A water level drift, connecting the workings of the two mines, has been completed. A main slope is being sunk at Mountinside and is now over 500 feet long. The vein is much distorted and faulted at Mountinside, the strike varying from north-south and east-west. The coal produced, when washed, makes an excellent steam coal. A large proportion of the output has been used and will be used for local fuel on the Northern Pacific railroad.

The property at Storrs, owned by the Amalgamated Copper Co., was practically closed down during the summer of 1904. One of the most modern and complete plants in the United States was installed on the property. The plant consists of a large washer, 100 completed and 100 uncompleted coke ovens, a store and hotel, an electric light plant and water system; also a large number of substantial houses for employees.

In Park county the Trail Creek field, Yellowstone field and Cinnabar field have been developed. The Trail Creek field is a small synclinal basin of the Laramie, 9 miles south of Mountinside. There are three coal beds of workable thickness throughout the northern end of the field. It yields a large proportion of lump coal, and is semi-bituminous. The Cinnabar field extends northward from the northern border of the Yellowstone Park. There are four coal beds in the main portion of this field, all of which are of workable thickness, the thickest being 5½ feet. The coal has all been highly altered by the eruptive rocks of Electric Peak, several intrusive sheets from which have invaded the coal-bearing rocks. The coal from three of the beds makes a good grade of coke, that of the other being semi-anthracite, very hard, and having the characteristic luster and cleavage of anthracite.

The Montana Coal & Coke Co., H. G. Merry manager and J. F. Kent superintendent, is the principal source of coke in Park county. The main workings are in one of the four workable beds found in this Cinnabar field. The field is much faulted. The plant and mines are located at Electric and Aldridge, respectively. The field tributary to the present workings lies between Mulherin creek and the Yellowstone river and comprises an area of several square miles. The mines, which are located at Aldridge, are nearly 3 miles distant from Electric by wagon road. The company has built a tramway from Electric to the top of the mountain, nearly a mile long, the grade being as high as 43%. The car is pulled up the slope by an electric hoist and serves to convey both people and

supplies from the town to the mine. At the top of this plane there is a trolley line which runs to the store and mines. The ovens are 250 in number and a coke extractor is used to pull the ovens. The coke is loaded into small cars by the coke extractor and then is hoisted by a small motor to a bin, from which it can be automatically loaded into box cars for shipment. The washer is located below the tipple at the mine. Until this washer was completed the coke produced was of an inferior quality. It is carried by water in sluice boxes to large bunkers near the coke ovens, where it is dried by steam. The steam used is the exhaust steam from the electric plant, which is also used to heat the company's buildings at Electric. The water for the washer is carried by a new water line recently constructed several miles in length. The power plant is equipped with four 150 H. P. boilers, two 500-volt generators and an 800-light dynamo. Under the present management there have also been made many improvements in the mine. The slope of the company is down 700 feet. Four entries have been driven, known as No. 1, the main entry; No. 2 and No. 4. No. 1 has been driven 1 mile. The main entry is 1½ mile in length; No. 2 is over 4000 feet long. No. 4 is now 3000 feet long. An electric motor hauls the cars in the main entry to the tipple.

Cokedale Coal & Coke Co. mines at Cokedale, 9 miles west from Livingston, are reached by a short branch of the Northern Pacific Railroad. Geo. H. Hill is manager of the property and Thomas Good superintendent. Much development work has been done during the past year. The 100 coke ovens have been repaired and the necessary buildings needed in such an operation have been built. The coal is of good coking quality. No shipments have been made, only enough coal being mined for steam purposes. Sufficient narrow work has been completed and enough rooms opened up to develop coal sufficient to keep the ovens running without interruption.

There are a number of other fields which have not been developed as yet. Along the headwaters of the West Gallatin river and between the Gallatin and Madison ranges there are several isolated areas of the Laramie formation. Their location, however, is so remote that little attention has hitherto been given to the coal. The only one of the several areas in which coal of value has been found is on Taylor's Fork of the West Gallatin, 75 miles from the Northern Pacific at Bozeman. This area occupies the high divide between the West Gallatin and Madison rivers. It forms a synclinal area 6 miles across, with dips on the northern margin of 20° and on the southern margin of 6°. There are three coal beds in this field ranging from 4 to 6 feet in thickness. The character of the coal is still in doubt, as none of the development work has exposed any of the beds to a sufficient depth to get beyond the effect of weathering. The other areas in this field offer promising fields for detailed prospecting. Owing to the proximity of large bodies of eruptive rocks, the coal will doubtless be found highly altered. These areas are located on the west fork of the West Gallatin and immediately north of the Sphinx mountain.

The Ruby Valley field is 30 miles west of the Gallatin field, and has received even less attention than the latter. The rocks are of Laramie age and do not present any indications of serious disturbance. The only prospecting done in this field consists of a series of open cuts along the outcrop. These have as yet failed to develop beds of workable thickness.

The Toston area is isolated, containing 6 square miles of the Cascade formation, 3 miles south of the town of Toston, and crossed by the main line of the Northern Pacific Railroad. The strata are badly broken and the field is so small that the erection of a large mining plant would not be warranted. The field could doubtless be operated with profit on a small scale, especially as the coal is coking. There are portions of the bed in which the coal has been altered beyond the coking stage and is essentially graphite.

The Sweetgrass Hills field is on the eastern slope of the foothills of the Rocky mountains, in the extreme northern portion of Montana. The coal occurs in the Belly River formation, which extends south from Canada. But little development has been done in this field and there are no producing mines. There are three coal beds exposed to workable thickness, which are capable of yielding a fair grade of semi-bituminous coal.

Along the summit of the main Rocky mountain range and westward there are numerous areas of Neocene lake beds, which contain some lignitic coal. None of these areas have as yet developed any coal of value.

The rocks of some of these areas were deposited in the basins of the granite, and others upon more recent beds. They form a series of isolated basins distributed over a region which extends westward 90 miles from the continental divide and southward into Idaho. They are probably to be correlated with the areas at the base of the Boise mountains. There are several points at which these lake beds have been subjected to the influence of the later eruptions, and further prospecting may develop coal of a higher grade than that thus far discovered.

THE operating cost at the Alaska-Treadwell mine, Alaska, for the month of November was \$1.021 per ton of ore treated.



### Hornsby-Akroyd Oil Engine.

Herewith is illustrated an oil engine designed for using crude oil as fuel—the Hornsby-Akroyd—built by the De La Vergne Machine Co., New York, and also by several makers in Europe, where it was invented and first put on the market. The makers say that in the Russian oil fields this engine is largely used for operating pumps and other purposes, and also in the oil fields of Ohio and Indiana. A number

in various units in operation, actuating the concentrating and other machinery in connection with their lead mines. Two of these engines have recently been installed by the United States Navy Department in the long-distance wireless telegraph stations in Cuba and Panama.

Fig. 3 shows a portable air compressing outfit, designed for prospecting and other purposes where compressed air is required for operating pneumatic machinery, such as rock drills, and which is required to be removed frequently and quickly to different localities.

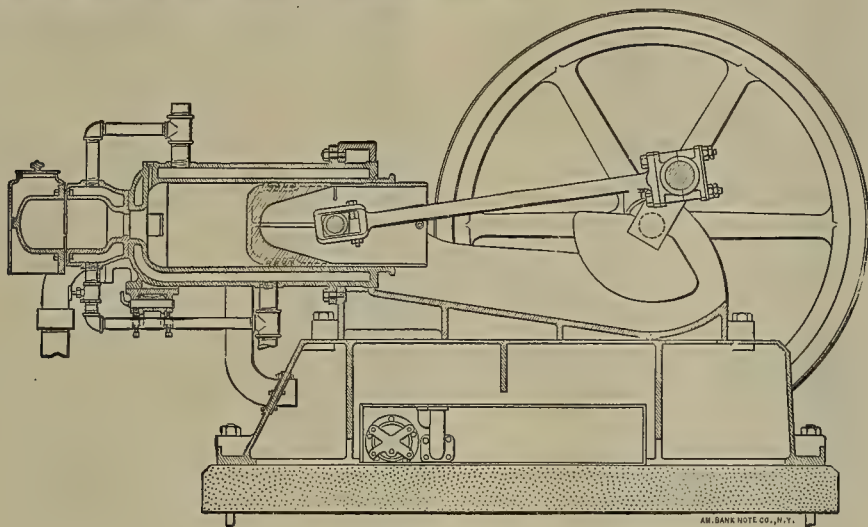


Fig. 1.

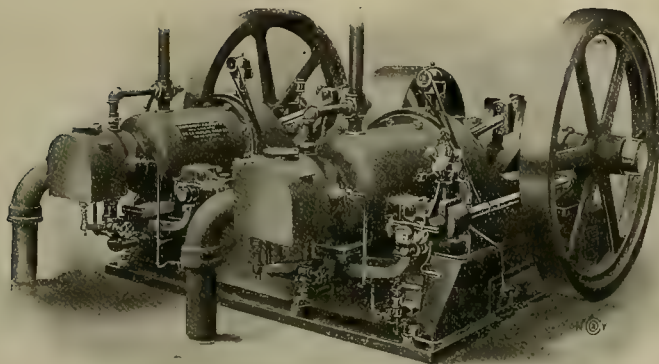


Fig. 2.

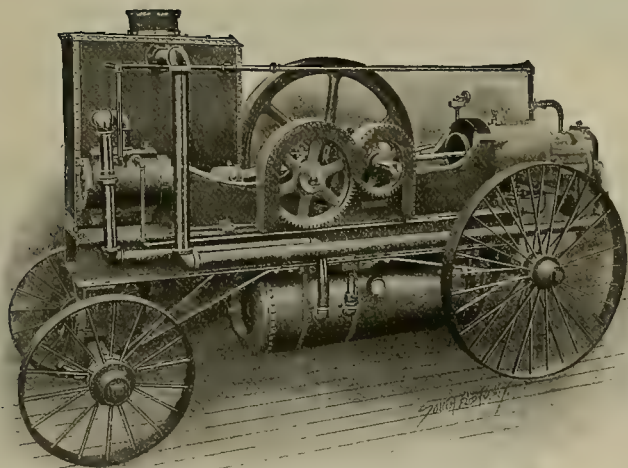


Fig. 3.

are also used in various districts burning crude oil.

Fig. 1 is a sectional view of this engine, which operates on the Beau de Rochas, or four-cycle system. The vaporizer is attached to the cylinder and is at all times open to the cylinder. With this engine the oil is injected into this vaporizing chamber and not into the cylinder, that where crude oil or fuel oil is used any deposit which may be formed it is not deposited in the cylinder, but in the vaporizer cap, not coming in contact with the piston or piston rings. On the larger engines, or where otherwise required, a flanged cover is added to the vaporizer cap, the removal of which facilitates the process of cleaning out such deposit. This only is required after about every sixty hours' run and does not interfere with the operation of the engine.

Fig. 2 shows a 50 H. P., two-cylinder type oil engine for use in mining and other purposes in the arid zone. The Luna Lead Co., Deming, N. M., have 200 H. P.

This outfit, as will be seen in the illustration, consists of the oil engine geared to a slow-speed air compressor placed on rigid steel truck, the air receiver being placed under the truck. The circulating water required to maintain the proper temperature of the air compressor and engine is cooled by a patented apparatus placed at the front end of the truck, and which utilizes the pressure of the exhaust to create a current of air passing through the water, thus cooling it.

The makers say that the fuel consumption guaranteed for these engines is less than one pound per horse power hour, and that where crude oil can be obtained at \$1 per barrel the cost is approximately 0.2 cent per horse power hour.

Further detailed information regarding engines of this type will be furnished on request by the De La Vergne Machine Co., foot of East 138th St., New York City.

### THE PROSPECTOR.

The rocks from Ainsworth, B. C., are identified as follows: No. 1 is siliceous chlorite schist, probably the result of alteration of a basic eruptive rock—diorite or diabase. No. 2 is a feldspathic dike rock, in which are developed numerous secondary minerals (zeolites), formed in what were probably originally vesicles in the rock. No. 3 is an altered intrusive rock and may have resulted from the alteration of either No. 1 or No. 2, probably the latter; it is not at all uncommon to find rocks like Nos. 3, 4 and 5 altered from a greenstone schist like No. 1. No. 4 is similar to No. 3, but suggests even more than No. 3, that it is due to the alteration of No. 1, as indicated by the schistose structure, though this structure, so pronounced in No. 4, may have been induced locally by pressure from a more massive rock than No. 1. No. 5 belongs to the same group—either an altered schist or massive rock like No. 1. The green mineral in No. 5 is chromium mica and resembles the mariposite so common in some parts of California. Nos. 3, 4 and 5 contain small amounts of disseminated iron and copper sulphide. No. 6 is a chlorite schist. Nos. 1 and 6 would be classified as amphibolite schist in accordance with the classification of the United States Geological Survey, that is a rock in which amphibole or its alteration products were the chief dark mineral. The rock from which No. 6 was derived was probably diorite. No. 2 is an unusual and very interesting rock and not of common occurrence. Rocks of this character are more likely to alter into masses of kaolin than rocks like No. 1. The latter is more likely to form slabs of talc schist than masses of clay upon extreme alteration due to pressure and mineralogical change. It is most difficult to say what effect this intrusive rock (No. 2) will have upon a fissure occurring within an older dike (No. 1). A vein accompanied by a dike like No. 2 is likely to be permanent, but the dike is no index of value or size of ore shoots. The condition of the vein walls is often far more suggestive and reliable as a guide. For instance, if an ore body pinches out in a fissure with a heavy clay gouge, it is a good idea to crosscut to foot and hanging, where it is not infrequently found that the pay shoot has formed a lap. Spots of sulphide mineral in the gouge are a "good sign," and a crosscut should be run wherever they are found. When the crosscut enters hard ground quit, for in all probability you have gone beyond the limit of that particular vein.

The rock specimens from Washoe, Nev., are all very much altered, and consequently difficult of determination. No. 1 is evidently an andesite, but greatly altered. It is this rock that was originally described as propylite on the Comstock lode—a rock in which the minerals are much decayed and in which there is a greenish discoloration of feldspars and groundmass. It was a name applied by the early geologists on the Comstock to a variety of greatly altered rocks, including diorite, diabase and various andesites. No. 2 is also so badly altered as to make its identification uncertain. It is evidently a lava, possibly originally an andesite. It shows evidence of amygdaloidal condition and contains small fragments of volcanic glass. No. 3 is a trachytic rock. No. 4 is similar to No. 2, but somewhat less altered. What appears to have been olivine is now found altered to serpentine. No. 5 is mostly silica, probably replacing feldspar or other mineral. It carries many fine grains of pyrite. No. 6 is similar to No. 2. No. 7 is andesite. A rock of this character probably by alteration produced a rock like No. 1. No. 8 is an eruptive rock, in which the original hornblende or augite is almost wholly altered to epidote. It was probably an augite andesite.

The rocks from Nevada City, Cal., have been classified as follows: No. 3, magnetite (a magnetic iron oxide); No. 4, granitic gabbro, consisting of a large amount of plagioclase (feldspar), some quartz and abundant magnetite. The original diagenesis, a mineral characteristic of gabbro, has been altered apparently into hornblende by paramorphism, and by further alteration has become epidote (the yellowish-green mineral). No. 5 is a granular quartz rock, such as sometimes occurs in aplite dikes in a granite country.

The rock samples from Searchlight district, Nev., are determined as follows: No. 1. Diorite. No. 2. A granitic rock (probably dike), much altered. No. 3. Aplite (micaless granite). No. 4 is diorite. Nos. 5 and 6 are porphyritic hornblende andesite (andesite porphyrite). No. 7. An aluminous silicate, probably a variety of kaolinite, resulting from decomposition of feldspar, and containing some finely disseminated quartz grains.

The rocks from Isabella, Cal., are: No. 1 is composed of striated feldspar (plagioclase), quartz and hornblende, which determines the rock to be diorite. No. 2 is quartz carrying mispickel (arsenical pyrite). No. 3 is an interesting aggregate of green and brown garnet grossularite, with bluish calcite (lime spar) and glassy quartz. This rock is probably the result of contact metamorphism.

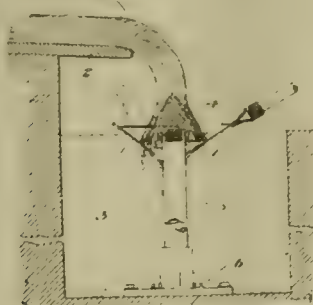


## Mining and Metallurgical Patents.

PATENTS ISSUED DECEMBER 20, 1904.

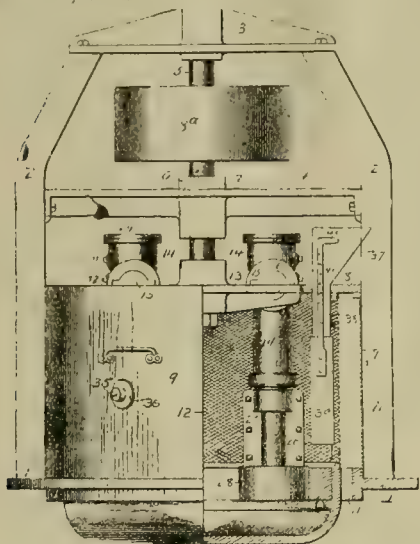
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

METHOD OF GRANULATING SLAGS.—No. 777,388; J. G. McDowell, Pittsburg, Pa.



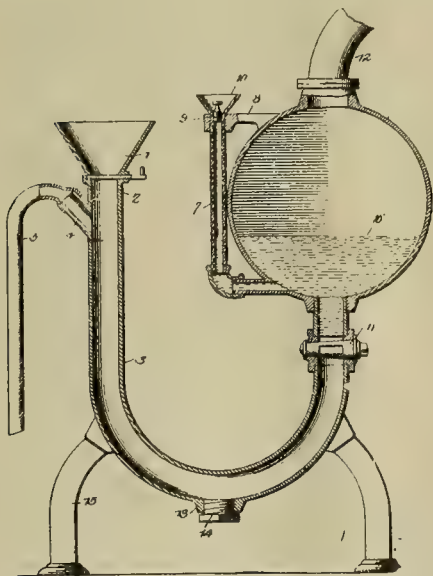
Method of treating liquid slag consisting in spreading stream of fluid slag into sheet form and driving water against slag sheet after spreading and while dropping through air.

PULVERIZING MACHINE.—No. 777,787; S. Hughes, Summerville, S. C.



Feed hopper for grinding or pulverizing machines and the like, comprising hopper having fixed spout, adjustable spout telescoping on fixed spout, longitudinal extension depending from fixed spout to guide adjustable spout, and means for securing adjustable spout at any level.

GOLD SEPARATOR.—No. 777,803; T. Pollock, Santa Barbara, Cal.



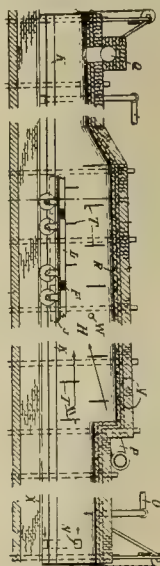
In gold separator, combination of U-shaped pipe having its arms of different lengths and disposed vertically, sand hopper carried by longer arm, valve on bottom of hopper, water inlet tube beneath and adjacent to valve and disposed obliquely to pipe, normally sealed discharge outlet arranged in lowest part of bend of pipe, mercury chamber carried by shorter arm of pipe, valve in pipe beneath chamber, and outlet pipe at top of chamber.

HOISTING APPARATUS.—No. 777,790; W. H. Jessup, Sheridan, Ind.



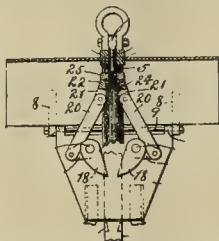
In device of class described, track rope, carriage supported upon same and having plurality of guide pulleys, plurality of winding drums, bucket having bail, hinged bottom and guide pulleys upon the side of bucket, link connected with bucket, lever supported by link, flexible element connecting inner end of lever with hinged bottom of bucket, flexible connection between free end of lever and one of winding drums, suitably guided hoisting rope supporting bucket by pulley connected with bail of latter and having its ends connected respectively with carriage and with winding drum, and suitably guided flexible element connecting bottom of bucket with winding drum.

FURNACE.—No. 777,814; W. Simpkin, Orange, N. J.



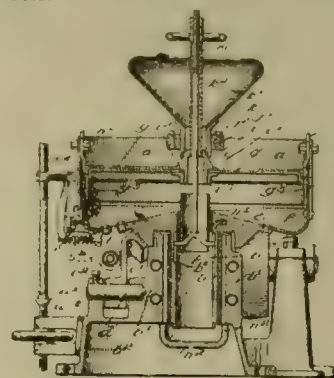
Furnace comprising tunnel structure having central combustion chamber, cars within structure, cars having air tight couplings and aprons extending into lutes or troughs, air admitted beneath cars at one end of furnace, and air admitted above cars at other end of furnace, air passing over cars and combining with fuel in combustion chamber, and products of combustion escaping over cars.

SAFETY DEVICE FOR HOISTING MECHANISMS.—No. 777,661; W. Burkart and H. A. Williams, Denver, Colo.



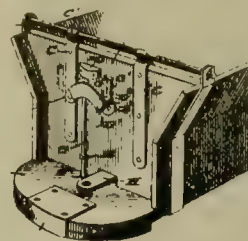
Hoisting mechanism, cage, rigid collar secured to cage, draw-bar adapted to move vertically in collar, projections at lower extremity of draw-bar, links pivotally connected to projections, rock-shafts adjacent to lower ends of links, arms rigidly attached to rock-shafts and pivotally secured to lower extremities of links, dogs rigidly secured to rock-shafts, coiled springs surrounding rock-shafts, one end of each spring being secured to stationary member and other ends of springs being secured to arms.

ORE CONCENTRATOR.—No. 777,837; I. A. Cammett, Denver, Colo.



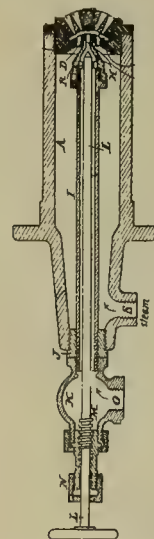
In ore concentrator, combination of bowl having discharges respectively for concentrates and waste, adjustable distributor supported directly from wall of bowl and water seal below distributor variable through adjustment of latter.

MINE CAR.—No. 778,097; J. B. Bell, Windber, Pa.



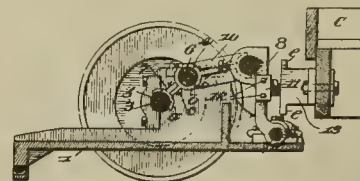
Mine car having end-gate, projecting platform, platform being perforated adjacent gate, curved segment carried by and spaced from gate, angled rod adapted to slide between segment and gate and to engage perforation in platform, rod having cranked portion adapted to rest on segment, and stop-block arranged on gate centrally above segment.

OIL BURNER.—No. 777,680; V. F. Lasso, New York, N. Y., and L. D. Lovekin, Philadelphia, Pa.



In oil burner, combination of tube for supplying spraying medium under pressure having front end closed by transverse structure having shallow outwardly-pointing conical oil chamber formed by front and rear walls arranged close together and provided with circular series of apertures through each of walls outer of which are conical with large ends directed outward whereby air may be forced from air-tube through apertures and oil-chamber, and means for spraying oil under pressure against one of walls of oil-chamber whereby it is mechanically subdivided and directed radially toward apertures so as to meet and be taken up by air passing through apertures.

CONCENTRATOR.—No. 777,838; W. L. Card and F. S. Card, Denver, Colo.



In concentrator, combination of revolving crank, oscillating crank adapted to have quadrant travel arc, intermediate pitman, vibrating device actuated by oscillating crank, and concentrator table actuated by vibrating device.



# Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

The November report of the Alaska-Treadwell shows that the 240-stamp mill ran 30½ days; 300-stamp mill ran 30½ days; crushed 82,887 tons ore. Estimated value of the bullion, \$75,242; saved 1900 tons of sulphurets. Estimated realizable value of same, \$70,319. Working expenses for month, \$84,696.

## ARIZONA.

### Cochise County.

At the smelters of the Copper Queen Con. M. Co. at Douglas three new 350-ton furnaces are to be put in, making eight in all, and the second largest copper smelting plant in the United States. At present the plant is turning out 6,000,000 pounds of blister copper monthly.

Superintendent J. Champion of the Columbia, Belle and Martinez mines has obtained title to a millsite at Cochran station, on the Phoenix & Eastern Railroad, and contemplates the erection of a concentrating and smelting plant.

The Duluth & Chiricahua Development Co.—M. Pattison of Duluth, Minn., president; G. H. Crosby of Duluth, secretary and treasurer; E. F. Sweeney, resident director living in Paradise—have bought the Sullivan mine and will start development. Estimates have been prepared for machinery and equipment. The Chiricahua Development Co.'s shaft has been sunk 380 feet through limestone mineralized with iron and copper sulphides. They are now in granite and upon reaching the 500-foot level they will cut their first station and begin crosscutting. The Mars shaft of this property is down 350 feet.—The Cochise Con. Copper Co. will increase their force to forty-five men.

The Tombstone Con. M. Co., E. W. Walker, superintendent, at Tombstone, is continuing tests for cyanidation of low-grade ores, subsequent to possible construction of a mill.—Superintendent Shaw of the Lucksure M. Co., ½ mile southwest of the Consolidated shaft, expects to be shipping a carload of ore per day early in the new year. The one-compartment incline shaft is down 200 feet.

### Maricopa County.

(Special Correspondence).—New ground is being opened up at the Vulture mine by drifts and crosscuts. A number of old drifts are being cleaned out, and it is supposed that the mine will again be a producer of bullion. At the Union mine, 18 miles north of Phoenix, the force has been increased and ore is being taken out for the mill. Hull & Duke are doing considerable work on their claims near the Garcia mine in the Vulture district. The Buffalo-Arizona M. Co., operating northeast of Morristown, have increased their force and will install machinery at an early date. The Gila Gold Lode Co. are working men on their property in the White Tank mountains. It is reported that they will install a mill. Phoenix, Dec. 26.

### Mohave County.

Work on the German-American mines, near Acme, is progressing and it is probable that a milling plant will be put in by Manager C. Schrader.—T. R. Garnier has taken and is working the St. Louis mines at Cerbat from J. Barry.—A blower has been put in at the Independence mine of the Union Pass group, where Jorgenson, Bohne & Richardson have a contract to sink the shaft 50 feet deeper.

### Yavapai County.

(Special Correspondence).—The Mountain Lion Gold Co., with mines on Rich Hill, at Stanton, will put in a power drilling plant and will increase the scale of work as justified by five years of hard work. They will put in a new or second-hand 5-drill compressor and a 75 H. P. oil or gas engine, and wish bids for mine cars, rails, corrugated sheet iron, etc. C. A. Devlan is manager at the mine. Stanton, Dec. 26.

The Castle Creek M. & Dev. Co., organized by J. H. Aagaard, J. M. Fike & Sons, is developing the Quishenbury mine and adjoining claims, 2 miles from Briggs. The ore carries values in gold, silver, lead and copper.

L. A. Davies of Prescott says that the Sun Dance M. Co. properties on the Hasayampa are to be worked under his management, with the backing of the Western Trust & Guarantee Co. of Chicago.

The Baumann C. Co. at Dewey will put in a 1000-foot capacity hoist and an 80 H. P. boiler on the Swiss Girl claim, which now has a double-compartment shaft down 110 feet. Later a hoist may be put on the Laura claim, which has a double-

compartment down 214 feet, exposing high-grade copper ore. H. P. Anewalt is president, J. Baumann secretary and manager and W. S. Goldsworthy treasurer, all of Prescott.

## CALIFORNIA.

### Amador County.

(Special Correspondence).—A new and important development has been made on the 1400-foot level of the Wildman mine in an ore body 15 feet wide. The mill is running.

Sutter Creek, Dec. 27.

Robinson, McLaughlin & Glenn are working the Glenn or Whitmore mine, near Volcano. The 4-stamp mill has been repaired and a 25 H. P. engine put in. Five more stamps will probably be added to the mill by the first of July.

The Empire mine in Murphys gulch, adjoining the Amador Queen No. 2, near Jackson, is being worked mainly for pockets under management of Green. It is said that the ore carries platinum in sufficient quantity to justify the extraction of that rare metal.

At the Defender mine a 5-foot ledge of ore is being worked from the old shaft and a new shaft, now 90 feet deep, is being sunk on the south end of the mine. F. B. Joyce of Defender is superintendent.

### Calaveras County.

The Emma M. Co. has been reorganized as the Outlook M. Co., with W. T. Robinson of Mokelumne Hill as superintendent, and A. E. Moyer of Boston as financial agent. Ten men are putting the mine and 10-stamp mill in readiness. They also own six mines in the Whiskey Slide and Jesus Maria districts, where they have at present a number of men employed.

At the Union Copper mine, at Copperopolis, thirty graders are at work for a new smelter. G. McM. Ross is superintendent.—The Welsh mine has closed down for a time and the owner, A. Arents Sr., has gone to Alameda, Cal.

### El Dorado County.

The Georgetown M. Co. has been capitalized for \$2,000,000 by G. Schmidt, C. R. Lord, C. E. Jones, F. A. Ring and T. Graber, with main office in Postoffice building, Berkeley, Cal.

A 4-stamp mill is being put up for prospecting purposes on the Scherrer mine, east of Georgetown.—At the Berry & Rupeley placer mine at Sugar Pine point hydraulicicking will be commenced.—The Oakland Dev. Co. has men building a restraining dam on Mameluke hill, near Georgetown, preparatory to working the ground. M. W. Sargent is in charge.—Work is being pushed on the Delwisch gravel mine, Georgetown district. The mill is being shipped from San Francisco.

### Fresno County.

A new pipe line is to be built to a point on the San Joaquin river, by the Producers' Union Pipe Line Co., A. Dollas, agent in Fresno. It is reported that 6,000,000 barrels have been signed for. The length will be 100 miles, and will be 8-inch or 10-inch pipe. Preliminary surveys have been made. The company offered 25 cents per barrel for fuel oil of the same grade as that being sold for 15 to 20 cents per barrel to other pipe-line companies.

### Nevada County.

The Central Con. Co. has bought the 20-stamp mill of the Coe mine at Grass Valley, including mill building, concentrators, rock breaker, ten tons of T-rails and five iron ore cars. The copper plates will be removed at once, but the mill and the remainder of the property will remain at the Coe until spring.

### Placer County.

The Santa Fe M. Co. has been formed by L. Hanke, G. Stark, A. R. Green D. Kirby, J. W. Morgan to work the Santa Fe and Dewey placer mines at Canada hill. L. Hanke is superintendent.

### San Diego County.

Phosphate is reported discovered in paying quantities in the Grapevine district, east of Banner, San Diego county, by D. McGregor. The phosphate occurs as apatite, together with calcite and tremolite, in several parallel ledges, included within 2000 acres of ground, located by the discoverer.

### Shasta County.

The Sugar Loaf claims at Copley will be worked under the superintendency of E. B. Burtis. C. D. Galvin, the consulting engineer of the company, has gone to Boston to report to the stockholders, and on his return development will be commenced on the Spring creek side of Sugar Loaf mountain, and tunnel No. 2, already started, is to be extended. A diamond drill will be put in.

The Copper Crest group of copper claims, adjoining the Mammoth mine, near Kennett, where a 750-ton smelter is being put up, will be developed by I. O.

Jillson, of the Gladstone mine at French Gulch, and M. E. Dittmar.

### Sierra County.

At the Mountain mine, near Sierra City, the power house, bunk house, blacksmith shop and part of the aerial tramway has been burned. Superintendent L. H. Carver says that the plant can not be replaced until spring because of difficulty of transportation in winter. The stamp mill had been started two days before the fire. Thirty men are thrown out of work.

The Poker Flat M. Co. at Poker Flat via Table Rock will finish the equipment for amalgamation, as the plant was built for concentrating without amalgamation. Tests show that \$6 per ton can be got on plates and \$5.18 from concentrates.—J. B. Lassiat of Table Rock, superintendent of the Lassiat mine at Poker Flat, will put in canvas tables and settling tanks.

### Trinity County.

The 50-mile power line of the North Mountain Co., from Junction City, Trinity county, to Eureka, Humboldt county, is nearly completed. The generators will be started by the first of the year, Eureka and Humboldt county being served with electric light and power manufactured in Trinity county. The plant generates 40,000 volts and is to be duplicated.

### Tuolumne County.

Work has been resumed at the Green Jumper mine, near Confidence. W. Conn is superintendent and J. Ryan of Sonora is manager.—The Roberts placer mine, near Montezuma, has been bonded by W. T. Beveridge and B. Harter to H. G. Comstock & Co. of San Francisco. After sixty days from the date of the agreement, until which time is allowed to begin operations, the first payment on this purchase must be made.—Nine men are now at work at the Omega mine. C. W. Ayers has assigned his bond on the property to the American Industrial Co. of Chicago.—The Shawmut mine, near Chinese Camp, is working 250 men.

The Morris Tunnel M. Co., after three years work, have reached the end of the upraise, 187 feet, connecting the tunnel and shaft. Development has been completed and the company will now work the several claims. J. Wainwright of Sonora has been interested.

At the Horse Shoe Bend at Columbia two raises are being run from the Englewood tunnel to the crest of the hill. At the 90-foot shaft operations have been resumed. Machinery for a 100-stamp mill is being collected.

## COLORADO.

(Special Correspondence).—An indication of an increase in business and general prosperity are the reports of the various railroads doing business in the State. These reports show a decided improvement over one year ago, and it is believed will be better the coming year.

—There has been a drouth in several parts of the State for several months past, and as a consequence some of the streams are getting low, but the snows of the last few days will have a tendency to increase the flow of water. In places water is badly needed for milling purposes.—It is rumored that the Red Mountain railroad, operating between Red Mountain and Silverton, in San Juan county, will be extended to Ouray this coming season. At present a stage line is run over the old toll road from Ouray to Red Mountain to connect with the railroad. During the winter months, traffic is suspended on the railroad and passengers and mail are carried by stage.—According to reports, Eldora, in Boulder county, will soon be connected with the outside world by railroad. The Colorado & Northwestern is now within a short distance of the town. The completion of this branch of their road should give an impetus to mining in Boulder county. Denver, Dec. 26.

### Chaffee County.

The Banker M. & T. Co. of Winfield is working nine men underground and completing putting in machinery. They have a sawmill running. F. Aude is superintendent, with A. E. Stahler as general manager.

### Clear Creek County.

The stamp mill of the United G. M., M. & T. Co. on Fall river, near Idaho Springs, is running steadily upon ore from the Specie Payment mine. The company owns a large territory on Bellevue mountain, for which a crosscut tunnel is now being driven from the level of the mill. Machinery for power drills will be installed in the near future.

### Gilpin County.

The El Dorado M. Co. at Central City is sinking on its Lynn shaft, west of the El Dorado, with two shifts, the shaft being down 80 feet. S. T. Harris is in charge.

### Hinsdale County.

The Big Casino mine at Lake City is being worked by Superintendent Miner. A large body of ore has been opened during recent work.

The Max M. Co. has been incorporated at Lake City for \$300,000 by N. H. Schenck, E. W. Hurlburt and B. Guionneau to work the Guionneau group on North Fork of Henson creek.

### Lake County.

The mill at the mouth of the Yak tunnel has been roofed. When the interior work is completed and the plant in operation the zinc production of Leadville will be increased.—The South Mosquito M. Co. is working its tunnel south of the South London mine, driving westward into the main Mosquito range. They expect to cut the contact 1500 feet from the mouth.—T. S. Schlessinger is operating the Bon Air, near Leadville.

The Empire T. Co. has the lease of all the land formerly held by the Home Extension M. Co. from the city of Leadville. The lease was forfeited by the Home Extension M. Co. and a new lease executed in favor of the Empire Co., giving the mineral rights under streets and alleys and other city property on the east side, between Harrison avenue and the Midas M. & L. Co.—At the Cloud City shaft the 10-inch water column, to carry water from the mine, has been completed. The engine and boiler house have been enlarged and a new 100 H. P. boiler has been put in. A 200-gallon pump has been put in the station at the 500-foot level. Sinking has been resumed from 562 feet, now that the water is under control.

A strike is reported in the breast of the Woods G. M. & M. Co., at Pie Plant, in the Taylor Park country, 20 miles west of Twin Lakes. The company has completed a cyanide mill, and expects to have it in operation by the first of the year.

The stamp mill and concentrator at Romley, belonging to the Golf M. & M. Co., has been destroyed by fire.

### Ouray County.

(Special Correspondence).—The tunnel on the property of the Bankers Con. M. Co. is being driven at the rate of 30 feet per week. They have recently opened up a vein 14 feet wide, which carries good values, and are at present working on this vein. The tunnel is now in over 700 feet. The object of the tunnel is to cut several known veins in the hill. Air drills are being used in the work. Seventeen men are employed. This property adjoins Camp Bird. Camp Bird Mills, Dec. 26.

### San Juan County.

J. C. O'Neill of Silverton has an option on the Mayflower group on Round and King Solomon mountains from Malchus Bros., on condition that he develop to some depth. The Arrastra Gulch tunnel will be continued to cut the Mayflower vein.

The Pride of the West mine, near Silverton, is putting in 250 feet of water pipe, extending from flume to power house. Power drills are to be put in.

### Summit County.

The \$50,000 Revett gold-dredging boat, near Breckenridge, is ready for the heavy machinery which has been ordered for delivery in March.

### Teller County.

Machinery, including a compressor, will be put on the Little Puck and Abdallah, on the south slope of Squaw mountain, by Swanson & Dillon of the Ocean Wave of the Little Puck Co., and Anderson and associates, lessees of the Climax.—Machinery is being placed at the shaft piercing Beacon hill in the Rocky Mountain property. As soon as it is in readiness sinking will be resumed. The work is being done for Ralph Airheart and H. L. Shepherd.

At the Gold King mine, at Poverty Gulch, near Cripple Creek, a 65-foot winze has been sunk 700 feet below the level, which is showing the entire width in smelting grade ore. They are shipping regularly and plan to sink to 800 feet in the main shaft.—The lessees of the June Blizzard on Battle Mountain, near Cripple Creek, are putting in new machinery and developing the ore body.—Mine machinery will be put in by the Sunset Eclipse, on Squaw mountain.

J. M. Hower & Co., leasing the Jo Dandy on Bull hill, near Cripple Creek, are unwatering the property preparatory to sinking.—Cripple Creek reports that J. E. Parkinson has a bond and lease on the May claim survey No. 7934 for two years from J. S. Jones and N. H. Partridge.—J. B. Fore & Co. have a two years' lease on the Maid of Erin claim on Raven hill belonging to the Elkton Co. and will continue sinking from 110-foot level. The lessees operating the Gregory claim of the same company have ore in sight in the second and fourth levels and are working ten men.

At Cripple Creek, articles of incorporation have been filed by the Pinto-Bison M. Co. for \$150,000, by J. O. A. Carper,



J. L. Dibble, W. K. Mansfield, E. R. Conway and C. D. Barnes.

J. K. Walsh and associates, working the Forest Queen claim, on Ironclad hill, will put in a 6-drill air compressor and new 80 H. P. boiler.

The Kimball Investment Co. of Denver, through Manager Leshor of Cripple Creek, has contracted with W. Watson for sinking 200 feet on the Saturday claim, on Rosebud hill. The shaft is down 203 feet. Water is being pumped from the mine at the rate of 1000 gallons per minute. It will be necessary to put in another sinking pump, of larger capacity.

The City of Cripple Creek G. M. Co. has put in an 8-drill air compressor, and after January 1 will begin sinking the shaft from the 200-foot level. The water flow from the El Paso drainage tunnel shows a slight increase in volume, due to the fact that the El Paso management is now drifting on the extension of the C. K. and N. vein in the bottom level.

## IDAHO.

The United States assay office at Boise, H. S. Woolley in charge, gives the following as Idaho's mineral production in 1903:

Counties.	Gold, Fine Ozs.	Value.	Silver, Fine Ozs.	Value.
Ada	570	\$ 11,907	106	106
Bannock	511	10,593	95	95
Bingham	641	13,256	128	128
Blaine	1,143	23,627	513,141	513,141
Boise	14,803	308,072	4,361	4,361
Canyon	413	9,157	83	83
Cassia	545	11,298	122	122
Custer	6,113	125,367	79,088	79,088
Elmore	5,193	105,488	2,470	2,470
Idaho	11,440	236,671	3,912	3,912
Lemhi	11,870	245,374	2,542	2,542
Lincoln	459	9,488	173	173
Oneida	539	11,142	157	157
Owyhee	30,479	623,338	756,569	756,569
Shoshone	7,651	158,160	5,473,655	5,473,655
Washington	1,312	27,121	76,363	76,363
<b>Totals</b>	<b>83,787</b>	<b>\$1,730,997</b>	<b>6,915,036</b>	<b>6,915,036</b>

Adding 214,252,369 pounds of lead, valued at \$9,641,356, and 1,111,423 pounds of copper, valued at \$138,928, gives the mineral production of Idaho a total value for 1903 of \$20,451,933.

### Blaine County.

At the Eureka mine at Bullion, near Hailey, new pumps and other machinery have been bought and winter supplies laid in. Six men are repairing the shaft.

### Custer County.

The Mt. Estes M. Co. has been formed by J. A. Czizek, E. G. Rowe, C. E. Gable, J. H. Richards and R. E. Collier to work the Montana mine, 6 miles north of Custer, and opposite the Golden Sunbeam Co.'s mines, upon which a 40-ton mill has been placed. C. E. Gable of Custer is secretary of the new company and manager of the Golden Sunbeam. The Montana mine has been opened through an incline shaft to a depth of 500 feet. A tunnel is to be run 1600 feet to open the mines 500 feet beneath the old workings.

### Idaho County.

The Rapid river and its tributaries in the Seven Devils range drain 500 miles. There is a good wagon road from Council, Washington county, the terminus of the P. & I. N. R. R., by the way of the Meadows, and down the Little Salmon river to Pollock, for 60 miles. Pollock is near the confluence of the Rapid river with the Little Salmon. A good wagon road runs from Pollock up the Rapid river for 3 miles, intersecting the trail that leads up the grade on Kings mountain to the property of the Hawkeye and Badger group of mines. On these claims the upper tunnel No. 1 has been driven 540 feet; tunnel No. 2, 250 feet; tunnel No. 3, 80 feet.

I. H. Friar, manager of the Pueblo M. Co., on Smith creek, reports that the shaft is down 80 feet. A mill is to be put in. Because of lack of transportation, 10 cents per pound is charged for hauling freight.

S. L. Abbott, superintendent of the Sunnyside and H. Y. Climax mines, states that the 40-stamp mill at Belleco is dropping thirty stamps and that the 7200-foot aerial tramway and rock breaker at the Sunnyside head house have been completed. The Blake crusher is operated by power developed by gravity on the load-line of the tramway. At the H. Y. Climax 200 feet are to be run on the Paloduro tunnel and the shaft is being sunk 2 feet per day.

F. Brown, manager of the Jumbo mine at Hump, reports that the chlorination plant for the property will start working about January 15. When the electrical machinery arrives they will resume work on the lower tunnel, which is now in 1000 feet. Ten stamps are working at the Jumbo. F. Brown states that he has resigned the management of the Crackerjack. Work is to be started in the Little Giant adjoining the Jumbo. It has a tunnel 200 feet long, which will be driven in another 100 feet. The Mother Lode No. 2 is working twenty men. The Atlas is working twenty men and the new mill is nearly ready. The Dollar Bill M. & M. Co. of Lewiston has purchased the Oro and Denver claims at Hump from J. J. Howery of Grangeville, and will

start work in the spring. H. Heitfeld is president, E. C. Steele vice-president, G. W. Thompson treasurer and J. M. Malloy secretary.

### Owyhee County.

The War Eagle Con. M. Co. will continue Sinker tunnel in War Eagle mountain, near Silver City, under management of H. L. Woodburn. When work was suspended a year ago the tunnel was in 6350 feet. It will pass beneath the summit of War Eagle mountain at a depth of over 2000 feet and will develop a large number of valuable properties. A 16-inch air pipe of No. 24 iron exhausts the air from the tunnel. The tunnel is 8x9 feet and has a tramway laid with 30-pound rails.

### Shoshone County.

The total output of silver in the Cœur d'Alene district for 1903 was 5,471,620 fine ounces; that of lead was 207,382,448 pounds.

### Washington County.

L. Gilson, of the Idaho Gold Coin Co., in the Black Lake district, Seven Devils region, reports the new 150-ton milling plant to be working satisfactorily. The mine and mill are connected with a 2-mile tram and with one shift and a force of five men is handling seventy-five tons of ore per day. Next spring the plant will be worked up to capacity. The amalgamation and cyaniding makes a saving of over 90% of the ore value.

At the Wardenhoff the big tunnel is in 750 feet. Ninety men are employed in the entire camp. Weiser is the supply point for these mines.

## KANSAS.

During 1903 Kansas produced 1,118,000 barrels of oil. The production up to November 30, 1904, has been 4,827,756 barrels. A year ago there were less than 1500 producing wells in Kansas and the Indian Territory. Now there are more than 4000, and the number is increasing at the rate of 400 per month. J. O'Brien, assistant general superintendent for the Standard Oil Co. in Ohio and Kansas, says the 8-inch pipe line to Whiting, Ind., of which 175 miles has been laid, will be paralleled in the places where the capacity of the line will be retarded, and later the entire line will be doubled.

## MONTANA.

### Beaverhead County.

The Indian Queen mine at Farlin, in the Birch creek district, is being developed by the Amalgamated C. Co. A contract has been let at Farlin for 140,000 feet of lumber for timbering the Indian Queen. The old winze is being retimbered and the shaft is to be sunk to 1000 feet, with a pump station at the 300-foot level. The McKinley M. Co., operating at Argenta, is contemplating putting up a mill. A 50-foot shaft is being sunk and crosscuts driven on the Snowball in the Birch Creek district, owned by J. G. Jewell of Dillon and B. Stanfield of Farlin.

### Broadwater County.

R. A. Bell is shipping ore from the East Pacific, near Winston. The capacity of the mine is to be increased by placing a cage in the shaft and the addition of another boiler.

### Fergus County.

It is reported that A. S. Wright of Gilt Edge will reopen the Spotted Horse mine. The Gold Reef mine, near Gilt Edge, have put in sawmill machinery for framing the mine timbers and a condensing plant. The company has bought coal teams and wagons and hereafter will haul its own coal instead of contracting it. The mill has been enlarged and repaired. The company now employs eighty-five men.

### Granite County.

L. C. Parker of Deer Lodge is working fifteen men on the Mammoth mine, near Garnet, Granite county, owned by S. E. Laribie of Deer Lodge.

### Jefferson County.

The Eva May mine, owned by the Montana Mineral Land Development Co., and located in Cataract district, is being worked under superintendence of J. Hume. E. J. Wexel of Pittsburgh is interested. Work is done with three shifts. The company will sink 300 feet deeper, to 1000 feet depth, and drift east and west when the vein is cut at the 900. The 400-foot drift is to be lengthened to 1000 feet.

A. M. Morgan is developing the Bob Ingersoll claim, 1½ miles from the Eva May.

### Lewis and Clarke County.

The American S. & R. Co., owning the smelter at East Helena, has announced a reduction in smelter charges to conform to the reduction in rates made by the Montana Central Railway on the lower grades of ore produced at Neihart. The railway company cut down the freight rate on ores running between \$15 and \$25 a ton in silver from \$2.50 to \$1.50 a ton, and the smelter now reduces its charges on the same basis, making a saving to the

producer on this class of ores of \$2 a ton.

Near Unionville, 4 miles south of Helena, the Whitlatch Co., working the Whitlatch Union, have sunk a three-compartment working shaft 425 feet and are crosscutting. F. L. Sizer is manager.

The Pittsburg & Montana M. & S. Co. of Butte have the Spring Hill claims, 4 miles south of Helena, and are preparing to ship the iron sulphide ore to their smelter in Butte.

### Silver Bow County.

The ore hoisted by the Butte mines between June 1, 1903, and June 1, 1904, was as follows:

Companies.	Tons.
Boston & Montana	988,865
Anaconda	983,001
Colorado	206,035
Parrot	165,108
Butte & Boston	202,256
Montana Ore Purchasing Co.	212,080
Original	278,776
Hypoka	118,817
Speculator	90,352
Johnstown	15,895
Alice	7,316
Clark Leases	8,000
Lexington	3,825
Goldsmith	3,000
<b>Total</b>	<b>3,296,651</b>

The gross value of the ore extracted by the several companies is as follows:

Companies.	Value.
Boston & Montana	\$12,720,281.97
Anaconda	10,761,472.83
Colorado	1,016,497.20
Parrot	1,270,627.32
Butte & Boston	1,576,622.02
Montana Ore Purchasing Co.	1,064,014.80
Original	2,426,000.00
Hypoka	750,051.42
Speculator	761,667.36
Johnstown	271,829.90
Alice	48,684.48
Clark Leases	8,369.85
Lexington	43,489.08
Goldsmith	200,000.00
<b>Total</b>	<b>\$34,149,641.24</b>

The monthly payroll of the mines at Butte is summarized by the Anaconda Standard:

Companies.	Men Employed.	Monthly Payroll.
Amalgamated Copper Co.	6,870	\$1,130,000
W. A. Clark	1,000	100,000
Heinze	1,000	100,000
Pittsburg Co.	280	30,000
Speculator Co.	250	25,000
Leasers of mines	350	35,000
Alice Co.	50	5,000
Lexington Co.	40	4,000
Reins Co.	45	4,500
Raven Co.	40	4,000
Blackrock Co.	30	3,000
Montana Zinc Co.	30	3,000
Jennie Dell Co.	30	3,000
<b>Totals</b>	<b>10,015</b>	<b>\$1,446,000</b>

### Teton County.

The well of the Swift Current-Boulder Oil Co. of Butte has been drilled 1700 feet through shales, and will be cased before drilling further.

## NEVADA.

### Goldfields District.

Goldfields, in Nevada, was revisited in November of this year by J. E. Spurr, of the United States Geological Survey. This district lies 23½ miles south of Tonopah, and was located late in the spring of 1903. Shortly after the discovery of gold in this district it was visited by Mr. Spurr. A little work was then in progress on what is now known as Columbia mountain, but up to that time no good strikes had been made. In January and February, 1904, however, rich finds were made in certain spots south of Columbia mountain. The district has now a population of 6000. The town of Goldfields has sprung up, and a number of small adjacent camps have been established. It is estimated that up to the present time \$2,000,000 worth of ore has been shipped from the district. Most of these shipments have been made in the last five months. This district is bounded on the west by a lava-capped mesa, the erosion of which has laid bare the underlying gold-bearing rock. The auriferous region is characterized by numerous low, irregular ridges standing out from the lower and more nearly level surface. These ridges owe their origin to hard reefs of quartz which form their crests. Their resistance to erosion has left them protruding thus above the general elevation, and in these quartz reefs the auriferous deposits are found.

Near the south end of Columbia mountain the rock is alaskite (an igneous rock consisting of quartz and feldspar), which is sometimes of granitic structure, and sometimes very fine grained, even resembling quartzite. White mica or muscovite is sometimes present, and pure quartz veins or dikes of similar origin also occur. These alaskitic rocks are intrusive into a dark siliceous rock (jasperoid), which is probably the result of the silicification of an original limestone. On the north end of the mountain the rock is an altered rhyolite; in this rhyolite are broad masses of white to purplish and reddish cherty quartz, which extend irregularly in a northerly direction. This quartz is a highly silicified rhyolite. The silicified areas have ill defined walls, and the highly mineralized portions which

they enclose are very irregular. The area of known ore bodies has spread since last year so far beyond Columbia mountain that values are now found over an area 6 miles square. The most productive area measures 2 to 2½ miles in either direction. The chief mines at the present time are the Jumbo, the Combination, the January and the Florence, all grouped together about a mile south of the southeast end of Columbia mountain. Some 5 miles southeast of Columbia mountain is the Diamondfields group, including the Vernal, the Quartzite, and Black Butte, from which shipments have also been made. Other ore deposits have been developed in various parts of the field. The rocks of Columbia mountain, Diamondfields, and the Jumbo group of mines were found to be rhyolites, rhyolite tuffs, andesites and basalts, all probably of Tertiary age. The alaskite and jasperoid of Columbia mountain are hardly represented in the surrounding district, although at the Tonopah Club (mine) a patch of probable jasperoid (silicified shaly limestone), in this case constituting the ore, was seen. The predominant rocks are abundant rhyolites and andesites, while basalt is rare. One andesite examined microscopically from near the Tonopah Club is a hornblende andesite, resembling the early andesite at Tonopah; a patch of basalt from near the Florence is an augite basalt, like the basalt of Siebert mountain at Tonopah. The rhyolite resembles the rhyolite of the Gold Mountain district, which lies about 4 miles south of Tonopah, on the road between Tonopah and Goldfields; and this Gold Mountain rhyolite, again, resembles closely some of the phases of the earlier rhyolite at Tonopah. The relative age of the rocks at Goldfields has not been determined, but it probably corresponds to that of similar rocks at Tonopah. At Goldfields the ores occur in both rhyolites and andesites, showing that mineralization occurred subsequent to the eruption of both lavas. At Gold Mountain the deposition of the ores evidently followed the eruption of the rhyolites, and at Tonopah the eruption of the earlier (dacitic) andesites was succeeded by a period of mineralization which produced irregular veins that frequently carry a larger proportion of gold than the locally more important veins formed after the eruption of the early andesite. There is, therefore, the possibility that the Goldfields deposits are identical in origin with the later series of veins at Tonopah. Indeed there are at Tonopah, in one place at least, mineralized quartz reefs in rhyolite tuffs that have the same peculiar characteristics as the tuffs of the Goldfields reefs; and assays of these Tonopah deposits, as was known to Mr. Spurr two years ago, have shown a moderate amount of gold and no silver.

At Goldfields there are no definite veins. The outcrops of the quartz bodies are irregular, straggling, branching, and apt to disappear suddenly. Neither were any definite systems observed, though further study might reveal them. There seems, however, to be a tendency to elongation in a northerly direction. The outcrops may even be nearly circular, or crescentic, and frequently they are roughly lenticular and intermittent. The quartz itself is gray and jaspery; it is almost entirely due to the silicification of the volcanic rock in which it occurs. Practically no ordinary crystalline vein quartz was observed. All indications show that this silicification (and the accompanying mineralization) is the work of hot springs, and that these irregular reefs represent the horizontal sections of columns of rocks traversed by rising columns of hot water. Had the rocks been strongly fractured we should have had veins, like those of the early andesite at Tonopah, which were also probably due to hot spring action; but at Goldfields the lack of such a fracture system resulted in this curious and rather unusual type of deposit. It follows that the quartz reefs will probably as a rule extend deeper vertically than horizontally, and so have roughly the nature of columns or pipes. Although showing disseminated pyrite, the greater part of one of these jaspery quartz reefs contains little or no gold. Microscopic investigation has shown in one case that in such quartz the iron of the pyrite is probably mainly indigenous—that is, that the iron sulphide has been formed by the action of sulphur contained in the hot spring waters upon the iron silicates contained in the hornblende and biotite. This explains the absence of gold, as the pyrite has the same origin as the barren pyrite near the ore bodies in the country rock at Tonopah. Within some of these barren reefs of silicified volcanic rock at Goldfields, however, prospectors have sometimes discovered portions containing gold, even in large quantities. Such portions are usually lenticular or irregular, like the main quartz reefs, and they are not easily distinguishable from the barren



quartz, except by panning or assaying; but it seems probable that these shoots are the real ore deposits, and that the mass of the reefs constitutes merely a siliceous jacket or casing, such as is shown to surround ore bodies in some other parts of the world. While this siliceous casing may be 25 or 30 feet wide, the auriferous portion may be only 1 to 2 feet; and the form and extent of this portion become evident only after the ore has been extracted. It is then seen to have a definite channel-like shape, often more regular than that of the whole outcropping reef, though it has usually a limited extent in the direction of its greatest elongation. It seems probable that these pay shoots represent the main channels of hot water circulation, while the siliceous casings are the result of the water soaking through the adjacent rock. The ores are often of very high grade. As an extreme example may be noted a shipment of 14 tons from the Sandstorm (Kendall claim), which when worked in a stamp mill yielded \$45,783 net, while the tailings still contained about \$1000 to the ton. From the McKane-Bowes lease on the Jumbo, \$600,000 was taken out in five months from a space 100 feet horizontally and 200 feet vertically on the shoot. One small shipment of 917 pounds of ore from this lease gave gross returns of \$4766. The whole production of the camp has been from ore which may be roughly estimated as averaging \$200 to \$300 per ton, or more. The values are all in gold—silver is usually practically absent—although the shipping ore from the Combination mine contains from 1 to 3 ounces. It is important to consider the origin of this rich ore in order to make prophecies for the future. Most of that which up to the present time has been extracted has been oxidized ore. The ores are mixed sulphides—usually pyrite and oxides—clear up to the surface. The oxidized material, which follows cracks and seams, is usually several times—sometimes several hundred times—as rich as the unoxidized portion. The irregular spongy nature of the free gold particles in such oxidized material completes the proof that this gold has been dissolved and re-deposited in a concentrated form during the process of oxidation. Iron sulphate derived from oxidation of the pyrites is the probable agent. Other sulphates, such as alum and gypsum, are abundant. These oxidized ores are prepared for shipment by screening, the fines being shipped and the coarse quartz rejected. As the water level at Goldfields is usually high for this desert country—water having been encountered in several shafts at from 150 to 200 feet—it is plain that this oxidized ore is only a temporary supply. In the Combination and the Florence, however, sulphide ores of very high grade have been found below the oxidized zone. In these mines a dark gray copper-bearing mineral, which is very rich, is most intimately connected with the gold. A specimen from the Combination, analyzed by Dr. Hillebrand, proves to be a sulpho-salt of copper, antimony and arsenic, which, so far as qualitative composition goes, may be tetrahedrite. Tellurium is also present in this ore, and the same element has been reported elsewhere in the district. Therefore, the sulphide ores may be very rich. Moreover, while the difference between the oxidized and the unoxidized portions of the ores within the zone of oxidation is in general so great, certain shoots occur, as in the January and the Jumbo, where the unoxidized quartz of this zone is of extremely high grade. Such ore appears to be mostly pyrite, but in view of the fact that tellurium is found in the district, it is very possible that gold telluride may be present. It appears probable that the rich oxidized ores owe their richness not primarily to concentration during oxidation, but to the existence of shoots of rich antecedent sulphide ore. It is probable that some of these sulphides are primary, while others have been formed subsequently to the main silicification of the reef, as in the Combination mine. Here the rich auriferous sulphides have formed in a broken zone in the silicified barren reef, and occur as seams and often as coatings on the pebbles in the breccia. The question arises, however, as to whether the subsequent mineralization was the result of descending or ascending waters. Concerning this the evidence is not conclusive, but there is no sufficient evidence that these rich ores have been concentrated from the lean antecedent quartz mass. The presence of elements like arsenic, antimony and tellurium in the subsequent sulphide ore suggests a deep-seated origin. Beside the element mentioned above, bismuth occurs in the ore. In the January it occurs in the oxidized ores in the form of silvery scales, which is, as determined by Dr. Hillebrand, bismuth—perhaps the oxide bismite. In the Combination, long needle-like crystals have been found, which, according to the man-

ager, Mr. Collins, give the chemical tests for bismuth sulphide—bismuthinite. The silvery mineral above noted is sometimes found in the January, arranged in long rod-like forms, and these are probably pseudomorphs after the sulphide. In the January this silvery mineral is usually, but not always, an indication of rich ore. Barite is a common mineral in all these deposits, but is not abundant. The indications are, therefore, not unfavorable to the continuance of high grade, or at least good grade, ores down to considerable depths. There is, however, as has been already demonstrated by exploitation, no continuous regularity to the ore shoots, whether sulphide or oxidized. They are curving, irregular, and often lenticular, but it may happen that below a shoot which has come to an end another shoot may be found occupying a slightly different relative position, or even overlapping the first. Similarly, the main quartz masses as a whole can be expected to show little regularity in depth; they may increase in size, or diminish, or even disappear, at least temporarily.

#### Lincoln County.

F. Palmer, president of the Louisiana Purchase M. & M. Co., has bought four copper claims, 11 miles east of Caliente, from H. Empey and W. Keele, and will develop them.

#### Nye County.

The Pacific Construction Co. of San Francisco, Cal., H. L. Willis local superintendent, has laid 8-inch pipe to Tonopah from Rye Patch, where fifty wells have been sunk to supply water.

Electric power will undoubtedly be supplied to operate the gold mines of Tonopah and Goldfield, but it does not seem likely that each of the following apparently well authenticated statements can be true. The Tonopah Bonanza says that the Owens River Water & Power Co. has begun the actual work of constructing their power plant upon the Owens river. They have purchased the land and water rights held by W. C. Watson and associates and those of Booth, Brougher & Parker, so that they have 6 miles of the river. The Owens river is the only stream within a radius of 150 miles of Tonopah that does not freeze up during the winter months. One of the reasons is its large volume and the large flow of hot water into the river from the Diablo hot springs. This insures continuous power every month in the year. W. E. Condon is at work with a party upon the final surveys for the hydraulic development and transmission line. This power will be distributed both to Tonopah and Goldfield, and the line will go as far south as Bullfrog if the demand for current warrants the expenditure. Specifications for the electrical machinery and water wheels are ready and the contracts will be let at an early date. The company intends installing three 1500 K.W., 25-cycle generators in their first power house. The distance from the power house to Tonopah is 87 miles and to Goldfield 78 miles. This line will pass through Silver Peak. The surveying corps will reach Tonopah about Jan. 5th.

E. DeSaba and J. Martin of the Bay Counties Power Co. and F. Drumm of the Tevis estates will build an electric power line 120 miles into Tonopah and Goldfield from Lavinia and Rush creeks, which flow into Mono lake. T. L. Oddie of Tonopah is interested.

### NEW MEXICO.

#### Grant County.

The North American M. Co. of the Lordsburg district has put in power drills. —S. W. Maltbie of the Boney M. Co. of the District of Columbia is in Lordsburg developing claims purchased in the Lordsburg district.

#### Rio Arriba County.

A rich platinum strike is reported on the Piedra lumber grant, on which J. Carpenter of Denver, Colo., holds an option. The Bromide district is 14 miles west of Tres Piedras, in the Conejos range. Burnt mountain and Kiowa mountain form natural boundaries on the north and south, and the Tusas and Vallecitas rivers on the east and west. The Western Review gives an extended account of the prospects of this region, showing that much development work is yet to be done. The ore is a gold and silver proposition with a copper base. The shaft of the Sixteen to One, owned by Green Hall, is down 150 feet. The Danbury, belonging to J. P. Rinker, is down 100 feet with crosscut. The Whale has a 50-foot and a 100-foot shaft; belongs to estate of A. Royal. The Keystone M. Co. has a 250-foot shaft with hoist and engine on the Payroll. The St. Michael M. & M. Co., R. Cole, manager, have developed with a combination hoist and 60 H. P. boiler. The Tusas Peak G. & C. Co., F. Bolton, manager, are developing the Tampa through a 390-foot shaft, which is to be continued to 500-foot level. The Straw-

berry, operated by the New Mexico M. & M. Co., has a 60 H. P. boiler, hoist and Norwalk compressor and pump. An electric drill has been put in the 700-foot tunnel of the Dillon Development Co.

#### Sierra County.

R. Woolsey has returned to Hillsboro from a trip East, where he organized a company to work claims in the placer fields, near Hillsboro.—The Empire G. M. & M. Co., owning the Good Hope-Bonanza mine and mill, near Hillsboro, estimates that the output for December will be \$6000.

#### Socorro County.

The Kelly mine at Kelly is employing seventy-five men and producing fifty tons of ore daily. L. A. Babcock is superintendent.—Under the management of J. Brown the Graphic mine, near Magdalena, is producing six cars of zinc ore a week, employing thirty-five men.

#### Taos County.

The Red Fissure M. & M. Co. of the Bromide district is planning to put in machinery for treating of ore. The workings have reached the 300-foot level.

### OREGON.

#### Grant County.

At the Copperopolis mine, Quartzburg, Manager W. W. Gibbs states that the new tunnel has reached the Copperopolis vein, it having been thrown farther than was first estimated. The ore is chalcopyrite in quartz gangue, estimated to carry 12% copper, \$15 gold and 3 ounces of silver per ton.

J. Waddell, manager of the Prairie Diggings mine, near Prairie City, says that the Jupiter G. M. Co. of Ann Arbor, Mich., will resume mining and milling operations at the Prairie Diggings in the spring.

#### Josephine County.

At the Golden Spike claim on Wagner creek, near Talent, the main tunnel is in 670 feet and 180 feet of shaft has been sunk to connect with the tunnel.—J. T. Pierce & Co. of Gold Hill have bonded land on Kanes creek and are prospecting with two drills, intending to put in a dredger.—The Lois mine on Briggs creek, operated by the Lois M. Co. of Portland, N. M. Bain manager, has 270 feet of tunneling and is milling with an arrastra, run by a water turbine wheel. Development work will be continued all winter and next summer, if the ledge continues to show up good; a large mill will be erected.

The Crescent M. & M. Co., owning eighty acres of land on the Applegate, near Murphy, are developing their ledge and may put in a 10-stamp mill. C. Richton, secretary and manager, is at the mine. A. A. Pompe of Vancouver, Wash., is president.—The Maid of the Mist, on Thompson creek, owned by H. M. White of Portland and B. Thurston of Applegate, has 180 feet of development work.

The Strong ledge on Applegate, near Murphy, has been bought by the Michigan M. & M. Co., C. D. Peters, president, and R. L. Sowers, secretary and treasurer, at Charlotte, Mich. W. T. Perry of Portland is vice-president and manager. The 100-foot shaft will be sunk another 100 feet and drifts will be run at the 50-foot level and 100-foot levels. If sufficient water can be had from the mine, the mill will be placed at the mine, otherwise on the banks of the Applegate river,  $\frac{1}{2}$  mile from the mine, and the ore transported by a gravity tram.

The metal occurring as black, irregular nuggets which has been found in the placers of western Josephine county has been identified by the chemists of the United States Geological Survey as a natural alloy of nickel and iron, containing 23.36% iron and 60.47% nickel, from which is deduced the chemical formula  $Fe_{1.5}Ni_{1.5}$ . It differs from meteoric iron in containing no phosphorus. The nuggets range in size from that of a grain of sand to a goose egg. They are found particularly along the serpentine belt of western and southern Josephine county. This is the only district in the world where the strange alloy is known to exist. It has been called josephinite.

### SOUTH DAKOTA.

The report of Thomas Gregory, State Mine Inspector, gives the production of the mines of the State as \$7,090,481.71 in gold bullion for the twelve months ending November 1, 1904. There are 3500 workers in the mines, and the average daily pay of the miner is \$3.50; helpers, \$3; and ordinary shovelers and mill hands, \$2.50. The average daily tonnage milled is 5700.

#### Lawrence County.

The Victoria M. Co. has elected A. B. Smith of Omaha president; A. C. Smith, Omaha, vice-president; A. J. Malterner, Deadwood, treasurer; J. C. Carson, Deadwood, secretary; W. M. Glass, Omaha, managing director; G. S. Jackson, Dead-

wood, general manager. The company decided to erect a 200-ton cyanide plant at its mine on Spearfish creek at Maurice station in the spring. The plans drawn by J. Hartgering, millwright, were accepted. The mill will be built close to the Burlington standard gauge track, and the ore will be trammed about 3000 feet.—The Custer Peak M. Co. will put up an experimental plant on its property south of Custer Peak.

The Victoria G. M. & M. Co. will put in a 200-ton dry crushing cyanide mill near Maurice station, on the Spearfish branch of the Burlington railway, 1300 feet from the mine. An aerial tram of this length will deliver the ore. The mine will be equipped with electric cars that will dump automatically into the buckets of the tramway. Steam will be used for power. J. Hartgering is millwright; G. S. Jackson of Deadwood, general manager.—The Imperial mill at Deadwood is treating 4000 tons per month, and making a gold production of \$22,000. Plans are made to increase the leaching capacity of the mill 50%. W. S. Elder of Deadwood is president of the Imperial G. M. Co., and T. J. Milliken mill superintendent.

#### Pennington County.

The Black Hills Electric Power & M. Co. controls 1280 acres of mineral and timber land and several miles of water rights on Rapid creek, between Mystic and Pactola, to expend about \$15,000, and will put in a placer plant with a capacity of 2500 yards of gravel daily. S. E. Ockerlund, Chicago, is president; C. A. Hutchinson, Chicago, secretary; J. F. Skeel, Joliet, Ill., treasurer.—At Keystone the Lucky Boy mine is being developed by J. G. Mattes. On the 300-foot level drifting and crosscutting is being done.—F. H. Long of Keystone expects to put a mill on the Bullion.

The Gopher M. & M. Co. of Hill City has bought the 5-stamp mill of the Sunnyside Co. and will remove it to the Gopher mine. The plant will be completely overhauled and some new machinery added to complete the equipment. A. D. Arundel is the general manager.

### UTAH.

#### Salt Lake County.

Manager A. L. Jacobs of the Butler-Liberal at Bingham says that they will be shipping copper ore by the first of the year. J. Langton is secretary of the company at 221 State street, Salt Lake City, Utah.

The management of the Boston Con. at Bingham has resumed ore shipments, after a shut-down of over a month. During the year the Boston has mined 50,000 tons of ore, treated at the Bingham Con. smelter. L. S. Cates is superintendent of the Boston.

#### Summit County.

At the Comstock, at Park City, Superintendent J. Hickey and Manager M. Dusseldorf have ordered a 5-drill Rand compressor, piping, hose and other materials and equipment, and a large water heater to be used with the boilers.

Manager W. I. Snyder of the California mine, near Park City, says that the property has been turned over to the stockholders and that all indebtedness would be cleared off by the first of February, after which the development of the mine will be continued.

### WASHINGTON.

#### Ferry County.

D. F. Anderson of Rosalia, president of the Belcher Co., says that the company will put in a compressor at the Belcher mine, near Republic. A wagon road from West Fork has been completed. They are working twenty-five men on the Mountain Boy and are shipping silver ore.

### FOREIGN.

#### AUSTRALIA.

##### New South Wales.

The gold yield of New South Wales for November amounted to 37,087 ounces, valued at £125,224. The yield for the first eleven months of the present year was 284,582 ounces, valued at £1,024,736.

##### Western Australia.

The output of black tin for the year showed an increase compared with 1902 of £16,107, with an excess of 197 tons, or an increase in tonnage of 32%. The quantity of coal showed a decrease of 7457 tons, the value of the output being £17,060 less than that of the previous year, owing to the stoppage of the Collie Proprietary mine because of a labor dispute. Boring operations for coal are being carried on near Mingenew. The copper ore produced during the year was 20,526 tons, valued at £56,541, as against 2262 tons for 1902.

The production of silver, obtained as a bye-product, was 168,113 fine ounces, valued at £19,153. The production of



ironstone and limestone was 220 tons and 1280 tons.

The report of the Department of Mines shows that the value of the total mineral output for 1903 was \$8,971,937, an increase of 11% on the value for 1902, 97% of this being gold; the total gold output for the year being valued at \$8,770,719. The number of men engaged in gold mining was 20,716. The gold output was 2,064,801 ounces. East Coolgardie showed an increase of 157,012 ounces, Murchison 30,977 ounces, East Murchison 11,587 ounces, North Coolgardie 10,410 ounces, Broad Arrow 10,294 ounces, and West Pilbarra 5936 ounces. There were sixteen State batteries—seven equipped with cyanide plants, one tin dressing plant and one Huntington mill in operation—treating 49,233 tons, yielding 58,305 ounces, valued at \$221,567, an increase of 25% over 1902, and an increase in gold of 1050 ounces. The total tonnage cyanided for the year amounted to 32,369 tons, which produced 6582 ounces fine gold, valued at \$28,016. The value of gold produced by battery and cyanide treatment during the year amounted to \$249,583.

## BRITISH COLUMBIA.

The ore shipments for November from mines in Kootenay and southern Yale were: Bluebird at Sandon, 20 tons; Slocan Star at Sandon, 264; Payne at Sandon, 17; Reco at Sandon, 87; Ruth at Sandon, 29; Black Grouse at New Denver, 30; Idaho at Three Forks, 40; Ivanhoe at Sandon, 130; Club at Slocan Lake, 6; Graphic at Slocan Lake, 4; Neepawa at Slocan Lake, 30; Ottawa at Slocan Lake, 130; Rob & Robin at Slocan Lake, 2; Wakefield at Silverton, 24; Enterprise at Slocan Lake, 20; Kokanee Chief at Kootenay Lake, 17; Lucky Boy at Trout Lake, 20; Triune at Trout Lake, 30; Silver Cup at Trout Lake, 126; Silver King at Nelson, 100; Iron Mask at Kamloops, 278; Alice at Creston, 52; Alice at Creston, 39; St. Eugene at Moyie, 572; St. Eugene at Moyie, 488; St. Eugene at Moyie, 666; American Boy at McGuigan, 21; North Star at Kimberley, 222; Last Chance at Sandon, 42; Lucky Jim at Bear Lake, 97; Vanmoerkkerke at White-water, 15; Whitewater at White-water, 24; Hunter V. at Ymir, 24; Hunter V. at Ymir, 940; Hunter V. at Ymir, 302; Hunter V. at Ymir, 1159; Kootenay Belle at Erie, 20; Queen at Salmto, 20; Relief at Erie, 20; Ymir at Ymir, 209; Le Roi No. 2 at Rossland, 2070; Center Star at Rossland, 9433; War Eagle at Rossland, 5023; Jumbo at Rossland, 1728; White Bear at Rossland, 120; Athelstan, Boundary district, 744; Brooklyn, Boundary district, 848; Brooklyn, Boundary district, 6140; Emma, Boundary district, 591; Emma, Boundary district, 156; Emma, Boundary district, 1563; Stemwinder, Boundary district, 610; Stemwinder, Boundary district, 336; Sunset, Boundary district, 1120; Arlington at Erie, 93; Granby mines at Phoenix, 44,670; Oro Denoro, Boundary district, 139; Senator, Boundary district, 314; Skylark, Boundary district, 40; Mother Lode, Boundary district, 11,730; Last Chance, Boundary district, 30; Elkhorn, Boundary district, 44; E. P. U., Boundary district, 20; Providence, Boundary district, 20; Le Roi, at Rossland, 10,327. Total, 104,337.

### Boundary District.

At the Nickel Plate the 3½-mile tramway from the mine to the mill at Hedley City has been in operation for several months. The 40-stamp mill has been running since June, and it is stated that it is to be increased to 100 stamps by the Daly Reduction Co. It is on the east side of Twenty-Mile creek. M. K. Rodgers is manager.

The Montreal & Boston Con. Rawhide mine at Phoenix is shipping to the company's smelter at Boundary Falls, where the second furnace has been blown in. The 300-foot tramway is working in good shape.

The British Columbia Institute of Assayers met recently and elected the following officers to serve during 1905: President, W. F. Robertson, provincial mineralogist, Victoria; vice-president, A. J. McNab, Canadian Smelting Works, Trail; secretary-treasurer, A. A. Cole, Center Star mine, Rossland. The following were elected members of the council: J. C. Welch, smelter manager, Montreal & Boston Copper Co., Boundary Falls; A. McKillop, Nelson; T. Kiddie, smelting manager Tyee Copper Co., Ladysmith; H. Carmichael, provincial assayer. The following scale of minimum assay charges is recommended by the Institute for use throughout the province:

### FIRE ASSAYS

Gold	\$ 1.50
Silver	1.00
Lead	1.00
Gold, silver and copper in one sample	3.00
Gold, silver and lead in one sample	3.00

### WET ASSAYS.

Alumina	2.50
Antimony	5.00
Arsenic	5.00
Chromium	5.00
Cobalt and nickel, not separated	5.00
Cobalt, separate from nickel	10.00
Copper	2.00
Iron	2.00
Lead	2.00
Lime	2.50
Magnesia	3.00
Manganese	5.00
Nickel separated from cobalt	10.00
Phosphorus, rough determination in an ore	5.00
Silica	3.00
Silica, insoluble matter, no fusion	1.00
Sulphur	3.00
Zinc	2.50

For control work, i. e., assayed in duplicate, add 50% to above figures. For umpire work, i. e., assayed in triplicate, or more, double above figures. Discounts—When five samples are submitted at one time, 10%; when ten or more samples are submitted at one time, 20%. "The Extraction of Oil in Oil Concentration Products," by L. C. Wynne; "The Determination of Silver in the Sulphide Ores of the Slocan," by D. Lay, were read.

### Nelson District.

The discovery of 10 feet of good ore in 600 feet on the crosscut level and 500 feet below 10 feet of similar ore on the surface indicates that the Foghorn at Ymir has a continuous shoot. C. Wolfe, superintendent of the Golden Monarch Co., owning and operating the Foghorn, expects that a milling plant will be put in.

### New Westminster.

J. C. McClure has found fire clay 3 miles from Abbotsford. The first deposit discovered at Matsqui, B. C., was found to contain sufficient iron to render it of no value as fire bricks, though it was suitable for building bricks and other purposes. The present deposit contains but 1.8% iron.

### Slocan District.

The annual report of the Hastings Syndicate, operating the Arlington mine at Erie, shows a year of profitable work. Leslie Hill, the local manager and engineer, reports that the ore shipped to the smelter realized \$47,300 after deducting cost of freight and treatment. During the year 1170 feet of development work was accomplished, at a cost of \$7.66 per foot. The 1086 tons of clean ore shipped to the smelters averaged, gold \$52.40 a ton, silver \$3.73. The net profits were \$14,666. A cyanide plant will be put in at the Chateau mine, near Slocan City, by Fred Stock, who has leased the property. Twenty-five and thirty men are employed in two shifts, and two cars of the best ore are being sent monthly to the Trail smelter.

### Yale District.

(Special Correspondence).—M. K. Rodgers, representing the Daly Reduction Co. of Montana, and manager of the Nickel Plate mine at Hedley, Similkameen, B. C., has bonded the Maggie group, on the Bonaparte river, north of Hat creek, from Wm. Hocking and L. M. Harley of Butte, Mont., for \$2400. The ore occurs as brass-yellow octahedral crystals in a cherty quartz of the Cache creek formation, which extends 60 miles from Spence's Bridge, on the Thompson, to north of Clinton, with an average width of 5 miles. It contains thin beds of limestone, dark argillites, cherty quartzites and serpentine. The eruptives are decomposed diabase-porphyrates.

Ashcroft, Dec. 20.

## CANADA.

### Ontario.

At the Williams iron mine, on the Algoma Central Railway, north of the Soo, new bodies of hematite ore have been struck, showing 23 feet of clean ore with 10 feet of second-grade ore, in a total width of 60 feet. This is a new field. North of Temagami iron pyrites and arsenical pyrites prospects are promising. The Huronian Co., a subsidiary of the Canadian C. Co. of Copper Cliffs, is completing water-power works at the falls on Spanish river, 4 miles north of the Canadian Pacific Railroad, at Turbine. They are to be of concrete, and 11,000 H. P. is to be developed. It is expected that the copper company's mines and smelters will be operated by this power next year at a much lower cost.

J. Wharton of Philadelphia, Pa., has extracted 3000 ounces of palladium from 300,000 tons of refuse from the nickel smelting furnaces of Sudbury. Palladium is of value because of its high fusing temperature, which makes it suitable for crucible evaporating dishes and in the chemical laboratories, while its silvery appearance and non-corrodible property makes palladium valuable to the maker of delicate instruments, such as chronometers, verniers, surgical instruments, etc. Palladium is not mentioned in any of the reports of the Dominion of Canada or in the metallic and mineral resources of the Dominion.

### Yukon Territory.

L. Bergholz, American Consul at Dawson, gives the following information to the Department of Commerce and Labor: The Yukon Territory, which prior to 1898 formed a part of the Northwest territory, has an area of 196,976 square miles, 196,327 being land and 649 being water; the population is estimated at 12,000, of whom 7200 are Americans. It is purely a mineral country and has produced since 1885, when the output of gold was first recorded, to the end of 1903, \$97,063,500 in gold. During the same period the gold mined in the Saskatchewan district was valued at \$292,946; in the Province of Ontario, \$2,086,393; in the Province of Quebec, \$103,940; in the Province of British Columbia, \$40,545,398, and in Nova Scotia, \$9,318,984; a total of \$52,347,661. Dawson has a population of 3500 persons, the Americans with 2450, greatly predominating and forming 70% of the total. The city is easily reached during the season of navigation (from about May 15 to October 10) in six to eight days from Seattle, Wash., or Vancouver, B. C., by three lines of steamers to Skagway, Alaska (three to four days), where connection is made by rail to White Horse (one day), the head of navigation on the Yukon river. From White Horse the White Pass Line runs comfortable boats to Dawson in from three to four days. The company operates, between White Horse and Dawson, twelve vessels and five barges, with capacity of 3500 tons. During the season of 1904 it handled 22,417 tons and carried 4932 passengers. Passenger rates from Seattle to Dawson are \$80 first class and \$65 second class. Freight rates from Seattle to Dawson by the carload are \$3 to \$4.25 per 100 pounds. Commodity rates from the Pacific coast points during the midsummer are \$2.37 per 100 pounds. From Dawson the rates to Eagle, Chena or Fairbanks, and Fort Gibbon, Alaska, are, per ton, \$10, \$70 and \$40, respectively. The White Pass Rail Division between Skagway and White Horse, 111 miles, operates daily passenger and freight service, with a capacity of at least 5000 tons a day. The company is under the Canadian flag, but American capital is largely invested in it. There is a second though much longer route, taking twenty-three days, from Seattle to Dawson by way of St. Michael, Alaska. Two steamboat lines, both American, run on the lower Yukon river between St. Michael and Dawson—the Northern Commercial Co. and the North American Transportation & Trading Co. The former operates twenty-two steamers and barges, with a total net tonnage of 7851 tons, and the latter nine steamers and barges, with a total gross tonnage of 6083 tons. The passenger rate by these two lines is \$125 from Seattle to Dawson, and the average rate per ton on freight is \$60. Besides the boats of the above companies, there are eleven independent steamers, American and Canadian, plying between White Horse and Dawson and points in Alaska on the Yukon river. Some of these have comfortable accommodations for passengers. Postal rates from the Yukon Territory are the same as from other points in the Dominion of Canada. From October to May, only first-class matter and single copies of newspapers are brought (by stage) by the postal authorities to Dawson. Other mail matter will, if requested, be forwarded by express on the stage, the charge to be paid by the consignee.

## MEXICO.

### Chihuahua.

On the Cusihiuiriachic district, 85 miles west of Chihuahua, Jones and Dixon are prospecting and developing near the Josephina. The 70-foot shaft is to be sunk deeper. MacManus and Urueta have the Santa Rita shaft down 121 feet. They have put in a gasoline hoist, and expect to have their water jacket furnace in operation early in the new year: the La Reina mine, worked by C. Barbier and F. Ramirez, has been producing silver by pan-amalgamation since April; at Milpillas, 18 miles southwest of Cusihiuiriachic, the lead mines are attracting attention and a number of denouncements have been made. Vanadium has been found as vanadate of lead.

The Parral Corporation, under the management of C. R. Henderson, is working the San Patricio mine, north of the Palmilla mine, in Parral district. H. H. Miller is superintendent.—Pedro Alvarado is equipping the Palmilla mine with electric Worthington turbine pumps—a six-stage turbine built in two sections, with a 100 H. P. motor between, throwing 500,000 gallons per day against a 600-foot lift, and two sinking pumps with a combined capacity of 500,000 gallons per day.—A. G. Urquhart is working the La Esmeralda mine, in Parral district, and has put in a steam hoist.

According to the Mining Journal, the following gives the relative importance

and exploitation of the mines in the district of Hidalgo: La Palmilla, owned by P. Alvarado, Parral; El Refugio, owned by F. A. Garcia, Parral; Quebradillas, owned by F. Stallforth, Parral; Los Muertos, owned by J. Almazan, Parral; Terrenates, owned by J. J. Long, Parral; La Presena y Anexas, owned by J. Almazan, Parral; La Sierra Madre, owned by J. Sandoval, Parral. On a small scale: Guadalupe, owned by V. Visconte, Jimenez; San Patricio, owned by F. Gomez, Parral; Las Cruces, owned by Hidalgo M. Co., Parral; La Esperanza, owned by P. Alvarado, Parral; San Juanico, owned by Hidalgo M. Co., Parral; Santa Ines, owned by J. M. Botello, Parral; La Union, owned by Parral M. Co., Parral; Mina del Agua, owned by Montezuma Lead Co., Santa Barbara; San Francisco del Oro, owned by Cia. San Francisco del Oro, Santa Barbara; Tecolotes, owned by Guggenheim Bros., Santa Barbara; El Toro y Anexas, owned by Cia. del Toro, Santa Barbara; San Jose y Anexas, owned by N. Pettit, Parral. The following refining plants have been regularly working: Patio of F. Stallforth, Lixiviation Two of Angel Garcia and Parral M. Co. The following are agencies for buying metals: The foundries of Monterey and Torreón, the Stallforth plant and five others.

The Mines Corporation, Ltd., is developing the Senorita mine in Victorino camp, 25 miles north of Chihuahua, under management of G. H. Arlett.

### Durango.

The State Government of Durango has contracted with the America-Mexico M. & Dev. Co. to build a smelter and reduction plant at San Lorenzo, on the Velardena branch of the Mexican International railroad. It is to be a 60-ton McDonald pyritic smelter, to be followed by a 100-ton furnace of the same kind.

### Guerrero.

(Special Correspondence).—In the La Union district, Americans are working the rich placers of the Rio Petatlan, 30 leagues from the port of Siuatanejo. Siuatanejo, Dec. 13.

### Mexico.

G. B. Burbank and G. S. Simons of New York are in Mexico, planning to utilize Malinaltenango Falls for power purposes. The falls are in the Tenancingo district of the State of Mexico, 45 miles southwest of City of Mexico. The volume of water is small, but it drops a distance of 2740 feet, and it is estimated that 25,000 H. P. can be generated. It is proposed to supply power to surrounding mining camps, and transmit it to City of Mexico for manufacturing purposes.

### Michoacan.

(Special Correspondence).—At the mines of the Carrizal G. M. Co., in the Ario district, a steam hoist is being installed at the main shaft. The second level of the main shaft has been connected with shaft No. 3. Sinking is in progress below the third level, the west face of which contains ore 4 feet in width, assaying \$20 per ton. A new grinding mill has been added to the milling plant. Owing to the copper in the ore, the cyanide tests have proved a failure. Over 80% of the values are saved on the plates by amalgamation. C. Briscoe is chemist.—The Columbia mine, east of Carrizal, owned by Hampson & Smith, has suspended work. It is a copper claim containing shipping values in gold and silver.—A big body of iron-copper ore has been struck between Ario and Morelia, near the Mexican National Railway. An assay of a hand-sample gave returns of 70% iron, 11% copper, 8 ounces silver and \$7 gold. It has been denounced by Ario-Carrizal parties.

Carrizal, Dec. 15.

### Sonora.

The annual report of the Greene Con. copper mines, Cananea, for year ending July 31, 1904, shows the production from the smelters to have been 27,507 tons of fine copper, 479,350 ounces of silver and 3752 ounces of gold, with a gross value of \$7,340,180. The total receipts for the year were:

27,414 tons of copper sold	\$5,901,584.75
7,555 tons of copper on hand	1,887,256.53
Value of silver produced and on hand	305,723.70
Value of gold produced and on hand	92,291.76
Profit on store, etc.	14,803.69

Total	\$9,501,660.43
Cost of operations	7,727,401.05

Net profit on operations for year \$1,774,259.38

Of the profit \$518,400 was paid in dividends. There were mined 489,352 tons of copper ore and 147,099 tons of lime, iron and fluxes; 262,466 tons of ore were smelted; 209,868 tons concentrated; 12,745 tons exported. The total cost of smelting and converting was \$3.19 per ton less for the last quarter of 1904 than the average for 1903.

The dredge of the Chicago & Sonora Gold Placer M. Co., on the Tecoripa river near Suagui Grande, is in operation.



Personal.

T. L. GREER of Chihuahua, Mexico, is in Peru.

F. H. NASH is manager of the Deer Lick mine at Spearfish, S. D.

T. C. WOODWORTH is putting in a 10-stamp custom mill at Goldfield, Nev.

G. S. JACKSON is manager of the Victoria G. M. & M. Co. at Deadwood, S. D.

J. CLEAVER is superintendent of the Libertad mine, near Toledo, Sonora, Mex.

O. K. FRANKLIN has returned to Nogales, Ariz., from a business trip to Chicago, Ill.

R. E. LINDER of You Bet, Nevada county, Cal., has been visiting Bellingham Bay, Wash.

R. H. BROWN is manager of the Yaqui Copper Co. mines at Suaqui de Batuc, Sonora, Mexico.

EMERSON GEE of Los Angeles, Cal., is in Sinaloa, Mex., and will return to Los Angeles Feb. 1, 1905.

S. B. SMITH is superintendent of the Mina Grande, near San Antonio de la Huerta, Sonora, Mex.

C. OLSEN is manager of the Pacific Concentrating M. & M. Co. at San Pedro, Santa Fe county, N. M.

J. U. JONES of Dallas, Texas, will hereafter represent the Allis-Chalmers Co. in Texas and its tributary territory.

WM. CAPP is manager of the Eagle Rock G. M. & R. Co. and the Siloam M. Co., Sugar Loaf, Boulder county, Colo.

E. O. DAUE has returned from the mines of La Leonesa M. Co. at Matagalpa, Nicaragua, C. A., and is stopping in Oakland, Cal.

H. J. RYAN of Cornell has been appointed head of the department of electrical engineering at Stanford University, California.

J. C. SMITH of San Francisco, Cal., has succeeded C. C. Leavitt as superintendent of the Monumental mine, at Monumental, Josephine county, Or.

W. L. WATTS has returned to Los Angeles, Cal., after spending several months investigating the mineral resources of south central Mexico.

SAMUEL J. HENDY, proprietor of the Joshua Hendy Machine Works, has returned to San Francisco, Cal., from an extended European tour.

R. L. EDWARDS, manager of the Burton mines at Ulysses, Lemhi county, Idaho, has been consulting with stockholders at Houghton, Mich.

J. M. PURRINGTON succeeds the late C. E. Elliott as San Francisco secretary of the Chollar, Potosi, Brunswick lode and other Comstock, Nev., mining companies.

H. SCHIFFLIN has been made assistant manager of the mining and crushing machinery department of the Allis-Chalmers Co., with headquarters in the New York Life Building, Chicago.

J. M. WILSON of Chihuahua, Mex., has resigned as manager of the Hearst interests in Mexico, to manage the mining interests of the Ryan Syndicate and the Morton Trust Co. of New York.

W. L. LOVELAND, the newly appointed head of the mining and crushing machinery department of the Allis-Chalmers Co., took up his duties October 18th at the main offices of the Allis-Chalmers Co., Chicago.

Commercial Paragraphs.

THE Pacific Construction Co. of San Francisco, Cal., have the contract for building the South Front St. bridge, Portland, Or., for \$58,000.

THE Pacific Hardware & Steel Co. of San Francisco, Cal., has bought the entire business of the Pacific Pump & Windmill Co., of the same city, and will hereafter handle all sales through its main office.

THE Springfield Boiler & Mfg. Co., Springfield, Ill., report the following installations: Twenty-eight 800 H. P. internally fired boilers for the Union Electric Light & Power Co., St. Louis; water jacketed smelters for the California & Arizona M. Co., Bisbee, Ariz.; four sets of water jacketed smelters for the Serro de Pasco M. Co., Brazil.

Books Received.

Upon studying the current engineering literature it is noticeable that the contributions often deal with difficult and unusual cases, ignoring the common details. These are undoubtedly suggestive and valuable to the practicing engineer, but he would also appreciate a detailed description of another man's solution of some problem that he meets in his own everyday practice. C. E. Fowler has brought together a concise statement of actual methods in "Ordinary Foundations." This was written with special reference to the needs of the bridge constructor, but contains much information that will aid in working in treacherous ground. After briefly tracing the historical development, the author minutely describes the construction and practice of various cofferdams, including crib dams, pile driving, sheet piles, metal construction, cylinders and caissons. The degree of success attained in their construction is indicated by the amount of pumping necessary to keep the interior dry. Methods and costs of pumping and dredging are fully discussed. All the elements entering into the choice and necessities of location and design for foundations are detailed, and he then advises as to what construction is best for different conditions. The materials of construction and typical specifications close the work. The subject is presented in a clear and able manner that will prove valuable to both the student and practicing engineer. It is published by John Wiley & Sons, 43-45 East 19th street, New York City, at \$3.50. It will be sent postpaid by the MINING AND SCIENTIFIC PRESS upon receipt of price.

Trade Treatises.

Friskie clutch pulleys form the subject of the story tersely told by the Eastern Machinery Co., New Haven, Conn., in their catalogue, which can be had for the asking.

"Bombas de Vapor" is the Spanish edition of a descriptive catalogue from the A. S. Cameron Steam Pump Works, foot of E. 23rd St., New York City, which is of much interest to all who use the Castilian tongue.

One of the neatest and handiest of the Christmas and New Year remembrances received is a handsome diary and reference book from the Vulcan Iron Works Co., Toledo, O., "chcock" full of up-to-date information.

Flour City gasoline engines, stationary and portable, are portrayed in a fine trade treatise received from the Kinnard-Haines Co., 44th Ave. North and Bryant Ave., Minneapolis, Minn., containing illustrated description and numerous testimonials of their successful operation.

The Word Bros. drill maker and sharpener, a labor-saving and money-saving machine, is finely described in a handsome booklet, issued by Word Bros., 24 First St., San Francisco, Cal. It will be sent anywhere on request and is worth seeing by any one who has anything to do with making or sharpening drills.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CANISTERS.—No. 778,065. Dec. 20, 1904. C. A. Norvell, Sacramento, Cal. This invention relates to an improved receptacle or container for teas, coffees, spices and the like. Its object is to provide a novel device of simple construction for use particularly as an advertising medium for grocers and others to be used by their customers exclusively or the buyers of their own particular wares or merchandise and which, when once filled by the vendor of the specific grade or quality of goods, it will be impossible of refilling by any one unauthorized by the vendor, the idea being, in other words, to furnish a vendee with an attractive container, which he is entitled to use so long as he purchases supplies from a particular vendor, but which can not be opened or refilled by the vendee or a competitor of the original vendor without the latter's consent.

STEM HOLDING AND CUTTING SHEARS.—No. 778,140. Dec. 20, 1904. Charles Paff, San Francisco, Cal. This invention consists in a stem cutting and holding device of fulcrumed handles and cutting members, a plate fixed to the inner line of one of said members and having a corrugated surface, said plate having an elastic extension substantially following the edge of the other cutting member and returning upon itself above the surface of said member, and a part against which the elastic portion acts to normally open the cutter. In order to hold the stem of a plant or flower against the cutting blade and prevent its slipping, one of the gripping surfaces may be roughened or corrugated.

Latest Market Reports.

SAN FRANCISCO, December 30, 1904.

METALS.

SILVER.—Per oz., Troy: London, 28½d (standard ounce, 925 fine); New York, bar silver, 61½c, refined (1000 fine); San Francisco, 61½c; Mexican dollars, 52c San Francisco, 48½c New York.

It is reported that there is a shortage of silver bullion in the United States mints, and silver is slowly advancing. December 1 it was 59½c, since which time it has advanced to the present quotation of 61½c. The advance is not large, but it is substantial, and in most instances means an increase in clear profit to the producer.

COPPER.—New York: Standard, \$15.12½; Lake, 1 to 3 casks, \$15.12½@15.25; Electrolytic, 1 to 3 casks, \$15.25; Casting, 1 to 3 casks, \$14.85; San Francisco: \$16.00. Mill copper plates, \$17.00; bars, 18@24c. London: £67 15s spot per ton.

Copper remains firm and is at a somewhat higher price than last week, the advance in the various grades being from 12½c to 25c, justifying the conclusions previously published herein. Copper at \$15.25 is very gratifying to the producers of that metal, and will have the effect of stimulating new equipment with increased production wherever possible.

LEAD.—New York, \$4.70; Salt Lake City, \$3.50; St. Louis, \$4.12½; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½; pig, \$4.85. London: £12 15s long ton.

SPELTER.—New York, \$6.00; St. Louis, \$6.12½; London, £24 17s 6d long ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

The price for zinc has advanced materially the past month—from \$5.87½ in New York to over \$6—which, in consideration of the former price, is a substantial advance.

TIN.—New York, pig, \$29.35 @ 29.50; San Francisco, ton lots, 29c; 500 lbs., 29½c; 200 lbs., 30c; less, 31c; bar tin, 32½@35c. London, £134 10s spot.

PLATINUM.—San Francisco, crude, \$18.50 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 82c per gram.

QUICKSILVER.—New York, \$40.00 @ 41.00, large lots; London, £7 15s San Francisco, local, \$39.00 per flask of 75 lbs.; Denver, \$45.00.

BABBIT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 19.50c; San Francisco, Plumbers', 100 lb. lots, 16.25c.

ZINC.—Metallic, chemically pure, 3½ lb., 50c; dust, 3½ lb., 10c; sulphate, 3½ lb., .04c.

NICKEL.—New York, 40@47c per lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 31@34c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$16.35 @ 16.60; gray forge, \$15.85; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$21.00; open hearth billets, \$21.00; San Francisco, bar, 7c to 12c per lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ¾c per lb. above keg price; in 1 and 5-lb. tin cans, 100 lbs. per case, ¾c. per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

LUMBER.—(Retail): Pine, ordinary sizes, \$24.00@25.00; extra sizes higher; redwood, \$28.00@30.00; lath, 4 feet, \$4.50 @ 5.00; pickets, \$21.00; shingles, \$2.50 for No. 1 and \$2.25 for No. 2; shakes, \$13.50 for split and \$15.00 for sawed; rustic, \$28.00 @ 35.00.

NAILS.—This week the basic prices are: Wire, \$2.77; Cut, \$3.25. Meanwhile the nominal quotations per keg (list prices) are: No. 20d to 60d, Wire, \$3.35; Cut, \$3.55; 10d to 16d, Wire, \$3.45; Cut, \$3.35; 8d Wire, \$3.50; Cut, \$3.50; 6d and 7d, Wire, \$3.60; Cut, \$3.60; 4 and 5d, Wire, \$3.70; Cut, \$3.70; 3d, Wire, \$3.85; Cut, \$3.85; 2d, Wire, \$4.10; Cut, \$4.10. Special rates for carload lots.

LIME.—Santa Cruz, \$1.25 country, \$1.25 city per bbl.

CEMENT.—Imported, \$2.15@2.65 per bbl.; California carload lots, \$2.10 f. o. b. at works; small lots, \$2.40 per bbl. in sacks, 4 sacks to bbl., 10c for each sack returned.

GENERAL SUPPLIES.

ANTIMONY.—New York, Cookson's, 7c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lb., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less

than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2.00 per keg.

CAPS.—3x, \$5.50@6 per 1000; 4x, \$6.50 @ 7; 5x, \$8@8.50; Lion, \$9@9.50, in lots not less than 1000.

FUSE.—Triple tape, \$4.00 per 1000 feet, double tape, \$3.50; single tape, \$3.10; Hemp, \$2.75; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c per set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.; carloads, 23@23½c; in tins, 30c; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb.; Cal. s. soda, bbls., \$1.10@1.20 per 100 lbs.; sks., 90c@1.00; chlorate of potash, 12@13c; nitrate of potash, 6½@7c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2½@2½c; flour sulphur, French, 2½@—c; alum, \$2.00@2.25; California refined, 1½@2c; sulphide of iron, 8c per lb.; copper sulphate, 5½@5½c; chloride of lime, spot, \$2.50@2.75; sulphuric acid, in carboys, 66% B, 1½@2c per lb.; nitric acid, carboys, 8c per lb.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.00; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8.00; Cumberland, \$13.00; Cannel, \$8.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13.00 in sacks; Sunnyside, \$8.50, long ton.

OILS.—Linseed, boiled, bbl., 55c; cs., 60c; raw, bbl., 53c; cs., 54c; Lucol oil boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 19½c; Astral, 19½c; Star, 19½c; Extra Star, 24c; Eocene, 23c; Elaine, 26c; Water White, in bulk, 13c; Mineral Seal, iron bbls., 18c; wooden bbls., 20½c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22½c; 86° Gasoline, bulk, 25c; do., cs., 31c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 75c; cs., 80c; Neats-foot Oil, pure, bbl., 63c; cs., 78c; Sperm, crude, 63@68c; Natural White, 63c; Bleached, do., 57c; Whale Oil, cs., 52@57c.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

BORAX.—Concentrated, 6@7c per lb.; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

BONE ASH.—Extra No. 1, 5@6c per lb., No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, 7½c; less than 500 lbs., 7½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

MOLYBDENUM.—Best, \$2.75 per lb.

CHROMIUM.—90% and over, per lb., 80c.

PHOSPHORUS.—American, per lb., 70c.

SILVER.—Chloride, per oz., 90c@1.00; nitrate, 55c.

MAGNESIUM.—Pure, N. Y., 60c.

MANGANESE.—per lb., \$2.75.

SODIUM.—Metal, per lb., 50c.

BISMUTH.—Subnitrate, per lb., \$2.10.

URANIUM.—Oxide, per lb., \$3.50.

MERCURY.—Bichloride, per lb., 77c.

FIRE BRICK.—Domestic, carloads per 1000, f. o. b., factory square, \$25.00; soap and split, \$22.50; arch and wedge, \$27.50; skewback, \$30.00; circle, \$32.00.

FIRE CLAY.—Domestic, per ton 2000 lbs. in 125-lb. bags, double, and dry ground, f. o. b., factory, \$8.50.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING DECEMBER 20, 1904.

777,769.—BOTTLE CASE.—R. Baermann, Anaheim, Cal.

777,770.—DRAFTING INSTRUMENT.—P. Barnes, Seattle, Wash.

778,165.—BOILER FIREBOX.—W. N. Best, Los Angeles, Cal.

777,718.—DEMILJOHN.—W. E. Brown, Los Angeles, Cal.

778,124.—VEHICLE BRAKE.—W. M. Flewelling, Santa Rosa, Cal.

777,851.—ELECTRIC BATTERY.—W. H. Gregory, Vallejo, Cal.

778,190.—CAR STEP.—J. A. Halbrook, Bridgeport, Wash.

777,728.—FURNACE.—J. H. Haskins, San Diego, Cal.

777,789.—FURNACE.—E. W. Jackson, Sausalito, Cal.

777,903.—HOIST.—J. J. Jordan, Tonopah, Nev.

778,065.—CANISTER.—C. A. Norvell, Sacramento, Cal.

778,140.—STEM HOLDING SHEARS.—C. Paff, S. F.

778,066.—SEWING AWL.—A. M. Parker, Los Angeles, Cal.

777,803.—GOLD SEPARATOR.—T. Pollock, Santa Barbara, Cal.

777,815.—CARPET FASTENER.—C. R. Shaffer, Eureka, Cal.

777,815.—CAN.—G. H. Stewart, Los Angeles, Cal.

777,982.—TOY.—M. L. Wicks, Jr., Los Angeles, Ca



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